

OUR COMMON FUTURE IN URBAN MORPHOLOGY (Vol 2)

ISUF

Editors

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ISBN: 978-972-99101-6-6

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Cover Design by Cláudia Monteiro

The present volume contains the full papers presented at the 21st International Seminar on Urban Form, held in Porto, from 3 to 6 July, 2014. Authors alone are responsible for options expressed in the book.

Cite as: Oliveira V, Pinho P, Batista L, Patatas T and Monteiro C (eds.) (2014) *Our common future in Urban Morphology*, FEUP, Porto.

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Preface

This year the International Seminar on Urban Form (ISUF) celebrates its twentieth birthday. Over the last two decades, the ISUF annual conferences and the journal *Urban Morphology* have steadily established as the main references of morphological debate worldwide.

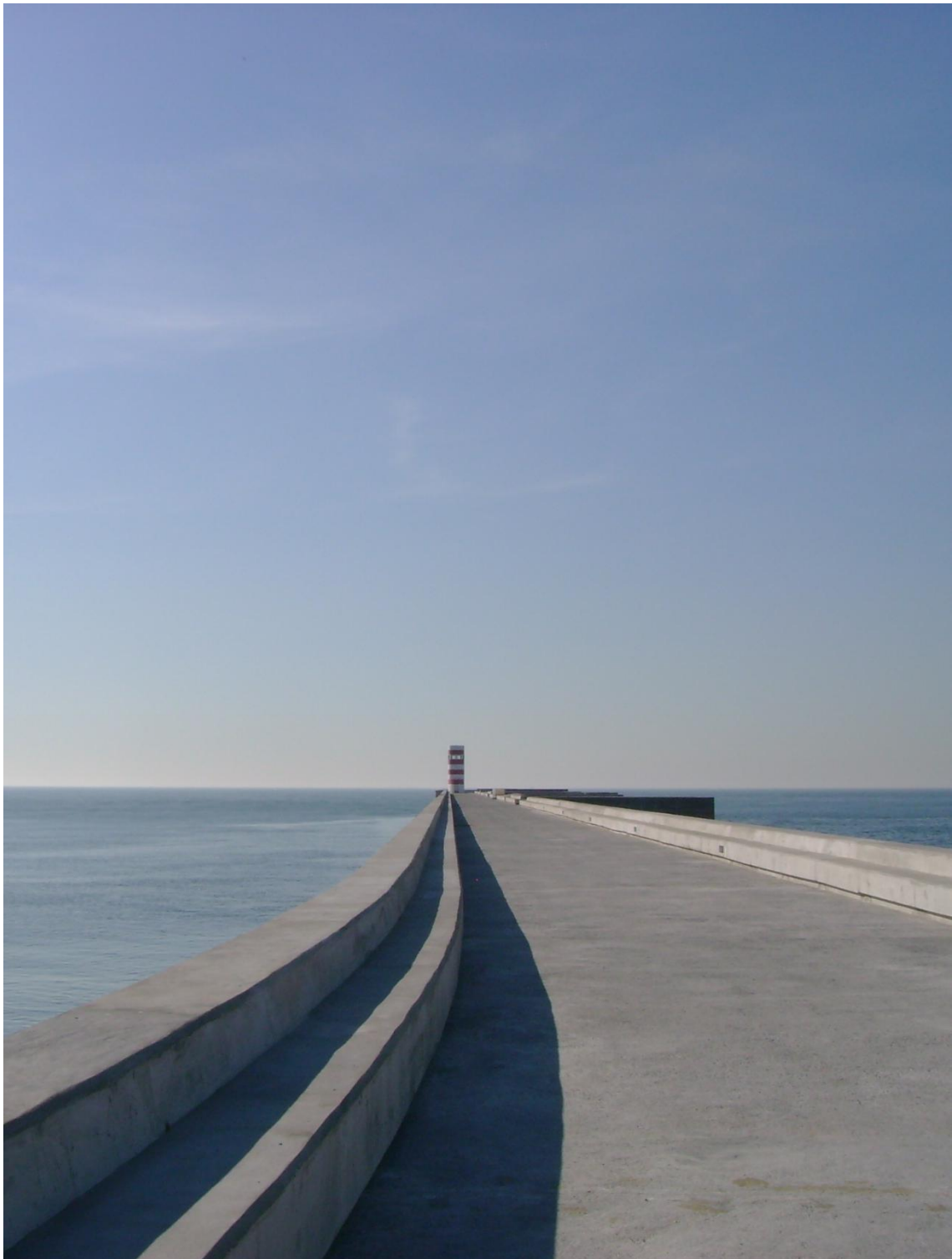
The development of ISUF included the formation of affiliated networks. The Portuguese Network of Urban Morphology (PNUM) was established in 2010 at the Hamburg conference. In June 2011 the PNUM launched its annual conference and in December 2013 it published the first issue of the *Revista de Morfologia Urbana*. Against this dynamic background, and for the first time in two decades of history, the ISUF annual conference takes place in Portugal.

‘Our common future in urban morphology’ has a record number of presentations. Almost 400 presentations are included in the conference programme comprising four plenary sessions and 80 parallel sessions. This book, composed of two volumes, follows the structure of the conference. Volume 1 gathers the abstracts of all communications included in the conference programme. Volume 2 includes the full papers submitted to the conference.

The plenary sessions of ISUF2014 include an overview of the urban form and structure of Porto; a debate on different approaches in the study of urban form (the German morphogenetic approach, the Conzenian school, the Muratorian school and space syntax); the description of a repository of urban tissue; and, finally, the presentation of recent work developed by the ‘ISUF Task Force on Research and Practice in Urban Morphology’, particularly of four case studies of application of morphological concepts and methods in professional practice and of the ‘Porto Charter’ including ISUF’s fundamental principles.

The 80 parallel sessions are structured around ten fundamental themes (including also five special sessions): urban morphological theory; urban morphological methods and techniques; the evolution of urban form, agents of change; revisiting urban morphological classics; teaching urban form; comparative studies of urban form; multidisciplinary in urban morphology; integrated approaches; and, finally, the relations between research and practice. The debate of these themes should help us to understand what should be our main contribution as urban morphologists, how it could be part of wider integrated research on cities, and how this could be applied into day-to-day practice.

Vítor Oliveira
Paulo Pinho



The Porto Charter

ISUF seeks:

To promote urban morphology as the study of the physical form of cities.

- a. To demonstrate the relevance of urban morphology at all scales, from the individual building to the metropolitan region.
- b. To facilitate the international dissemination of urban morphological knowledge, techniques and experience.
- c. To promote recognition of the cultural and environmental significance of urban form and the importance of its contribution to social and economic well-being.
- d. To stimulate the interaction of intellectual enquiry and practical activity in endeavours concerned with urban form.
- e. To facilitate communication across the range of professions, disciplines, intellectual traditions, and communities of interest concerned with urban form.
- f. To foster comparative studies and assess the impacts of the transfer of concepts and experience in different environments and societies.
- g. To promote and facilitate the study of urban form in the training of built environment professionals.



Urban Morphological Methods and Techniques

The identity of any field of study or discipline is inextricably bound up not only with what the discipline does but the way it does it. We are defined, in part, by our methods not least because methods to a large extent fall out as a logical consequence of the subject matter. At the same time, our methods are a reflection of where we want to go with the subject and what we want it to become. But what happens when the field is multi-disciplinary and the subject as multi-faceted as the city? What happens when 'we' are architects, archaeologists, anthropologists, geographers and historians? The multiplicity of methods potentially becomes a liability rather than an asset. The step back out of this corner is the recognition that urban morphology is, in part, a meta-discipline, a fact that goes back to the inception of the field. Goethe in his preliminary notes on morphology set out the following sequence of thoughts. "Characterization and limitation of the field in which we are working; i) phenomenon of organic structure; ii) phenomenon of the simplest structure which appears to be a mere aggregation of parts but often explainable just as well through evolution and epigenesis; iii) necessity of considering all expository methods together, not to thoroughly explore a thing and its nature, but to give at least some description of the phenomenon, and to impart to others what has been perceived and seen (Goethe 1952, p85). The last note provides the perspective that gets us out of the corner. The multiplicity of methods becomes an asset when we see that one of the roles of morphology is to coordinate the findings of other disciplines around the unifying aspect of *form* (Wilkinson 1962). This is not to say we don't have 'in-house' methods, far from it. It is to say that the coordinating framework is part of morphological method. So, whether the primary investigation is in-house or not, part of what we need to do is to *situate* the results within the framework. To make the most of the information we need to see where it sits within to the body of accumulating knowledge and how it is related to the other parts.

Karl Kropf

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Urban morphological elements studies: for describing generated urban form

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Abstract. *Urban morphology represents entire city areas or built environment consisting of two parts: generated form and planned form, in terms of their growing processes and morphological characteristics. In classic urban morphological theories three morphological elements, such as streets/blocks, plots and buildings have perfectly defined urban physical form. However, these elements are constituted as the top-down hierarchical mechanisms, which could not fully express morphological feature of generated form. Following previous morphological studies, it is worthwhile to further examine these uncertain conditions. To clarify the relevance of morphological elements and characteristics of two forms, four cases including both generated form and planned form were chosen from the same area: southern Jiangsu province. Based on morphological analysis a comparative study was made among those cases. This paper will present that typo-morphological studies could differentiate varieties of morphological elements and define their correlations with the type of tissues. The results could be transformed as design methods in urban design practice.*

Key Words: Settlement pattern, typo-morphology, morphological element, generating process

Introduction

Recently, the big challenge in front of architects and urban designers is how to deal with the problem of the built environment, which leads to urban studies gained popularity among architects and urban designers in recent years, dealing with land use, place making, site analysis and descriptions of physical feature. Since urban design practice has to consider various factors such as developers' requirements, city governors and public users, so that studies have to be done from different aspects and angles, six dimensions were shown by Carmona and Tiesdell (2007). A plenty literature made for constituting urban theories through years, the value of urban design has been demonstrated, however, what is the core of urban design theories remains unclear. Cuthbert argued 'that mainstream urban design in fact collapsed around its own limitations and it now in need of a paradigm shift towards a deeper theoretical engagement with the world' (Cuthbert 2007); while Marshall proposed that 'urban design to take a freshly critical look at itself from a scientific perspective', which 'is the need not just for 'more and better science', but more specifically, more systematic verification and critical assimilation of scientific knowledge within urban design theory' (Marshall 2012). Taking these views, urban study has been held to correspond to the knowledge of generating urban form and thus to be susceptible to description by urban morphology.

On the other hand, more urban studies from urban morphologists, their works focus on the tangible results of social and economic forces and analyze urban evolution its formative years to its subsequent transformations, identifying and dissecting its various components (Moudon, 1997). The work of Conzen, Caniggia and Kropf has been particularly relevant, that knowledge system of urban form is being constructed by normative scientific researches by involving a reduced set of physical elements to describe and explain the city in morphological terms: the streets, the plots and the buildings. Joined by geographers, architects, planners and sociologists, Urban Morphology constitutes an interdisciplinary platform, which is more appropriate for variety disciplines with a broad discourse (Ley, 2012). Recently, one of the most significant topics based upon urban morphological platform is trying to bridge the gap between urban

morphology and urban design or planning practices, that will help to make up the lack of urban design theories.

As tangible form, two specific terms are particularly important for urban design, which are urban tissue (Moudon, 1996) and typomorphology (Moudon, 1994, Kropf, 1996, 2006, Samuels, 2008). In Caniggia's term the urban tissue is a structure of element or association of buildings, which has been further developed by Kropf proposed three useful conceptual tools: the outline, the desired spatial scale and the degree of particularity used (Hall, 1997). As a physical entity, urban tissue is not only identifiable object for urban morphological research, but also understood as objects by urban design. Typo-morphological studies have been used as a design tool throughout architectural history, the work done by Krier brothers and Aldo Rossi shows quite fruitful, particularly in the sense of type of urban fabric, buildings and open spaces, as well as with socioeconomic processes. Typo-morphological studies use building types to describe the physical form of cities and the process of accumulating of human habitats, which is useful in understanding the three dimensional structure of the city and its underlying formation process. As Moudon (1994: 290) states, "typo-morphology offers a working definition of space and building type, and serves as a rich launching ground for studying the nature of building design, its relationship to the city, and to the society in which it takes place. Therefore, typo-morphological studies are not only good for analysis of existing cities, but also build the theoretical base for urban design practice, since it has influenced certain strands of thought in urban planning and design through urban geography and urban morphology during the European urban development (Carmona et al., 2006: 219).

The most typomorphological studies have done within the circle of morphologist seldom appearing in urban designer. Marshall (2011) have set very clear division between urban morphology and design: "separate hemispheres of the brain", he suggested that urban morphological analysis should be tailored more towards the kinds of abstraction that are most useful for designers to use in practice, from designer's view such abstraction is "Type". In design field, normally typology can be seen as methodology guiding problem solving, since each type is tied closely to a class of problems in the reality, thereby, if connecting typomorphology to urban design practice or forming urban design theory, it has to have attribute of designing not only research. Therefore, this paper tried to follow the term of urban tissue and typomorphology and analyze them systematically from urban design perspective.

Four cases are selected in the same area, in order to have the same properties in land features, geomorphology, economic conditions and cultural features, but different in urban morphological structures. The purpose of selection is to focus on analyzing the relation between morphological elements (building-parcel-block-district-territory) and typomorphology. Base upon examining morphological elements this article try to answer what are different between those types? Why they are different, the forming process is interested for designer.

Settlement pattern and morphological elements

Tangshu, Jin, Jincunyu and Huyuan are four residential communities in Southern Jiangsu Province (Figure 1) which cluster farmers. They belong to one of China's best farming areas, which has a sunny, warm and humid climate. The blessed water resources offer convenient conditions for agriculture irrigation and transportation. Jin has existed for over 1700 years, with many ponds crisscrossing, while the more than 1500-year-old Tangshu maintains a traditional structure of centralized farmlands surrounding by ponds. In terms of sites for houses, the farmers follow the settlements' characteristics of being intimate with rivers, building houses along the rivers, and keeping the houses facing south. Their courtyards are mostly embellished by green lands for good ventilation and sunshine, convenient water resource and pleasant scenery. Different from the traditional layout of villages, Jincunyu and Huyuan have a pattern

similar to the urban areas, with convenient communications. They have been newly-established in recent years due to market causes.



Figure 1. Four selected cases are located in southern Jiangsu Province in China (source: Google Earth).

The four communities have similar conditions of the waterside settlements and they adopt production modes equally emphasizing agriculture and sidelines, with hardly any families not farming. Jin operates handicraft as its sideline, while Tangshu engages in fishing due to its geographical features. Although Jincunyuan and Huyan are separated from the old villages, their residents still keep the occupation of farming. Most of them travel back and forth between their cultivated lands and dwelling places every day. Tangshu, Jin and Huyan have similar sizes between 10-12 hectares (respectively containing 181, 201 and 242 families), while Jincunyuan is a little larger than the former three, about 15 hectares (containing 366 families). According to the local policies, every family shall be allocated the curtilage (including the house and the vacant land in front of or at the back of the house) based on the per capita cultivated area. With the accelerating urbanization in recent years, township industry has emerged and developed quickly, which is gradually changing the farmers' employment structure. The traditional settlements are starting to be removed and merged into new farmers' communities like Jincunyuan and Huyan. Some residents are replacing the original curtilages with houses in the new communities. However, the policies and standards for curtilage approval remain unchanged.

The same region and living habits, similar scales, production modes as well as specific history and regulations generate different settlement patterns: grid pattern or cluster pattern. In the following text, we will analyze and compare the four cases from a designer's point of view with indicator, plan issue and spatial characteristics, and explore and interpret the relationship between the morphological elements and typomorphology.

Planning indicator

This section intends to identify the relationships between different settlement patterns and morphological standards (density, height and floor area ratio). The denotations of the indicators are directly influenced by the calculated areas as the two traditional communities have a loose planar structure while the new ones are compact. It should be noted that the traditional communities are defined by unclear boundaries, depending on the natural conditions such as the curb stones, borders of the green lands and water revetments. Therefore, the indicator calculated accordingly is just a general concept which indicates the relationships between buildings or between a building and other open spaces (including roads, green lands, squares and water

bodies). However, equal to the urban plots, the morphology standard for the curtilages in the selected cases can better define the figure-ground relationship of such specific private sectors. As a result, the sum of the curtilage plots is regarded as an indicator different from the dwelling area.

Plot density

The plot density is only discussed in terms of the dwelling area. In the traditional settlement pattern, the cultivated lands interweave with the village dwellings and consequentially enlarge the village. However, the new farmer communities are essentially same as the urban communities, excluding the agricultural lands and only supporting the dwelling function. Therefore, the coverage rate of the curtilage plots is noticeably increased.

Floor Space Index(FSI)

The plot density only shows that the mode of land use varies with the settlement pattern. The floor area ratio linking up with the building volume seems more relevant to fabric form of the settlement pattern. In terms of the dwelling area, the new communities have floor area ratio are nearly twice as large as those of the traditional communities. However, the equal floor area ratios do not generate the same form. Although Tangshu and Jin have the equal floor area ratios of 0.36, their form characteristics are still different.

Coverage Space Index (CSI)

"The acknowledgement of a city is related to a certain building density and a sufficient construction area," (Salat,2011) same as the dwelling community. In terms of the plot indicators, the curtilage approval measures regulate that, the housing area shall not exceed 70% of the curtilage area. The new communities comply with the regulation on building density while keeping the value above 60%. However, the traditional communities have building densities only about 50%, generating a figure-ground relationship of 1:1 with the vacant land in front of or at the back of the house.

Building height (L)

The relationship between the building height and the street width influence the spatial form of the dwelling area(Figure3). Almost all buildings in the new communities are two-story and even three-story, with an average height not less than 2. Although most of the farmhouses in the traditional communities have transformed from tile roofed houses to buildings, there are still many one-story houses, pulling down the average building height to around 1.6.

Open space ratio (OSR)

Intrinsic relationship between the interweaving private sector and open space on the curtilage compose the spatial characteristic elements of the farmers' settlement pattern. The new communities have a single nature of land use and greatly reduced open space, only half of that of the traditional communities. Tangshu and Jin contain dwelling plots and cultivated lands, green lands and ponds besides, making full use of lands of all natures and enlarging the open spaces.

1. TANGSHU



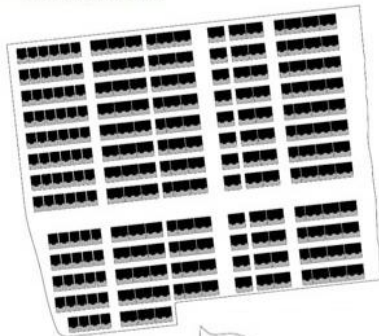
PLOT		DWELLING	
Area	39325	Area	105757
FSI	0.93	Gross Area	37888
CSI	55.4%	FSI	0.36
OSR	44.6%	GSI	21.5%
		Plot Density	39.3%
Plot/per	217.3	Street Density	7.7%
Coverage/per	120.3	Green Density	29.0%
Yard/per	97.0	Water Density	6.9%
		Square Density	13.4%
		Wasteland Density	3.7%
		OSR	0.50
		L	1.67

2. JIN



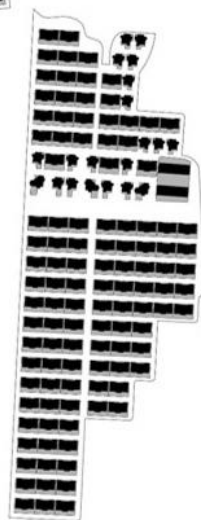
PLOT		DWELLING	
Area	37468	Area	118343
FSI	0.88	Gross Area	43077
CSI	53.1%	FSI	0.36
OSR	46.9%	GSI	23.3%
		Plot Density	45.4%
Plot/per	186.4	Street Density	11.8%
Coverage/per	98.9	Green Density	29.4%
Yard/per	87.5	Water Density	7.3%
		Square Density	5.3%
		Wasteland Density	0.8%
		OSR	0.61
		L	1.56

3. JINCUNYUAN



PLOT		DWELLING	
Area	76051	Area	157413
FSI	1.34	Gross Area	101746
CSI	66.8%	FSI	0.65
OSR	33.2%	GSI	32.3%
		Plot Density	48.3%
Plot/per	207.8	Street Density	26.3%
Coverage/per	138.8	Green Density	25.4%
Yard/per	69.0	OSR	0.25
		L	2.00

4. HUYAN



PLOT		DWELLING	
Area	57260	Area	104951
FSI	1.26	Gross Area	73994
CSI	61.4%	FSI	0.71
OSR	38.6%	DWELLING GSI	34.4%
		Plot Density	56.6%
Plot/per	236.6	Street Density	22.3%
Coverage/per	145.2	Green Density	21.1%
Yard/per	91.4	OSR	0.32
		L	2.05

Figure 2. Planning indicators with two variables: plot area and dwelling area.
(1) Tangshu; (2) Jin; (3) Jincunyuan; (4) Huyan.



Figure 3. Main Streets in cases, 2014. Photograph by the author.

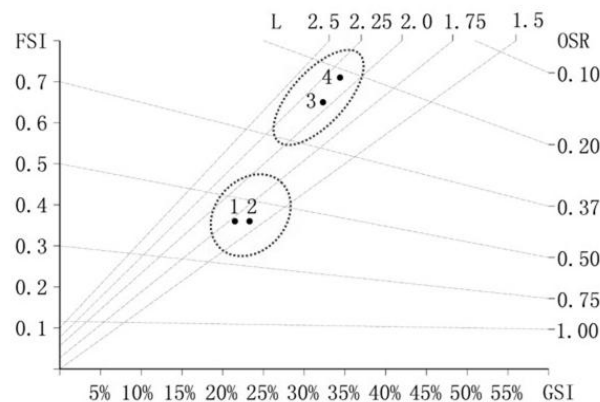


Figure 4. Four examples in the Spacemate: (1)Tangshu; (2)Jin; (3)Jincunyun; (4)Huyan.

Results

With Meta Berghauser Pont and Per Haupt's method(Pont, Haupt, 2005), summarize the four indicators (FSI, CSI, L, OCR) that more directly influence the forms of the selected cases(Figure4). The morphological standards vary with the settlement patterns. The planning indicators of new and traditional communities respectively occupy an area in the coordinate system, which explains the communities' morphological difference in a certain extent. However, the planning indicators cannot determine the forms of the patterns, and the settlements in one group with the similar indicators display some different characteristics (to be discussed in detail in the next section). In addition, the construction phases, architectural modes and spatial arrangement can influence the generation of a unique and distinctive morphological system, but the indicators cannot.

Characteristics of plot and building

Starting from the cases' basic forms and in terms of plan issue and spatial characteristic, this section will, based on the patterns' status quo, outline their morphological characteristics, tease out their morphological elements and identify the differences between the morphological types by comparing and analyzing the elements, so that some elements could be gained for typomorphology design.

Subdivision of plots

Overall planning for Jincunyun and Huyan is initially divided into plots by roads, and then the plots are subdivided to curtilages with equal areas. Each curtilage has a side-way in front of and

at the back of it, and all curtilage have their own concession roads of the equal length. In the old Tangshu and Jin, the division of most of the plots has no relationship with the road system, because the curtilages are approved only based on quantitative indicators and the farmers could select the position at will. Additionally, the houses are not built in the same time, and some plots has no relationship with surrounding curtilages; therefore, the communities' layouts are relatively disorderly. (Figure 5, Table 1)

Plots and buildings

In the selected cases, most of the curtilages have houses in the north and yards in the south, which ensures the houses keep a certain distance from neighbors on the south side and get good ventilation and sunshine. Otherwise, Tangshu and Jin create diverse relationships between plots and buildings. The houses and side-located auxiliary room enclosing the yard to form an "L" shape can commonly be found. (Figure 6, Table 2)

Arrangement of buildings

The traditional communities seldom juxtaposed over three buildings. If needed, the buildings would be staggered or keep a certain distance from each other for passing through. The new communities are prone to follow the building code and save the cost of excessive road, thus the buildings are arranged as the military camp, with over 4 buildings in a row, even up to 10, except those in some corners. (Figure 7, Table 3)

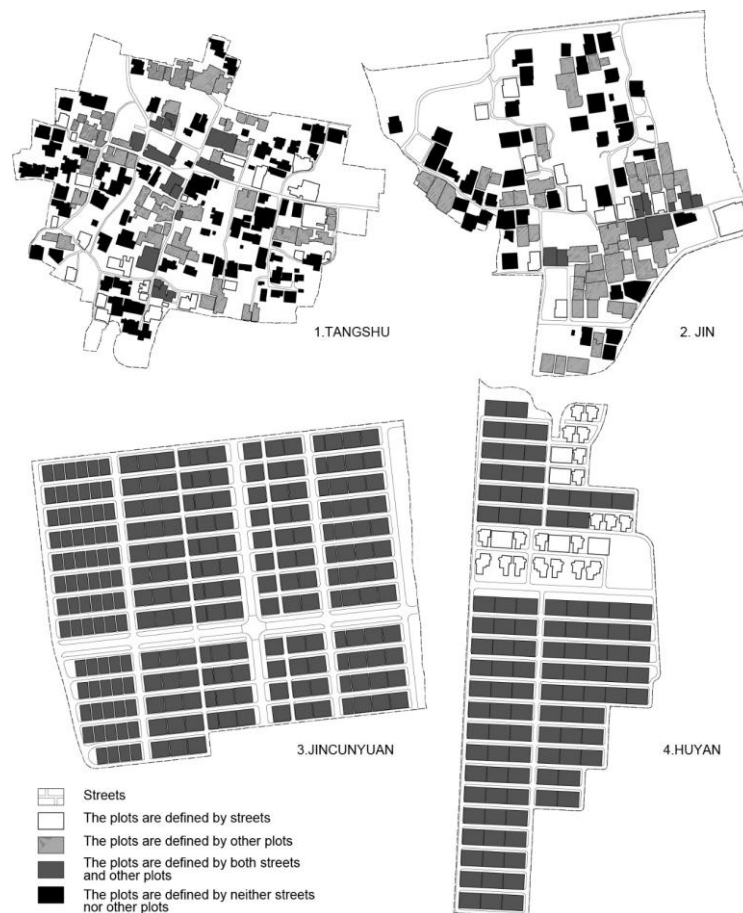


Figure 5. The relations between plots and the streets system or other plots, based on authors' field survey.

Table 1. Subdivision of plots.

	Numbers of plots	Defined streets	by	Defined other plots	by	Defined streets&plots	by	Defined nothing	by
1.TANGSHU	162	22		49		13		78	
2.JIN	117	11		52		9		45	
3.JINCUNYUAN	231	0		0		231		0	
4.HUYAN	131	23		0		108		0	

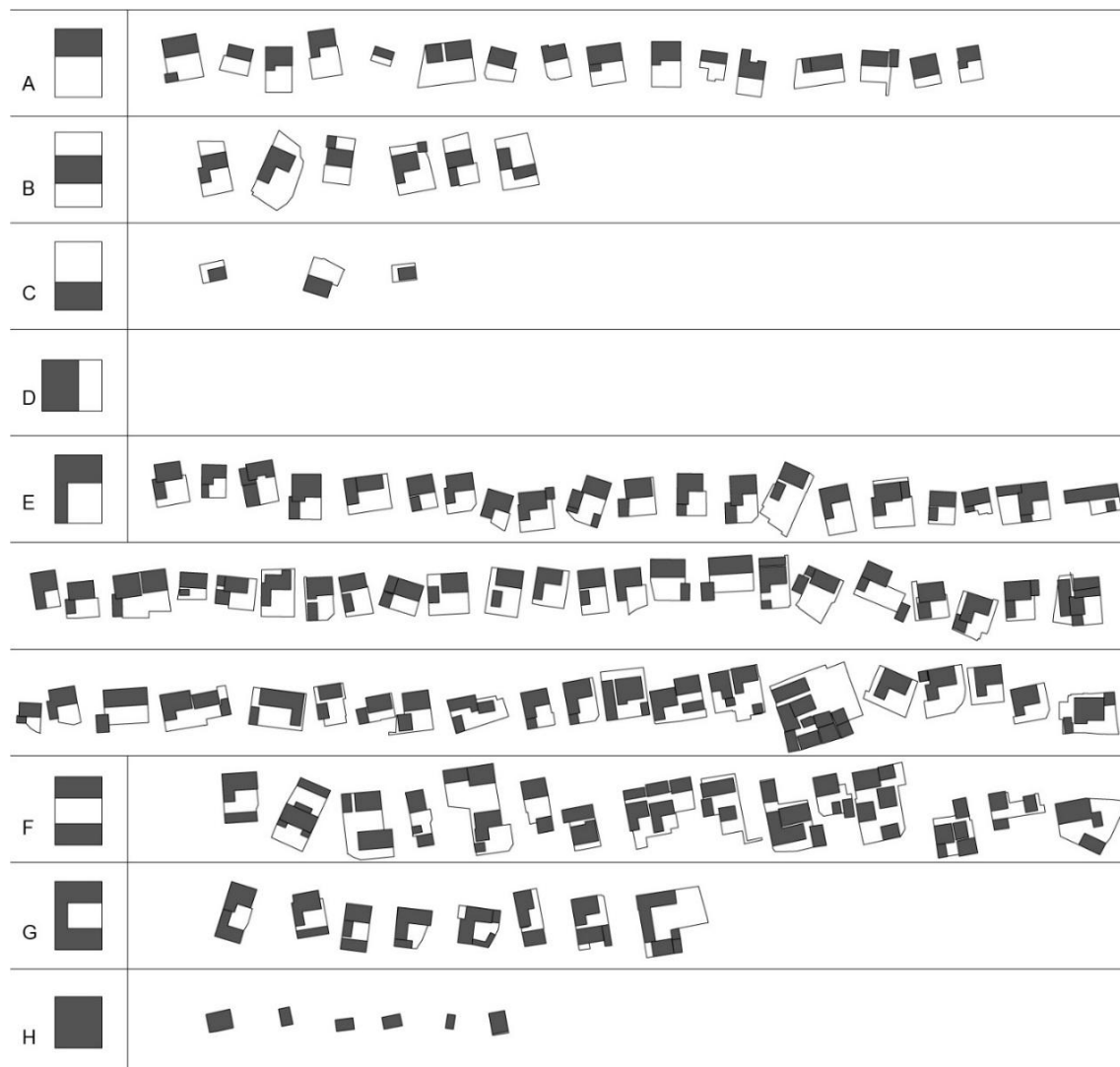


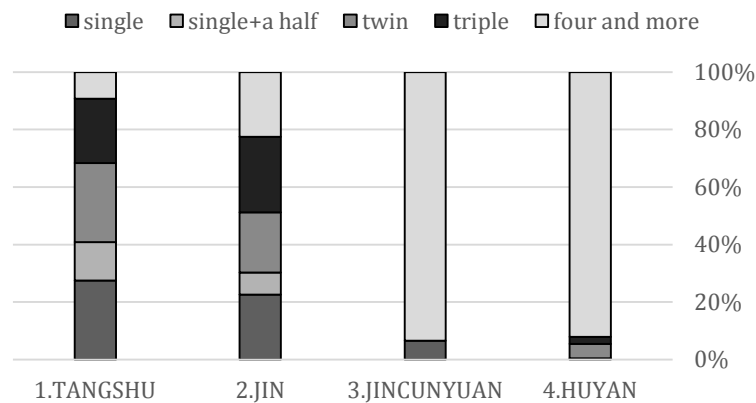
Figure 6. The relations between plots and buildings in JIN.A.Farmhouses sitting in the north and facing the south.B. Farmhouses sitting in the center of the plots.C. Farmhouses sitting in the south.D. Farmhouses sitting in the east or west with a side yard.E.L-shaped farmhouses facing the yards.F.Yards surrounded by houses from the south and the north sides.G. U-shaped farmhouses facing the yards.H.Farmhouses without yards.

Table 2. Types of relations between plots and buildings.

	1.TANGSHU	2.JIN	3.JINCUNYUAN	4.HUYAN
Numbers of plots	162	117	231	131
TYPE A	98	16	231	131
TYPE B	7	6	0	0
TYPE C	0	3	0	0
TYPE D	4	0	0	0
TYPE E	16	63	0	0
TYPE F	12	15	0	0
TYPE G	0	9	0	0
TYPE H	25	5	0	0

Table 3. Arrangement of buildings (Numbers of buildings in rows).

	1.TANGSHU	2.JIN	3.JINCUNYUAN	4.HUYAN
Single	74	67	0	1
Single and a half	36	23	0	0
Twin	74	62	24	12
Triple	60	78	0	6
Four and more	25	67	342	223

**Figure 7. Proportion of building arrangement.**

Distance of buildings

Analysis on the sample of the pattern profile shows that the traditional communities are almost entirely for dwelling, and have fewer public open spaces because major public events are held in cities or towns. The families are of similar demographic structures and economic conditions, so that there are few differences in the boundary and volume of the house. The distances between the buildings usually are suitable and unfixed, depending on the vacant lands and green lands between the curtilages. The new communities no longer consider the feasibility for farming. As a result, the distances are uniform, with an average value slightly higher than that of the traditional communities. (Figure 8)

Road crossing

The amplitude of space change is directly reflected by the diversity of the road crossings in the community. Twists and dislocation of the road crossings diversify the landscape. The new communities have much more road crossings; however, the forms of the road crossings are less diverse. Almost all of them are orthogonal. (Figure 9, 10, 11)

Street space

In traditional communities, the houses are built along the rivers and orientated according to the river direction. Then lanes generated between the buildings. Both the house orientation and courtyard wall direction are generally not parallel with the streets and lanes, and accordingly create the unique spatial characteristics. Without designing the building orientation based on the river direction, the centralized-built new communities lose the spatial and morphological characteristics of the traditional ones. (Figure 12)

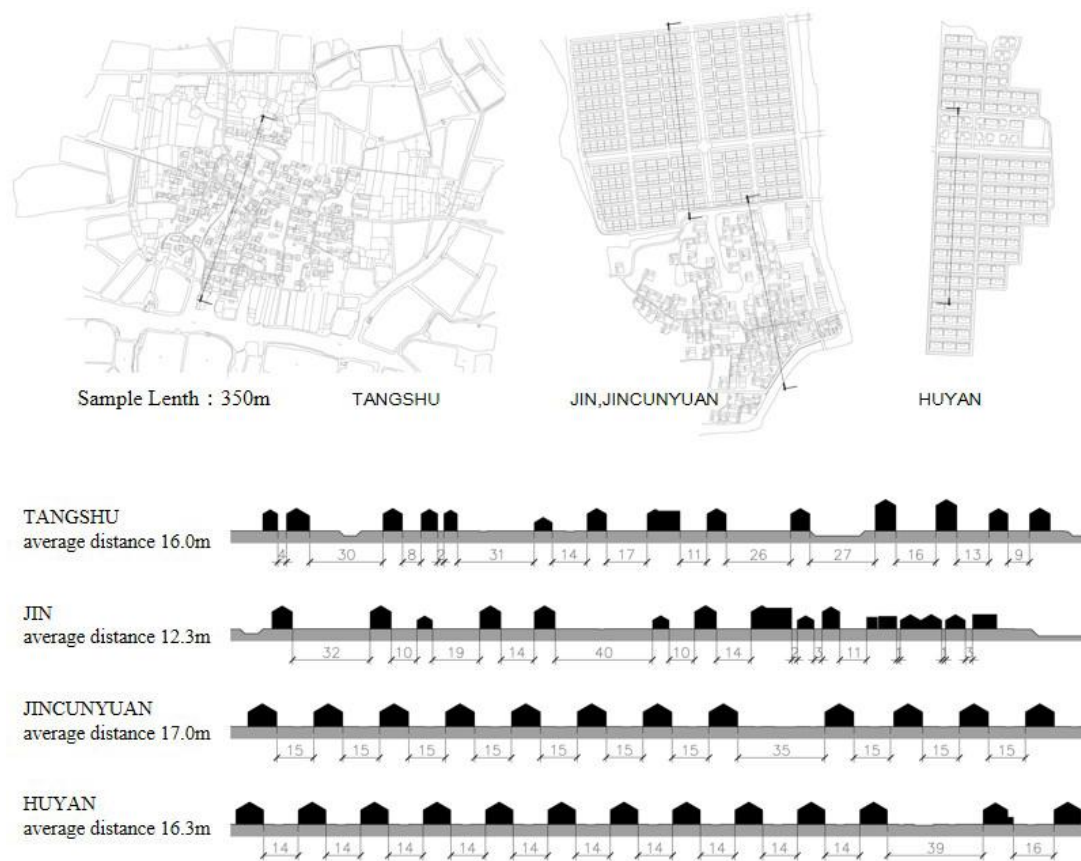


Figure 8. Distance of buildings (sample length: 350m, direction: north-south), based on authors' field survey.

Plan of buildings

In terms of layout design, all the four communities follow the farmers' habits and customs, with the central room connecting all other functional rooms, but the new communities are additionally deployed with a garage for each family, closer too villas in cities. However, the two types of communities also have a difference. In Tangshu and Jin, the neighboring courtyards are generally directly connected or connected through the side-way at the east and west sides. In

new communities, the two buildings are completely separated, and can only access to each other through the main road. (Figure 13)

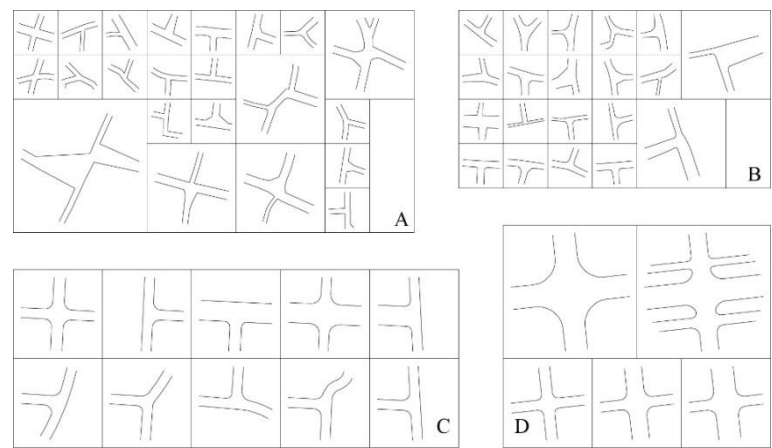


Figure 9. Types of street crossing, based on authors' field survey. A.Tangshu; B.Jin; C.Huyan; D.Jincunyuuan.

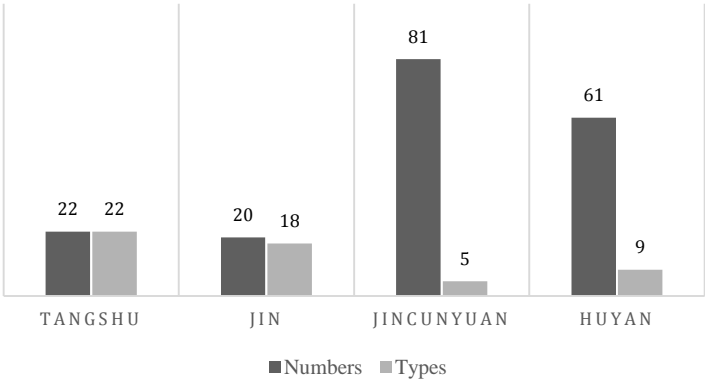


Figure 10. Numbers and types of street crossing.

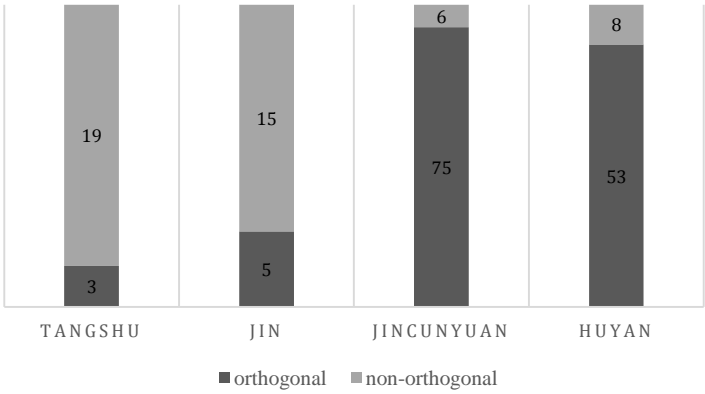


Figure 11. Shape structures of street crossing,orthogonal or non- orthogonal.

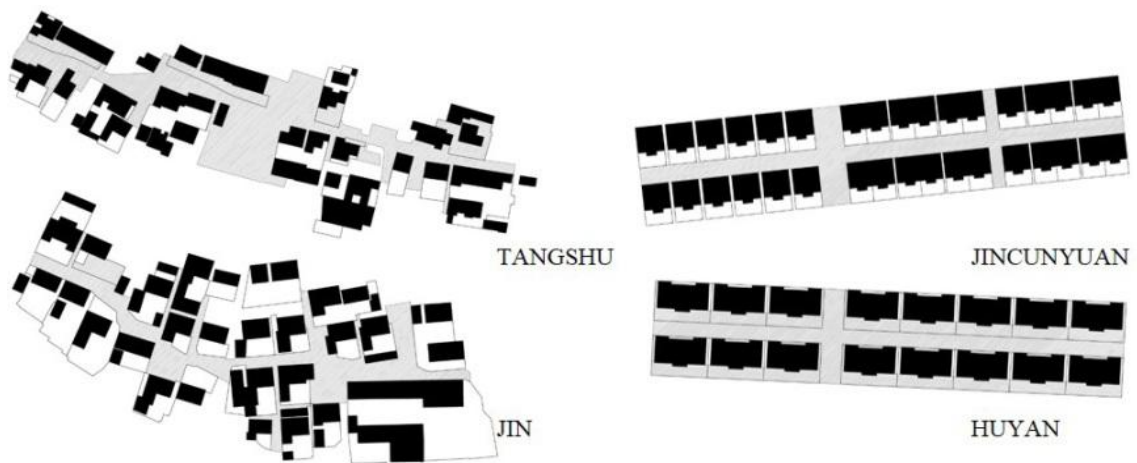


Figure 12. With the influence of the different interfaces, the structures of open space are diversified.

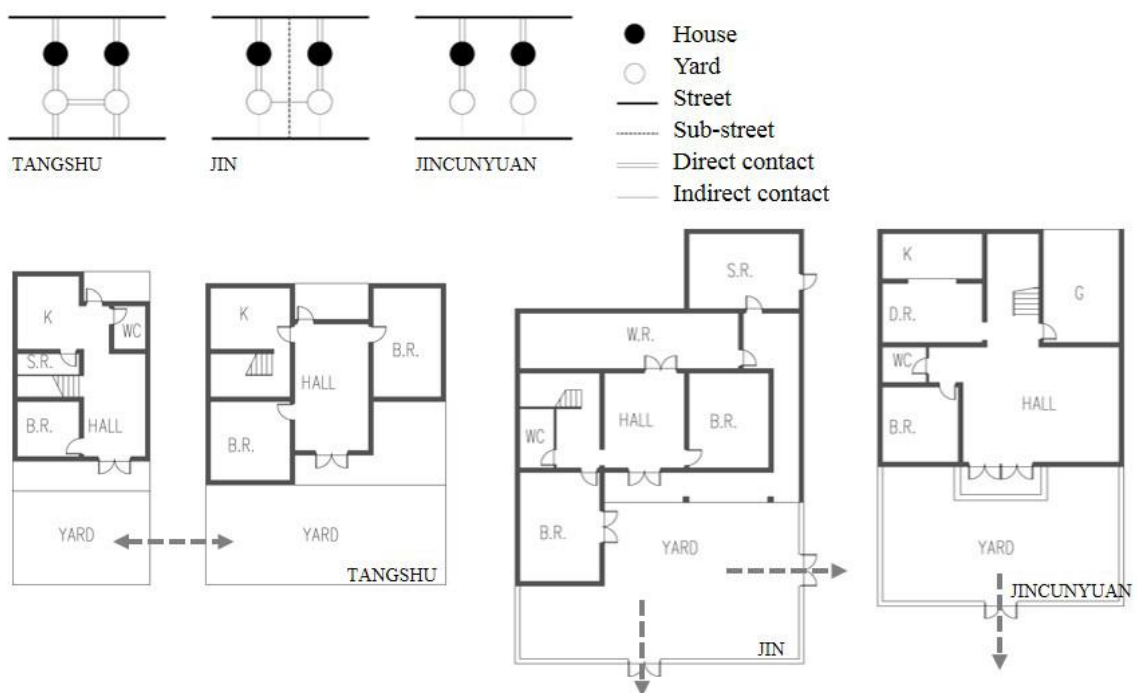


Figure 13. The four different plans show changes in combination forms of plans.

Table 4. Characteristics of plot and building in four cases

	TANGSHU	JIN	JINCUNYUAN	HUYAN
Subdivision of plots	Nearly half of plots are defined by neither streets nor other plots.	Nearly 40% plots are defined by neither streets nor other plots.	All the plots are defined by both streets and other nearby plots.	Nearly 80% plots are defined by both streets and other nearby plots.
Plots and buildings	Most houses are sitting in the north or forming an “L” shape.	Most houses are sitting in the north or forming an “L” shape.	All the houses are sitting in the north and facing in the south.	All the houses are sitting in the north and facing in the south.
Arrangement of buildings	More than three houses in a row will be separated.	More than three houses in a row will be separated.	More than four houses are sitting in a row.	More than four houses are sitting in a row.
Distance of buildings	Non-fixed value.	Non-fixed value.	Building interval is 15.0m.	Building interval is 14.0m.
Road crossing	More than 80% street crossings are non-orthogonal	More than 70% street crossings are non-orthogonal	Only 7% street crossings are non-orthogonal	Only 13% street crossings are non-orthogonal
Street space	Street space in variations is defined by houses.	Street space in variations is defined by walls.	Street space remains the same.It is defined by houses.	Street space remains the same.It is defined by walls.
Plan of buildings	The yards of the adjacent two houses are joined.	The adjacent two houses are connected by the sub-street.	The adjacent two houses are connected by the main street.	The adjacent two houses are connected by the main street.
Building forms	Buildings in different ages are strongly represented.	Buildings in different ages are strongly represented.	Buildings in a uniform style are produced at the same time.	Buildings in a uniform style are produced at the same time.

Building forms

Traditional communities have a morphological characteristic that a row of houses have different layout as the unit plan is affected by the era when the houses built. However, the new communities planned and built in a unified manner have uniform geometrical form. Additional, a house's era can tell us the development trend of its materials and style. However, even the houses built at the same time employed inconsistent styles and building methods because these were determined by the owners of the houses. (Figure 14)

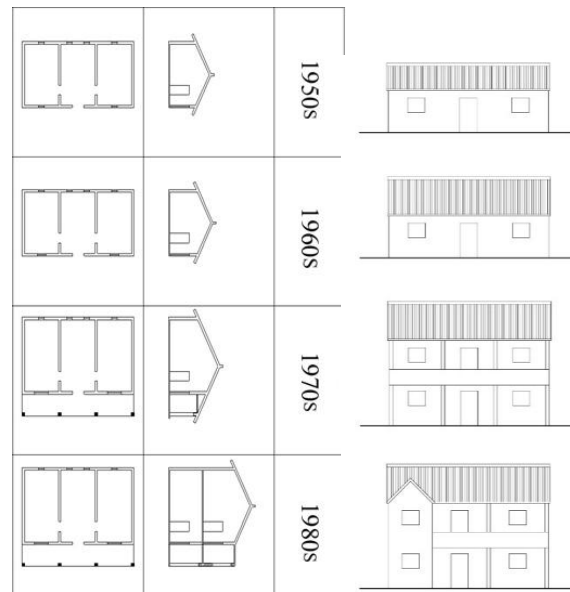


Figure 14. Building forms in different ages. A. Plan and section. B. Elevation.

Results

Table 4 reports the results of measurement of the above-mentioned 8 morphological elements. Overall, the new communities are more in line with the level-by-level control on urban morphological elements from the street to building in the urban morphology theory. Traditional communities are gradually formed by gathering houses in which house construction has relations with family development, house situating has relations with the neighborhood, as well as the unit plan has relations with the era when the houses built. Comparing the morphological elements, we can find that the two types of patterns: *grid* and *cluster*, have entirely different control hierarchy on the morphological elements. The following text will analyze the generation process of these two morphological types to find the inherent laws and their morphological units and hierarchy. (Table 4)

Topography and generating process

The main objects of study are established typomorphology and the morphological elements. We considered that the form of the traditional communities were generated based on complex causes, related to natural and social environments. With the historical evolution, its morphological elements are double affected by the nature and human, finally forming a community form interdependent with the natural landscape and holding relatively stable social relationship. This form is generated during a long process of coadaptation and interactivity. In addition to the environmental elements, the awareness and values of the community also contribute to the generation process and element structure of the form.

Topography

The traditional inhabited space of farmers is gradually generated, developed and evolved during the course of human adapting to the environment (including the natural and social environments). Topography here is generalized, which not only includes the characteristics of the landscapes (including the terrain and ground object) in specific plots, but also involves the

built environment existing in the plot before (such as the spatial layout of the existing houses and the social relationships between the residents).

Because the cases give priority to the plain geomorphology of waterside settlement, the community form of water network dominates. The habit of living by rivers make the form of the traditional settlements corresponds with the river form. The river system structure determines the form and structure of the pattern, while the direction of the water revetment determines the house orientation. While building houses along the river, the farmers tend to keep them facing the river, with the orientation parallel or vertical to the river and without forming an included angle with it. Jin's water system consists of rivers and ponds; therefore, the houses turn with the rivers. Tangshu's water system gives priority to small ponds, and the houses are consequently built around the ponds with consistent orientation, although are loosely arranged. (Figure 15)

The water determines the orientation of the house, and the built environmental factors are concerned with selecting dwelling places. They express the relations between the people and the environment. The villagers have a very concrete understanding of environmental space. Only when they are in it, there is a value to consider “at this time and place” (Wang, 1997). Moreover, a traditional village is the outcome of living together, and the result of relations between houses. In our investigation, we found that the combination of houses fully reflect the social relations between people. To build a house close to the neighbour, roughly sharing the environmental space need first to be agreed upon, and then the positional relations with the existing houses are taken into account.

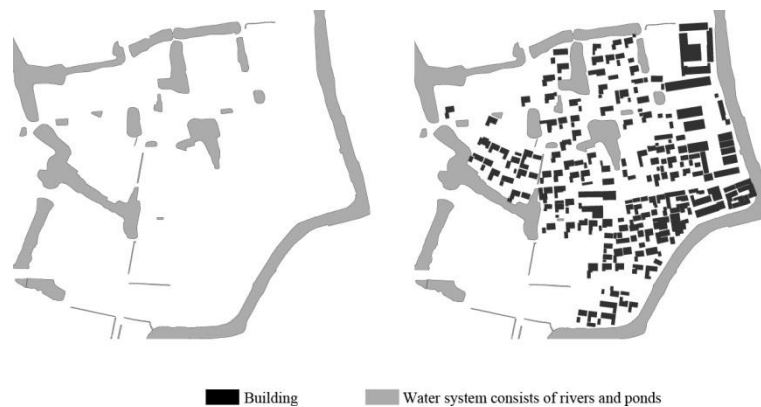


Figure 15. The buildings turn with the rivers and ponds in Jin, based on author's field survey.

Buildings

The location and orientation of the houses are determined by people, but the plan layout and elevation style are closely related to the era. The old houses built before 1949 were mainly 3-bay, with the door on the central room and one more room built on each side of the central room. Between 1949 and 1980, old house renovation dominated due to the production system and economic level, which extended the depth and turned the structure to 5 rooms of 3 bays. In early 1980s, the tile roofed houses were transformed into buildings with the corridors downstairs and balconies upstairs for living condition improvement. From 90s onward, the functional layout started to incline to the urban lifestyle, and some houses were even enlarged to 4 or 5 bays with each son owing a room.

The house style is directly affected by the local culture. The farmers advocate a simple but elegant style (white wall and black tiles) whiling tending to accept innovation. As a result, the facing material transformed from the whitewash to mosaic and face brick, and then to new paint with the main color tone kept as white. The balcony railings appeared and evolved from wooden, cement, granitic plaster to now close type. Simply put, the new materials appear in

cities will be adopted in farmers' new houses two years later. The only unchanged characteristics are the pitched roof and its bratticing.

Plots

Facing to the south is common in farmers' settlements in Jiangsu Province. The vacant place in the south side of the house can be used as a passageway and a place for working or stacking straw or other things.

While building houses, people always pay more attention to the completion of the house, but ignore orderliness of the plot. Policy control over the plot only involving the quantitative indicators also contributes to this result. The private area usually keeps a loose relationship with the surrounding vacant places, and the borders of the vacant lands are uncertain. However, there is an order accepted through common practice. That is, the borders of the plots that face to the houses are nearly parallel to the house, although they are not very orderly.

Streets

During the times of agricultural cultivation, there were roughly two types of streets in the traditional villages: one for external traffic and one for the internal connection of farmhouses. The houses were always built first, then the streets. This process is quite the opposite of the construction of modern residential quarters. Streets are referred to as the structural frame or skeleton in a modern residential quarter, but in a traditional village, streets are just the open spaces between farmhouses for the use of traffic. Therefore, the street system in a natural village was initially not the support of the village; instead, streets were developed in response to the farmhouses.

To sum up, the traditional settlement pattern in rural areas have different morphological elements with those in urban areas. Its morphological hierarchy is that topography determines the house orientation and location (the house type are related to the era of construction), the plot of land of the house determines the private plot, and finally streets are generated between the houses. In contrast, the new communities have a planned settlement pattern. Its generation process is in line with the level-by-level control of streets/blocks-plots-buildings in the urban morphology, which is reverse to that of the traditional communities, topography-buildings-plots-streets. Therefore, the generation mode of morphology is a major factor that influences types of settlement patterns.

Conclusion

Through the analysis of both settlement patterns of grid or cluster in Southern Jiangsu the various factors have taken into account for examining their roles on the generation of the type of the pattern, which include the set of planning indicators, the morphological elements in terms of design aspects and environmental values. The way of such analysis is aiming for searching the factors that could act as designing elements in practice, such as the factors to determine building position in the plot, group of buildings arrangement and building body shaping. The second is testing whether morphological elements for describing could also match to the operational factors acting in the design process.

First of all our study has shown that settlement pattern in terms of urban tissue formed by very complex reasons: planning regulations and site plan indicators, decision making of placement or site plan and environmental value judgments. Through typo-morphological studies tested with both settlement pattern of *grid* or *cluster* clearly proved there is the correlation between the types, morphological elements and formative process, which gives certain evidence for supporting typo-morphology acting as a kind of urban design theory.

Analyses of morphological elements in different views are critical, such as planning control, form describing or building placement. In our case studies that planning indicators and regulations are important for housing settlements, but are not effective factor for forming physical pattern. Morphological elements introduced by Conzen and Caniggia have shown their powerful capabilities in differentiating settlement patterns: grid pattern or cluster pattern. Furthermore, our study has also found that not all the elements or factors are operational in terms urban design. According to our research plot configuration, house placement, street structure and their density, and building interface and street crossing pattern are the key issues for the type of the settlement patterns. Planning indicators and regulations are the simple role for forming grid pattern, while structure of natural elements, such as river, pools and hills are the important reference for the house placement in cluster pattern.

Most morphological studies recognized that urban design takes place in reality at the nexus of the users' requirement, the government's control and the designers' knowledge base, while designer intention is seldom considerate. Design Intention is based on "requirement", "controlling indicator" and "design knowledge (partly contributed by morphological study)", but go beyond of them. Norberg-Schulz proposed a phenomenological method in order to understand and describe the "spirit" of the place through a depiction of its physical features and an interpretation of the human experiences within that place (1980). His theory helped us to understand the meaning of the pattern of cluster, as well as decision making with intention of the place. Research on the relationship between physical features and human perception of the places has to be further studied.

Finally, during our case studies we have found that 'typological process' of Caniggia and the 'plan elements' of Conzen (Levy, 1999) could be understood in different design methodology although they were made equally in morphological terms. As Hall cited (1997) that Caniggia developed his down-top morphological hierarchy and Conzen's concept of plan-unit was other way around. In our cases the settlement with grid pattern could be described by Conzen's top-down hierarchical mechanisms, while the settlement with cluster pattern could suit the theory of Caniggia. This result should be taken account by designers.

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Urban morphology of streets in central area of Vitória (ES)

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Abstract. *It is proposed the construction of a urban form study, from the analysis of streets and its typological variations, of the central area of Vitória (ES), featuring characterizing the relationships between physical elements (buildings, lots and streets) through analysis of floor plan and cross-sectional profiles, produced with graphic scale, in order to allow for correlations between physical elements (buildings, lots and streets) through analysis of floor plan and cross-sectional profiles, produced with graphic scale, in order to allow for correlations between studied elements of different typologies. The theoretical framework is based on Moudon (1994), Borthagaray (2010), Proença (2011), Panerai et al. (2013). The registration and analysis of cycles of urban transformation of the physical dimension of certain tissues, give a meaning to the study of morphology, when combined with the practice of urbanism, the potential to be effective instrument for the design of the city. The central area of the city of Vitória (ES) is chosen as a pretext and context for the development of a study group, with reference in urban morphology, because it is the subject of frequent analysis of the student of architecture and urbanism, holds proximity to the urban reality, has current reliable Cartographic base.*

Key Words: urban morphology, central area, typology, Vitória (ES)

Introduction

This article is part of a research that has been developed, since 2013, in a College of Architecture and Urbanism - Brazil, which main objective is the creation of an academic research environment through the proposed analysis of the urban form in the central area of Vitória (ES), studying specially the streets and its typological variations. This study's group was created by the Professors Msc. Flavia Botechia and Agnes Thompson, had the support of The Institute of Education Multivix –Vitória and for scientific initiation by FAPES-ES¹, and involved the graduation students Joyce Andrade da Silva, Ana Carolina Rosa Marques, Fernanda Careta Ventorim, Giovana Gonçalves Achiamé, Pedro Queiroz França and Valdomiro de Souza Neto.

Presents itself at this point the partial results of the analyzes developed by teachers and students, fellows and volunteers, highlighting the physical categorization of the object of primary interest. This article is structured in two parts. At first, it was intended to bring together a theoretical framework about the street as the scene of events and life (Borthagaray, 2010; Ascher, 2010); as a morphological element (Kohlsdorf, 1996; Moudon, 1997; Lamas, 2000; Panerai, 2007) and as an object of categorization and analysis. The main theoretical reference is the morphological studies of the French School or "Versailles", represented here by Philippe Panerai in his works entitled "*Urban Analysis*" (2007²) and "*Urban Forms*" (2013). Was also important for applied research the example of Proença (2011), "*The diversity of street survey in Lisbon*", which gives further characterization performed by morphological inventory of street in Portuguese cities (Forma Urbis Lab - Faculty of Architecture/Technical University of Lisbon³).

¹ FAPES: Fundo de Apoio a Pesquisa do Estado do Espírito Santo. It means a financial found created by the Government of Espírito Santo state, Brazil.

² Year of the book version in Portuguese (Brazil).

³ By the coordinator and professor Carlos Dias Coelho (FAUL).

In the second part, the analysis will be presented about the typology of streets and their variations in the central area of Vitória (ES), from the creation of categories related to geographical location. Resources will be used as the historical approach to describe the background, analysis of the current floorplan base map (2009) with mapping technique known as solid-void and fieldwork. The limits of central area will be the official boundaries of the neighborhood named "centro" (Figure 1) with 94,43ha. This choice was made because it is rich space by overlapping times and forms, functions and experiences, as a source of interest for reflection through the lens of urban history.



Figure 1. Map of Vitória (ES) indicating the central area (Source: Google maps modified by Botechia, 2014).

The street

The street as a public space

Urban space is composed of various public and private elements. The public space is defined by being belonging to the community, accessible to everyone, anytime, including: streets, squares, alleys, boulevards, canals, beaches, bridges, squares, docks (Panerai, 2007: 79). All this set is organized on a network, hierarchical and continuous way. From all, the street is definitely the predominant element in the formation of the urban fabric due to the permanence of the trace over time (Panerai, 2007), the attribute of imageability in the construction of collective public image of the city (Lynch, 1997) and because it's place of sociability and hosts social events (Jacobs, 2000).

Conceptions of streets and city are very intertwined. Numerous examples of this relationship are part of the history of architecture since the origin of the city through the contemporary territory. Now, it's possible to remember Baron Haussmann when it comes to interventions in Paris in the late nineteenth century, promoting the opening of wide roads; Walter Benjamin when he writes about the same Paris portraying its boulevards, streets and characters in the twentieth century; and finally to the initial gesture of Lúcio Costa in the design of Brasília, in the XXI century. But there are so many others examples...

To Borthagaray and Ascher (2010), the street is also a space of living together, in a harmonic way or not: "What is a street? It is a road inside an urban cluster that serves specific or both, to cross a zone in the cluster to access places situated along or near this route immediately and to produce usable in various types of collective space activities. A street then assures at least one of the following functions: transit access (distribution) or received" (Ascher apud Bortagaray, 2010).

Since the eighteenth century, in consequence of the greater mobility of people and goods, the number of streets tended to increase. Throughout the twentieth century, the mobility increases even more and diversifies itself in such a way that the street becomes the main infrastructure in a large circulation system and, with more or less impact on the city, has different speeds, functions, templates, perspectives. This hierarchy of speeds generated avenues, streets, sidewalks, highways, freeways, exclusive, underground tracks. A few Brazilian municipal master plans, working with the idea of this hierarchy, classified the streets according to their flow capacity, width and location in the city as local, collector or arterial roads. Full of vehicles - buses, cars, motorcycles, bicycles, and its variables - the streets are also filled with people enjoying it at different speeds: walking, shopping, and chatting; older people, younger people; same people, different people. In the post-fordist city nor the pedestrian street or expressway tend to disappear.

In spite of all rich scenes and typologies, the street has been portrayed in Latin America in the last few years for its conflicts and dysfunctions, discussing their effectiveness and adaptation to the city (or vice versa), with much emphasis on the aspects of traffic engineering and statistics mobility. We believe that the street can and should be studied according to its urban form. The street cannot be divorced from the context in which it appears, and must be addressed as part of the urban fabric.

The street as a morphological element

In the second half of the twentieth century, in contrast to the modernist scenario that preached the "paradigm of the machine" as a processor of cities and buildings, has spread among urban planners and sociologists, the defense for everyday life, the mix of uses and the scale of human needs (Montaner, 2013).

It is in this context of growing sensibilizations for the local culture, starts to be systematized the studies of urban morphology, whose basic assumption is that the city can be read and analyzed for its ordinary physical form (Moudon, 1997). The production of the city is more than a distribution of objects in a territory organized around functions. The urban form is a set of architectural objects linked by spatial relationships and morphology "(...) is the study of the form of the urban environment at their outer physical parts, or morphological elements, its production and processing in time" (Lamas, 2000: 38).

Given the similarities and specificities of each of the major European schools of morphological studies - Italian, French and Anglo-Saxon origin - Moudon (1997) along with other members of ISUF⁴, fits three principles of morphology: the shape is defined three physical elements (buildings, plots and streets); the form can be read in four different levels (plot, street, city and region); the form can only be understood historically elements of which derives continually transform and there is an overlap.

With a historiographical approach, Lamas identifies three dimensions of urban form and eleven morphological elements of urban space, with the understanding and design of these identifiable in those, depending on the reading scale. This classification proposal builds on previous authors as Tricart and Rossi, have the argument that the reading of the city is done simultaneously at different levels and that the definition of scales - street, neighborhood, city - is key to any morphological study. In the sectoral dimension, or street dimension, Lamas identifies elements such as tracing, the square, the tree, the monuments, street furniture and street. In this context, the street is part of a set called "urban fabric or urban trace" (which can also be observed in urban dimension, or scale neighborhood): "[...] is one of the most clearly identifiable elements both in the form of a city as the act of designing. Based on a preexisting

⁴ It is an international organization created in 1994 to unite researchers of urban morphology -. International Seminar of Urban Form (ISUF). Official site: <http://www.urbanform.org/>.

geographic support, regulates the disposal of buildings and blocks, connects the various spaces and parts of the city [...]” (Lamas 2000: 99-100).

Also understanding the street as part of a whole, for Panerai (2007), the beginning of an urban morphological study should be done from the growth of the city related to the lines of force of the geographical territory. In his writings on urban analysis, this French author develops the definition of "urban fabric", in clear Italian influence, understanding this as a superposition of three key sets of elements: networks of roads, land subdivisions and buildings. Notes that the analysis of urban fabric involves the identification of each of these elements through the observing of the relationship between typology of buildings and urban form. In this approach, these elements together constitute the public space as opposed to bordering land available for housing, mostly private. Whereas the hierarchy and the role that roads have on the structuring of urban form, Panerai states that the design of streets appear geometries, regularities and repetitions and that this can be analyzed as well as the whole of routes from: i) relationship between plotting routes and geographical site: relief, soil type, flood zones; ii) role of roads in urban and regional groups; iii) geometric logic of strokes especially in monumental systems, and its relation to the history of land ownership.

With the premise that it is from the existing topography that draws the city (Lamas, 2000) and that there is a relationship between track route and site (Panerai, 2007), we intend to make an urban study of morphological characteristics of public space through the removal of layers of various components, beginning with the element "street".

Among the papers presented at the 1st Conference of PNUM⁵, held in Portugal/2011, Proença's work was taken as an example because his analysis of Lisbon's streets take the approach that the origin of the urban form is related to the *topos*: "Thus, we consider the public space of the street space bordered by adjacent private space; landforms Break, plans to scarps and water; or other distinct morphological elements of the considered public space" (Proença, 2011: 260).

In defense of the need to identify the diversity of the streets in the central urban area, Proença uses topography to define typologies, so-called: streets of ridge, valley, coast, coast and half climbers. This analysis considers as starting point the "natural streets" or those that mimic the geographical features of the site, comprising three phases: selection and collection cases; morphological analysis; rating categories.

Streets in the central area of Vitória (ES): a case study

"The city as an educational tool? It's not about whether it should be such a thing, but that cannot be anything" (Rowe, apud Proença, 2011: 259). By understanding the necessity of analyzing and constructing a type-morphic frame representative of urban form and considering that the study of urban morphology, when allied with the practice of urbanism, becomes a potential tool for the design of the city, this work suggests a morphological study of the streets in the central area of the city of Vitória (ES), based on the proposal of Sérgio Proença (2011) categories of type- morphic pathways.

The method for developing the primary stage of studies is also based on the theoretical frameworks discussed in the decomposition technique in layers and steps: record low plant all streets in the central area of Vitória sector from basemap with identification of typologies; record in transverse profiles and scale photographs taken in the field visit, each representing one of the typologies typologies, detailing elements of composition and allowing correlations between different types of elements studied. In this research project will be considered analytic

⁵ PNUM – Portuguese-language Network of Urban Morphology.

variable "form", with regard to the description of the geographic influences, full and empty site; width, scale and proportion of buildings and wide streets.

The territorial clipping covering the Centro neighborhood, called central area of Vitória, is justified by the fact that the morphological studies conducted focus in this area are rare; the fact contain a variety of cases, which enables a search rich in examples; and also because of having reliable cartographic databases.

Importantly, this work is located temporally in the present, so that no historical issues and transformations of the street over time will be analyzed. It is, therefore, an analysis that involves relating the types of streets found in central area of Vitória to its uses, thus knowing their morphological diversity for understanding the design of the city.

Conceptual cutout is based on the proposal type evidenced by Proença (2011) and the model of urban performance for the street proposal by Andrés Borthagaray (2010), in order to establish, systematically, the selection of cases. This selection followed the criteria relevant to the form and framework of the street in the immediate urban area associated with the characteristics of the physical site, thus defining the rating categories of analysis.

As Proença, the construction of a type consists of two phases: defining and meeting the common properties of the elements that make up each category, thus defining the type. From the observation of differences in the type, it is possible to observe variations in type.

Thus, goes the definition of categories and types identified in the central area of Vitória (ES).

Categories and types of streets

The classification of streets into categories and specific types observed implies understanding that the city, whatever it is, has specific characteristics that define and structure. These characteristics can be cultural, physical, social and economic.

Based on this understanding, we can infer that the city of Vitória has as elements that influence the streets of the central area topics related to physical site, since it is an area of rugged topography, formed by a large central mass, and soaked in water, the Vitória bay. The flat areas are due to the fact landfills in the nineteenth and twentieth centuries have been made, as shown in Figure 2.

The urban layout with topographic features is a dash of Portuguese vernacular urbanism, which the city of Vitória is heir, being one of the oldest cities founded by the Portuguese during the colonization of Brazil.

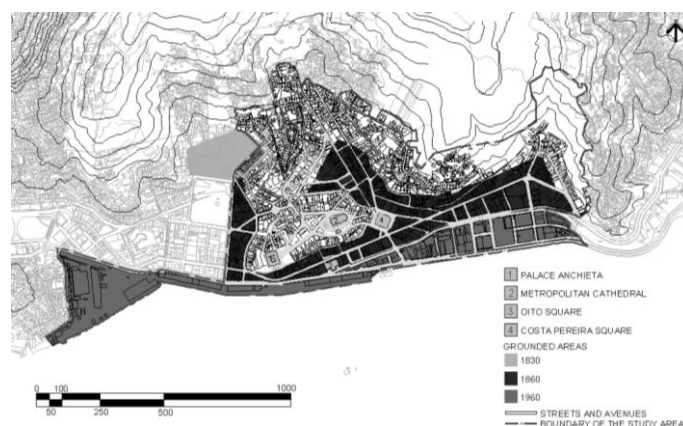


Figure 2. Gounded areas in the central area of Vitória (ES) (source: Ventorim, 2014).

Thus, it can be said that the streets of the central area of Vitória are divided into two categories of classification, according to its location: the physical site originally, composed this being the central massif of Vitória -, and area landfills.

From these two categories types can be defined. In the original physical site category, the types are: street slope and cross street. In the area landfills category, the types are: straight avenue and street corridor.

The street slope

The street slope, in the original physical site category, can be defined as one that extends on a single quota of a hill, or near quotas, requiring less effort in conceiving it, and also reflecting the influence of Portuguese vernacular mesh.

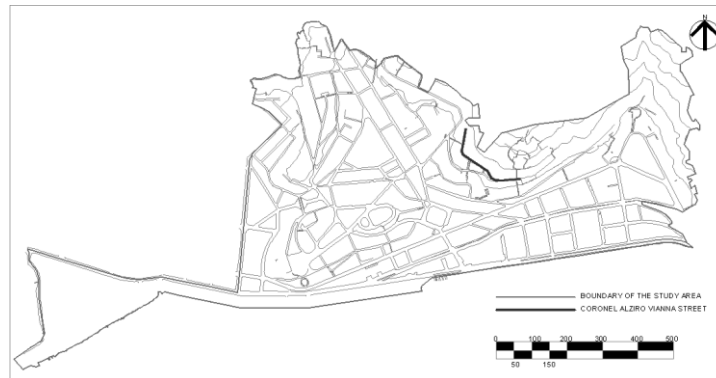


Figure 3. Coronel Alziro Vianna street location (graphic scale) (source: Marques, 2014).

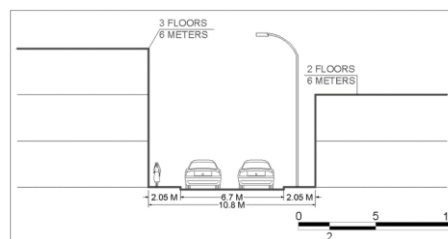


Figure 4. Coronel Alziro Vianna street view (graphic scale) (source: Marques, 2014).



Figure 5. Coronel Alziro Vianna street (source: Marques, 2014).

In this type of street, buildings are located on the line of the street and are usually narrow. An example is the Coronel Alziro Vianna street, which can be visualized in figures 3, 4 and 5.

In the figures, it can be seen that the road is narrow, approximately 11m. It has a parking area of a side of the track. Two sidewalks are approximately 2m wide each in attempt to define the pedestrian path. However they are inadequate if observed, since the buildings are implanted in the line of the batches, and often with projections from other decks on the sidewalk; therefore, inducing pedestrians to walk on the road. Typological variations on the street slope are given by the height of the buildings and the presence of vegetation along sidewalks. In some of these constructions, there are two or three floors, while in other constructions; they are observed having five to six floors. The streets are narrow, giving access only to homes with restricted access, preferably residents.

The street slope ends up defining their uses. Due to its small dimensions, it mostly has the function of inhabiting. This situation leads to what Andrés Borthagaray (2010) says, namely, that the various functions of the street are more or less compatible with each other, depending on how it is presented, based on the morphological point of view, the relationship between the physical elements associated and, furthermore, the modes of transport.

The situation of narrow streets with narrow sidewalks, little stream of cars, some trees when possible and the relationship of the building with the lot, characterizes a type of street that is not shown to the city, but is preserved. It establishes an urban street performance that according to Borthagaray (2010), dissociates and divides the urban space as it presents its specific use - mostly residential - decreasing the chance that people other than those who reside there can cherish it.

The cross street

The cross street, also present in the original physical site category, refers to the connection between the high and low parts of the study area, interconnecting slope streets, overcoming gaps and topographic inflections (figure 6). The cross streets can also, connect the slope street and the street corridor, to meet in the transition from the original physical site from the landfill areas.

In general, the cross street type has similar attributes to the street slope: narrow streets, with minimum dimensions of sidewalk, presence of trees in just a few streets, less intense flow of cars, buildings on the lot tested with three floors, commonly giving the characteristic articulation of pathways between same attributes, or, organizers of transition, switching the type of hillside street to street corridor.

Thus, their morphological structure is directly related to the function of access, circulate-through, allowing residents of hillside streets to connect with the city, furthermore establishing a formal response to the occupation terms in areas of rugged terrain; besides receiving activities related to trade and local services in order to meet residing in the vicinity.

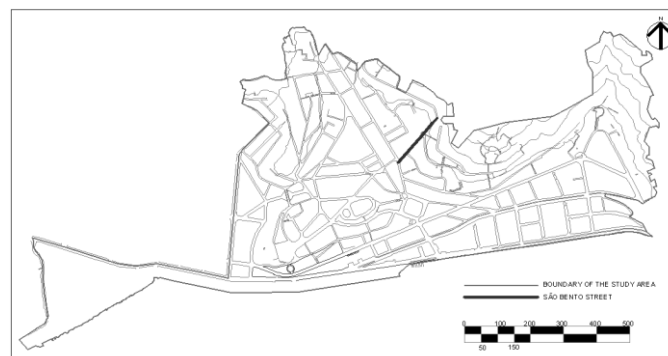


Figure 6. São Bento street location (graphic scale) (source: Achiamé, 2014).

For this reason, the cross street that presents a model of urban performance (Borthagaray, 2010) which tends to establish the union of urban space; is associated with the link function, attracting more transient flows of pedestrians and cars than the streets of the hillside.

The straight avenue

The straight avenue, present in the category of landfill areas, can be defined as one that extends longitudinally, throughout the study area, exceeding this limit, and expanding to other parts of the city.

The straight avenue features common variations of the typical characteristics, such as the presence of tall buildings commonly implanted in the tested lot with ten to fifteen floors, sidewalks on both sides, sparse vegetation present only in the squares bordering the avenues, three or more lanes of cars without parking, these variations establishes the heavy traffic of cars, besides the main bus stops in the study area. These features can be evidenced in figures 7, 8 and 9, which show the straight Princesa Isabel Avenue.

Variations in type present in the straight avenue refer to median plats, number of crosswalks present in each direction of the road/avenue, width of sidewalks, buildings with canopies that project on the road/avenue, or the presence of a boardwalk bathing bay Victory - integrating the city with nature. These variations on the type reinforce the idea that every town, and every street has its own attributes that give them identity, making them readable, and contributing to the understanding of the design of the city, associated with local characteristics.

Thus, it can be said that regardless of the variations found, its function is to connect the different parts of the city as well as receive various activities that meet the different sectors of the city. Usually having mixed functions, such as dwell (on a smaller scale), access, receive different activities related to trade and services.

In the case of straight avenues present in the central area of Vitória (ES), these activities are: i) households, banks, medical offices, institutional buildings on Avenida Marechal Mascarenhas de Moraes; ii) banks, consumer electronics stores, popular trade retailer in Princesa Isabel Avenue / Governor Blei; iii) retailer popular trade, banking and cultural buildings on Jerome Avenue.

Then we observe that the various activities presented in variations of straight avenue type also determines its urban performance, since the model of urban performance is defined precisely by the association between spatial form and uses and functions.

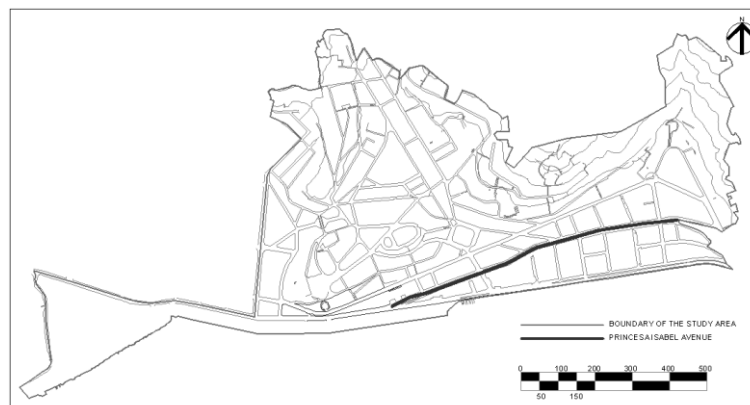


Figure 7. Princesa Isabel Avenue location (graphic scale) (source: França, 2014).

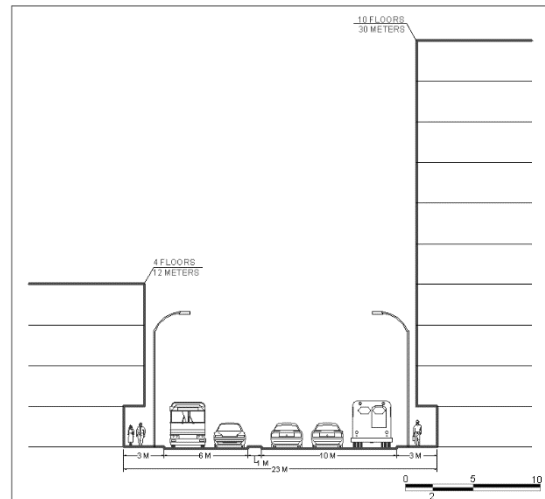


Figure 8. Princesa Isabel Avenue view (graphic scale) (source: França, 2014).



Figure 9. Princesa Isabel Avenue (source: França, 2014).

So, it can be said that the Avenida Marechal Mascarenhas de Moraes has a model of urban performance that divides the space because its features - connections from different sectors of the city, high flow of cars, activities related to specific services, such as medical offices, law firms, banks, institutional buildings - turns out to disperse the relations of social interaction, establishing them only in the squares that lie along this pathway. This is an example of what Margaret Pereira (2010) states: The Streets " [...] no longer places of conviviality, places to see and be seen and will be considered, especially as the main infrastructure increasingly fast 'large traffic systems'.

The Princess Isabel / Governor Blei and Jerome Avenues present a performance model of urban crowding, spatially integrates the city, the present flows of people, trade flow, communication, various activities related to culture.

Nevertheless, it is these pathways that normally occur the political and social events of the city, becoming stage of life events, once the largest concentrated flows of people, cars and transportation modes, are wide and connect the neighboring towns. In those moments, they become protagonists of the city.

The street corridor

The street corridor can be defined as one that connects straight avenues. It has templates, forms and layout of buildings compatible with those presented in the avenues that connect straight uses, but presenting the box narrow street with approximately 12m, 9m of which are in the range of cars bearing (figure 10).

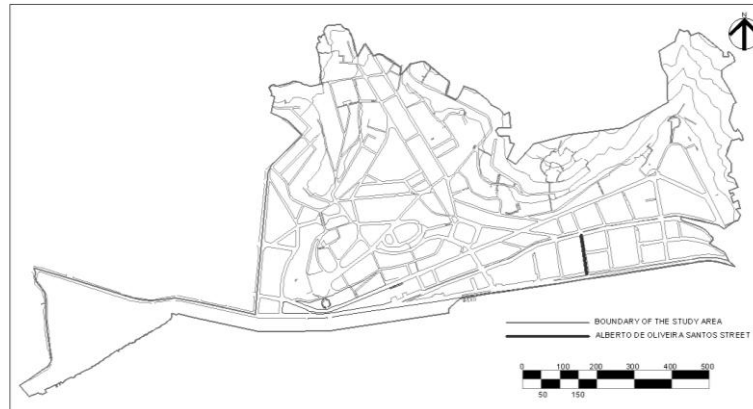


Figure 10. Alberto de Oliveira Santos street location (graphic scale) (source: Neto, 2014).

The absence of trees, along with the (dis)proportion of buildings and the width of roads/streets/avenues accentuate the compression feeling of pedestrians and create strong gusts of wind, consequently, it becomes uncomfortable to stay and walk through. This situation, coupled with the lack of variety of uses - notably services - ultimately set it as low urban quality with exclusive access function, circulate-through, making as a channel the movement of people and cars.

Pursuing a model of urban performance (Borthagaray, 2010) which divides the urban space, since the uses and forms of layout of buildings make a distribution of urban space that separates the people from the space itself; in other words, only interested in looking at something specific in one of those buildings are using it as part of the circulation system of the city.

Conclusions

By the establishment of typologies for the streets in central area of Vitória (ES), one can understand the design of this part of the city, linking them to their uses and observing how the relationship form x function directly affects the way people behave in each place.

The four typologies found - street slope, cross street, straight avenue and street corridor - shape their uses by morphological characteristics, triggering models of urban performance of different street, which sometimes unite, integrate, and sometimes split, dissociate.

Read, understand and classify each of these types of street allows to conclude how they seem to be repeated in other parts of the city, establishing general characteristics of urban morphology in Vitória; and also contribute to, from the understanding of the dynamics found between form and function of streets, contemporary conceptions that can assess the strengths and weaknesses of each of the typologies, thus interweaves them with the new to continue the readability of city.

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Studies and hypothesis on Mdina and Rabat urban form

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Abstract. *The study presented here deals with the theme of the reading of the urban form of the city of Mdina, the old capital of the island of Malta, and Rabat. The interest in the study of these two urban centers, whose fortunes are inextricably linked to structural reasons, arises from some geographical considerations. The island of Malta, in fact, lies at the center of the Mediterranean Sea, in a central position respect to cultural exchanges between the peoples who inhabited its shores and the resulting hybridization dynamics that have characterized its history. Dynamics that can be researched in Maltese architecture, built result of contributions and strong exchanges between the different cultural areas and during different historical periods. Mdina, with Rabat, still preserves its urban form, readable and comparable with other centers such as Birgu and Valletta. The analysis of its urban form aims to highlight some typical features of the Mediterranean: the presence and persistence of the house with a courtyard in the building tissues. It was also possible to advance a hypothesis, based on the method of study and reading of the alignments walls, identification of medieval pathways, advances and the size of the bands attributable to the built, of any planned reorganization by Romans, more evident in the tissues of Rabat.*

Key Words: method, urban tissues, typological process, urban organism, Mediterranean Sea

Chronology of major historical events

Mdina, the old capital of Malta, is situated on a promontory that juts out into the eastern side of the west plateau that defines the highest part of the territory of Malta, located about 200 meters from the sea level. An ideal location from the point of view of strategic groups of nomads who need to choose a safe place to settle and establish their own production activities, typical of primitive men. In fact, the city is protected on three sides by the height difference between the promontory and the valley it overlooks and which has full visual control.

The earliest records of settlements date back to the Bronze Age (1500-700 B.C.) and confirm this thesis quoted above: the discovery of a significant number of ceramics and the discovery of some stone blocks dating back to this period, that during the Middle Ages, were reused for the fortifications near the Porta dei Greci, suggests the idea of a little settlement that would have had a significant importance for the island. Given the archaeological evidence, we cannot exclude the possibility that this may have been protected, the less well from the south side, by a defensive wall. The transition from the Bronze Age at the next time is marked by the arrival of the Phoenicians (VII century B.C.). It is likely that they encountered the island in a totally fortuitous way: starting from the eastern shores and pushing towards the western part of the Mediterranean, which is physically beaten by them in trade routes, in search of new territories to colonize, the Phoenicians have easily occupied the island reaching the ancient Bronze Age settlement on the promontory of Mdina. “At some point in time between the 6th and the 3rd Century B.C., when Malta seems to have firmly under the control of the West Phoenician city of Carthage, a fortified town replaced the Bronze Age settlement on the Mdina Promontory” (D. De Lucca, 1995, pag. 3). It was probably the site of a Carthaginian military contingent pledged to defend the island from the continuous attacks by the Greeks from Sicily, and later by the Romans during the Punic Wars.

In 218 B.C. the island of Malta fell under the control of the Romans and the Phoenician-Punic Melith became Melite (or Melita). There are many archaeological finds from the Roman

period, but little is known about the urban structure of the city. In 535 A.D. the Byzantines took possession of the island: the Pax Romana was broken and returned to the constant fear, because of the attacks of the Berbers from North Africa and from the Italian peninsula. This general state of decay, which often has even led to the abandonment of entire settlements spread across the lowland, forces the population to return to their fortified enclosures. It is presumably what has happened to Melite: "the hypothetical creation of a Byzantine *Kastron* on the side of Mdina standing proud among the ruins of the ancient Punic town and containing a church and suitable residence for the civil and military Byzantine administrators is a plausible image of the fortified Byzantine settlement that emerges on the Mdina promontory in the early 8th Century" (D. De Lucca, 1995, pag. 18). The raids of the Arabs were followed until 870 A.D. when finally conquered the island and Melite became Mdina. Due to the almost total absence of information concerning the Arab period, is not possible to reconstruct the urban form that the city took after their arrival, but it is possible to imagine, for example, the presence of a place of worship as a mosque, inside the defensive walls. From 870 B.C. to 1240 A.D., the year in which all the Arabs were expelled from Sicily and Malta by order of Frederick II, the city of Mdina experienced a period of prosperity. As Idrisi, an Arab chronicler of the time, wrote: "Malta, a large island with a protected harbor open to the east, where there is a town (Mdina) rich in pastures, flocks, and fruits of all treasures." After the mid-13th Century, placed firmly under the influence of European culture and the Christian religion, this registering a considerable impact on the gradual transformation of the Muslim town during the course of 14th and 15th centuries hinged, of course, on the small Romanesque church standing as a shining light in the center of the town" (D. De Lucca, 1995, pag. 25). Conventual religious orders, such as the Benedictines, Augustinians, Carmelites, Dominicans and Franciscans, they build the great monastic complexes in the empty lands outside the walls of Melite.

From the social point of view, after the conquest of Sicily by the Spanish Aragonese, the island riched diverse cultures: the indigenous Maltese, Arabs, Greeks, Jews and Latinos joins the Sicilian nobility that, through the institution of the *Universitas*, administratively controls the new Maltese feud. For the defense of the city was designed to strengthen the system of fortifications already thickened by the Arabs: it was erected new walls parallel to the first on the south-west and it was dug the ditch. Particular attention has been paid to the design of the main entrance of the city: in this case you import the bayonet model, spread throughout the Mediterranean, so it prevents, through the imposition of built fronts on the route, the linear and direct access to the city center. "In this respect, the main entrance area of Mdina, with its statue of a pagan Goddess and with its small church of S. Maria della Porta, shops, stores and military trappings, must have offered the first greeting to the trader, the pilgrim, the farmer and the town dweller so that it could be correctly interpreted as a customs house, a passport office, an immigration control point, a market place, a place of worship, a reliquary of old traditions and a celebration of military power, all rolled into one spatial entity of enormous significance and physical strength" (D. De Lucca, 1995, pag. 33). The city was gradually set up as a place to seek shelter and protect themselves from the incursions of Berbers from North Africa, taken by force from the beginning of the fifteenth century. The interior floor plan is organized arranging themselves along the main route that bisects the city, dominated by the most important buildings and the headquarters of the Sicilian nobility in Malta.

Compared to the main path, the eastern part, where today stands the cathedral of St. Paul, home to government buildings, the representative architecture of a certain artistic value, while in the eastern part develops the typical residential fabric of the Mediterranean areas, formed by houses organized around a common courtyard. 1530 was the year of the arrival of the Knights Hospitaller in Malta. Landed in October in the port of Birgu, only in November, the Grand Master L'Isle Adam agreed to meet with representatives of the *Universitas* of Mdina. The reluctance to act this was due to the poor conditions in which the city of Notabile was fallen: semi-abandoned and adopted a system of fortifications now obsolete for new and powerful weapons used by the Turks of Suleiman, ready to go to the West. In addition, for the first few years on the island the priority was given to the same type of defensive adaptation with the

Castrum Maris, which was the first site elected by the Knights for their stay, albeit temporary island. The work began and continued at a slow pace, but fortunately finished in time to cope with the massive attack of the Turks and the subsequent siege of 1565. The form, and, more generally, the design of the new fortifications were based on projects developed by Italian engineers: the mighty ramparts who surrounded the city, joined in turn by massive walls, allowed to have a full view on territory and to aim their weapons at the enemy, covering all possible angles. The Italian engineer Gabrio Serbelloni, already former superintendent of papal fortifications, proposed to transform Mdina in a military camp: the proposed withdrawal of the south walls to cut off a good part of the fabric of existing houses and the construction of two large bastions angle. For unknown reasons these proposals were never implemented.

There are four operations of major construction, took place between the sixteenth and the seventeenth century, that have fundamentally altered the urban form of Mdina. The first of these concerns the construction of the Magistral Palace near the south entrance to the city; the second concerns the construction of the church and convent of the Carmelites on the site of the ancient church of Santa Maria della Rocca; the third is the expansion and reorganization of the Benedictine monastery, with the addition of a convent for nuns; the fourth relates the story of the construction of the Cathedral. Of course, being in the Baroque Age and considering the dependence on the administrative and cultural center of Mdina to Sicily, the forms and the architectural language was based on those that were spreading on the Italian peninsula through the greatest exponents of this period, Bernini, Borromini, Rainaldi, among many.

The tragic event of the earthquake of 1693 caused an inevitable slowdown in the construction of these four important works, as well as damaging heavily on the structural level. The reconstruction of Mdina is chronologically divided into two major phases: the first (1693-1722) covers the ecclesiastical architecture and was marked by the projects of the new Baroque Cathedral, the Palace of the Bishopric and the new seminary. The second phase (1722-1736) concerns the reconstruction of buildings, military and civilian, of Baroque palaces and of the new baroque gate of the city. And it is precisely at this time that Mdina takes the established urban form, still visible today.

After a brief French domination, in which Napoleon, sailing to reach Egypt, stopped in Malta for a couple of years plundering the relics of the value of the Carmelite Church in Mdina, in 1813 the island passed into the hands of the English. The institutional and economic center of gravity shifted to Valletta and its large port. "In 1850, the British colonial government had decided to transport to Valletta all the 90 cannons belonging to the Order that were mounted on the fortifications of Mdina, thus underlining a policy of transforming this historic war machine into a "silent city" associated with peaceful activity" (D. De Lucca, 1995, pag. 120). From the architectural point of view, even in Mdina enters the new artistic way of making architecture: the revival takes hold and transforms the facades of the old mansions in beautiful neo-Gothic or neo-Renaissance palaces (Palazzo Testaferrata, House Gourgon).

Luckily there will be no more substantial transformations in the consolidated Mdina late baroque structure, until today. The city thrives on tourism and a renewed focus on the restoration of its architectural gems helps to maintain the perception of its ancient history.

Interpreting urban aggregative organism

The choice of the city of Mdina and Rabat as urban centers to analyze in conjunction, with the scale of aggregation and urban organism, has matured whereas, on a regional scale, represented the central and hierarchically more important urban node of the entire island. With the shift of the capital to Valletta and the growth of the strategic role of the Grand Harbour, Mdina has lost its institutional function of representation, it has preserved its historical and artistic value, becoming in time the main tourist destination in Malta. Rabat, however, has continued to carry out its purely residential function, avoiding to specialize the urban tissues, if not for the presence of the large convent complexes.

These two urban centers have witnessed a common history and must be analyzed simultaneously.

Planned city. Hypothesis for comparison

The hypotheses on the origin of the ancient urban structure of the planned city of Melite have proved conflicting. The archaeological evidence, in some cases substantial, have given and continue to give valuable suggestions for the definition of urban structure that has taken during the past ages, but as a whole are scarce and still lack a systematic organization. They allowed, however, to be able to assume the presence of an early settlement already during the Bronze Age and compare it as a typology to that of Borg-in-Nadur, consists of houses constructed with sporadic piles operated into holes in the ground and protected where the natural conformation of the site would not allow it, with a massive defensive wall.

From the seventh century B.C. the Phoenicians begin to move toward the western shores of the Mediterranean Sea, and during one of these voyages of exploration it is likely that they stopped on the island of Malta. Now, to occupy it and make it a small colony, the step was short. With the arrival of these people more organized from all points of view, the settlement of the Bronze Age is replaced with a real urban core, in all probability, fortified.

With the conquest of the Romans (218 B.C.) Melite does not seem to have changed the urban structure imposed in the Phoenician-Punic. This hypothesis is supported by prof. Denis De Lucca in the book "Mdina. A History of Its urban space and architecture "(1997) excludes the possibility of a Roman planning on orthogonal grid. De Lucca instead supports the hypothesis of a Punic origin of the ancient Melite, availing of the literary sources, archaeological evidence which hitherto were available: the presence of remains in the foundation of a fortified wall dating back to Punic, identified by the excavations in 1994 by prof. Anthony Bonanno, inside the city walls that enclosed Melite, suggested the presence of an acropolis area on the upper part of the city, consisting of public buildings, administrative and religious, as distinct from a lower zone, occupied by the current extension of Rabat, mainly residential. De Lucca argues that "the urban armature of Punic Melita was based on an irregular system of planning that probably developed as a response to the natural contours of the terrain" (D. De Lucca, 1995, pag. 8). In support of this thesis, he also proposes a comparison with some sites excavated in Punic Sardinia as Tharros, Monte Sirai, sulci and Nora. A few years later, the hypothesis of the presence of the Acropolis in today's Mdina seems to be confirmed by the studies of Nathaniel Cutajar (2001): the alleged absence of archaeological layers dating from the Punic period (V-III century B.C.) which would indicate a relatively low housing activity of the area, over the previous period (VII-VI century B.C.) has to think of a public use of the same area, left open like a square. At the same time, however, the excavation of numerous pieces of wall, found in some rooms beneath the Cathedral, others escavated in Villegaignon Street, others remains discovered in the foyer of the seminary and in the Villhena Palace, strengthen the hypothesis, a few years first excluded, of the planning on orthogonal grid of Melite. In the doctoral thesis of the scholar David Zahra titled "A didactic itinerary of the historical heritage of Mdina" (2002) there is the first attempt to sketch the alleged Roman grid. Nothing has been produced rather than the area that stretched on the current Rabat.

Hypothesis of roman re-planning

The analytical work get start from the light path traced by recent studies on the subject and try to provide some additional insights that can be verified only with the help of a more thorough and systematic archaeological campaign. The reading and interpreting method adopted is the one defined by Gianfranco Caniggia. It first involves the identification of routes that shape the fabric and contextually relevant strips that determine their hierarchy. This is necessary for

understanding the way in which the fabric has been consolidated in the course of time, according to those general laws relating to a precise cultural area around of which Malta forms part, which is the Mediterranean. The basic instrument of the research is mounting architectural surveys of the ground floors of the buildings. In this way, having returned the most complete assembly possible of existing buildings in tissues, we proceeded to the identification of these orthogonal grids which define the possible overlaps of built that occurred at different times. Another important factor is the process of medievalization which generally invests the urban fabric, adapting to new cultural needs of the medieval period. All this cannot be separated and must be based on the broader historical record and traceable on archaeological evidence unearthed during the excavations.

The urban fabric of Mdina, in contrast with Rabat, is still enclosed within the massive defensive wall since the Phoenician occupation and reshaped according to the military technology, force in each subsequent period. Today it is structured on a main street with a north-south direction, Villegaignon Street, which connects the city gate with the bastion placed in an not-built area on the north side of the city. This trail overlooks the majority of buildings including specialized buildings as Palazzo Falson, Palazzo Santa Sofia, Palazzo Iguanez, the Convent and the Church of the Carmelites, the Convent of the Benedictines, the Giuratale Tour, the little churches of St. Agatha and St. Peter. In the middle of this axis, opens to the East the town square, on which stands the imposing Cathedral of St. Paul, from which it takes its name, and other specialized buildings such as the former Seminary and the Archbishop's Palace. The western side of the fabric axis, presents a totally different nature: it focuses, in fact, the purely residential fabric of Mdina, which developed along the structuring of St. Nicholas Street, which in turn is polarized in the Porta dei Greci. The secondary routes, orthogonal to the principal route, bud from these two main axis and in the transverse direction (east-west) structured the entire city.

Beyond the walls, the empty area of respect, defining a sort of hiatus, determines the distance from the urban center of Rabat. The route structuring the urban grid is detectable in San Pawl Street and seems to repeat the same direction of St. Nicholas Street in Mdina. Here the fabric is essentially composed of basic building type with the insertion of large specialized complexes of conventual buildings, occupying antinodal areas. It is obvious just by looking at the urban form of Mdina, the concentration of specialized buildings in the eastern than western area and also with respect to the fabric of Rabat over the majestic Cathedral, which abuts the Sacristy, are the former Seminary and the Archbishop's Palace. This could indicate the maintenance of civil and religious functions of the area in Roman times, where would host the temple of Juno, also indicating a probable continuity with the religious tradition of the Phoenician goddess Astarte and after the Punic goddess Tanit. In Rabat, it is conceivable the presence of the Roman Forum in the central area of the fabric, now occupied by a serial specialized building with conventual function. Through time, this spaces, and more generally, those that have specialized, for example along the walls and near the entrance gates of the city, are usually abandoned during the period of late antiquity, when the institutional and administrative structure of the Roman Empire begins to crumble. Over time, these spaces become clogged with specialized constructions (monasteries, markets) or remain unbuilt. Is the case of the site where it is assumed there had probably been a building for the games (amphitheater): in addition, the walls and routes, that just in the vicinity of the suggested site deform and bend, seem to confirm this view. Following the same observations, we identify the site where supposedly there was the Roman theater: it may have been built near the main entrance of Rabat, on the south side, in the urban node into which flowed the territorial routes that connected the city to the countryside, where we assume the existence an important gateway. Here, too, the shape of the curve constructed buildings would resume the typical semicircular shape of the auditorium. Among the few archaeological finds up to today, in addition to the common theatrical masks in terracotta, stands a tomb dedicated to a young comedian and lyre player from Pergamum died in Melite. These help to strengthen our argument. Another important investigative tool is given to identification of the orthogonal arrays based on the

cadastral: these showed a certain modularity of routes and allowed, adding them to the sketched "clues" proposed by D. Zahra, returning an orthogonal credible of the roman structure of Melite.

Overlaying this first hypothetical grid on the cadastral, we could find another phenomenon typical of planned tissues, the so-called "medievalization": during the Middle Ages, the hierarchical routes, such as via principalis and the via Praetoria, great roads with reports not comparable to the needs of the medieval fabric, are obstructed from the constructed facade to the center. It is possible to read these "advances" also on the fabric of Rabat. Another key element to the base of the study was the excavation of the Roman domus and other alleged residential buildings near the south western fortifications of Mdina. Discovered accidentally in 1881, consists of a large colonnaded atrium whose mosaic floor is kept in excellent condition and related environments that are arranged around it. This domus has provided the other possible arrangement of the orthogonal planned grid that has been taken into consideration. Putting all the information from a system we could return a complete and coherent plan of a hypothetical re-planning of Melite, took place under the rule of the Romans.

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Territory and urban planning in Northern Sinaloa: Geometric rationalization of the land structure in the municipalities of Ahome and Guasave.

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Abstract. *A scientific reading of the territorial structure of both municipalities of Guasave and Ahome, in northern Sinaloa, has been carried out starting from the urban analysis through three successive workscales: territory, city and quarter. In the first approach, the agricultural planning of a vast portion of the coastal plain where a hierarchical grid of roads and canals modulate the territory with high precision is detected. At the city scale, it is revealed the presence of natural and historic traces, that compete with the geometric rigidity of the territorial grid to configure the present urban fabric of Guasave. The Sinaloa river and the courses that interconnected the old Sinaloa missions of the 17th century are historical paths that become incorporated into the urban planning of the 20th century, where the development of the central quarter (Colonia Centro) acquires a differential character. The old core mission of the Nuestra Señora del Rosario Church generated, since the 1920s, a urban grid that follows the geometric pattern of the colonial city with square blocks on orthogonal axes deviated slightly from the traces of the agricultural macroplanning. It is flexible in any case, because settles into the plot divergent paths departing north from the church square and sets its limits to the natural accidents or historical traces.*

Key Words: North Sinaloa, Mexico, geometric colonization, agricultural territory, American colonial city, orthogonal and hierarchical network system.

Convenience in territory and urban form research in North Sinaloa

Within the framework of the International Architecture and Urban Planning Workshop 2014, held in Sinaloa, Mexico, managed by the INTHAB (Instituto Tecnológico del Hábitat) and sponsored by the State of Sinaloa and the municipalities of Guasave and Ahome, it has been given an opportunity to a group of architects and town planners from different European and Mexican Universities, to place the first contact with the cities and the territory of Northwest Mexico, and more specifically with the municipalities above mentioned.

The geographical factors of Northwest Mexico and the remoteness of the region in relation to the heart of the country have kept it for ages in a secondary position to the political, cultural, economic and social main dynamics that have been taken place in the rest of the territory of the Mexican Republic. We must consider that the state of Sinaloa is located in Northern Mexico's Pacific Ocean coastline, in front of Baja California Peninsula across the Cortes Sea, and it is also part of this region together with States of Sonora, South Baja California and North Baja California. The region (Ortega, 1999) is framed by the abrupt mountains of Sierra Madre Occidental that run on the South into the belt of volcanic mountains that crosses Center Mexico from West to East. Such geophysical conditions have always made difficult to access the area and have kept The Northwest in an isolated position. The mountain range has proven a major obstacle to the mobility of all of the groups that have occupied Mexico from the beginning of Spanish exploration and, particularly, acted as a physical barrier to who have held the power in the main cities in central Mexico.

For the majority of experts that have travelled to North Sinaloa to participate in the workshop, and specially, for those who came from Europe, the area was quite unknown because there are very few documentary references of the study of its territory and its cities in the circles of scientific production that European experts are used to attend. These published references of the research of the different stages of urban and territorial development of the municipalities of North Sinaloa where we focused our studies, however, do exist, although information is scarce and scattered, and very often is focused from non-technical aspects. Many studies are made under ethnographic or folkloric aspects and are confined to small local areas⁶. Urban and land planning and development have been carried out in recent times: the first half of the 20th century, and they were very distinctive for both Guasave and Ahome, as will be shown. Therefore, it is very interesting to open lines of research in its study but from a different angle and, in any case, based in a scientific methodology.

To put forward this process is necessary to undertake an objective observation in line with the present state of a world that is different from the one we usually find in the European or North American context. Herein lies its strength and originality, thus, in a first phase, that is concerned with this paper, the reading will be basically descriptive and will focus on the analysis of the morphology based on the geometry of the traces that define the territorial and urban structures, determining its layout, hierarchy and metric parameters. The start of this research is complemented by the outline of the context formed by social, economic and historical motivations that influence growth of cities and transformation of the territory.

Historic outline of the urban and territorial development of Guasave and Los Mochis

Guasave and Ahome are the most important municipalities of North Sinaloa, according to demographic, social and economic criteria. They are also very large municipalities⁷ (3.464 y 4.343 km² respectively) that are settled on a coastal plain crossed by the rivers Fuerte and Sinaloa that flow into the sea perpendicularly to the coastline. At the moment, the plain is used for irrigated lands, with fertile soils and presence of water distributed through large hydraulic infrastructures which has enabled the expansion of high-yielding mechanized agriculture, becoming a strategic activity for the national agro-industry.

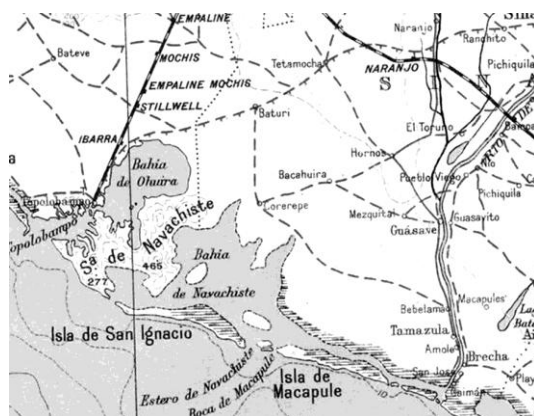


Figure 1. Baja California del Sur. American Geographical Society. N.Y.C., 1923.

⁶ See Colección Presagio: "18 Encuentros con la historia". Culiacán, Gobierno del Estado de Sinaloa, Revista Cultural Presagio, Academia Cultural Roberto Hernández Rodríguez, 2001. y Humphries, Reba, *Los Mochis, historia oral de una ciudad*, Los Mochis, Universidad de Occidente, 1986

⁷ Data from *Instituto Nacional de Estadística y Geografía INEGI*, Mexico.

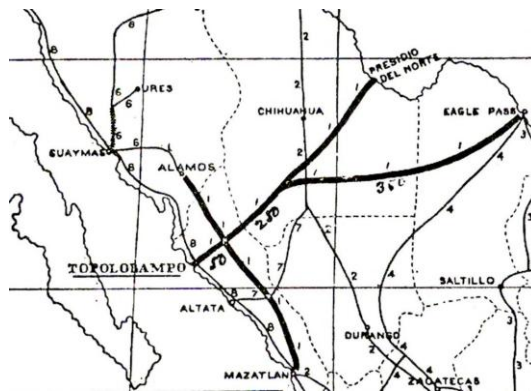


Figure 4. Mexican Railways. Built and projected lines, 1881.

The creation of the port of Topolobampo and the construction of the railway that would link it to the US, unfinished until 1961, from the Atlantic coast (Norfolk, Virginia) to this port in the Pacific coast (Zonn, 1977), lead characters as Albert K. Owen to the Fuerte River Valley for the establishment of an agricultural colony in Topolobampo with American immigrants under the premises of the Utopian socialism in the last quarter of the 19th century (Ortega, 1987 and Moreno Rivas, 1992).

The most important work of settlers was the construction of the largest irrigation systems that were known in the Valley. According to Villaseñor Atwood (2001), under planning carried out by engineer Eugene A. H. Tays, they dug with spikes and blades a main canal, with length 11 kilometers, called Tastes canal, to carry the water from the Fuerte River up to the early settlement of Los Mochis, and also built secondary distribution canals and the cleared 1.500 hectares of wasteland grounds which were going to opened to cultivation (Ortega, 1999).

The initial trace of the village, that determines the core of the city at present, was guided by this set of canals, arranged in parallel to Tastes Canal, and following an approximate North-South direction. The canals are separated a distance of 1 km each other, alternating supply canals and drain canals. Layout gave expression to a functional optimization of irrigation systems, as well as to the most appropriate sizing for a crop field. Installation of sugar industry by Benjamin F. Johnston, in 1902 (Villaseñor Atwood, 2001), expanded the populated area due to the needs of the workers of the company, so commissioned an urban project that would guide the expansion of the city by following the traces already fixed by Owen and Tays. Street lines were traced perpendicular to the existing canals, separated by the same distance of 1 kilometer, generating an urban fabric of square blocks, very similar to the first proposal for the development of the colony in Topolobampo driven by Owen, although never carried out.

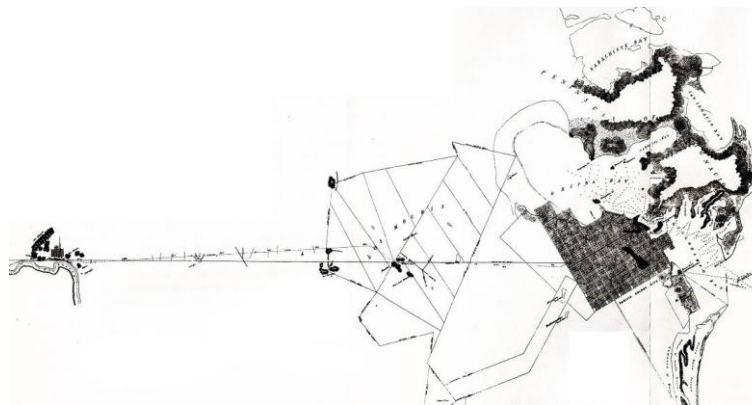


Figure 5. Plan of the first section of the Pacific Railway. Philadelphia, 1885.

Such planning did not follow the tradition of the Spanish colonial city in the sense that there was not a central place in the urban fabric called to host the public square around which would place the Church, the Market and the Government Palace.

Rather, the urban fabric enclosed a principal place that consisted on the plot of the sugar factory and its campus, in which were located the houses of the owners of the company and certain employees of first class; keeping this space closed and segregated from the rest of the population.

As it has been explained, the urban traces of Los Mochis came from the agricultural planning. As urban sprawl has been taking place, the agricultural elements that have been imposing the rationalization of the territory: canals and fields irrigated by them, have been transformed into streets and lots as they were being phagocytosed by the growth of the city which has been extended as oil slick, though profiled by the pattern of 1-kilometre square, to acquire current proportions of about 4500 hectares.

Until Federal Plans for agricultural planning are not taken in the decade of the 40s of the 20th century, Guasave and Los Mochis are listed as different worlds. The agricultural development was accompanied by the construction of large strategic infrastructures of transportation in Northwest Mexico. That programme has the inauguration of the highway Mexico 15 in 1955 as a culmination. Up until that moment Guasave and Los Mochis had traveled different paths despite having the same economic base in an important agricultural development.



Figure 6. Plan of municipality of Guasave. Technical Cadastre Office, 2001.

Reading of the urban and territory form: Guasave and Los Mochis

A scientific reading performed is extended to the territory between the municipal capitals of Guasave and Los Mochis, and goes downscale up to focus on the town of Guasave, completing the process in the study of urban form of the historic center. So that, from this point is developed a methodology of urban analysis through three successive workscales: territory, city and quarter.

Territory scale

On the plain between the towns of Los Mochis and Guasave, a large hierarchical mesh of roads and hydraulic infrastructures modulate the territory with great precision.

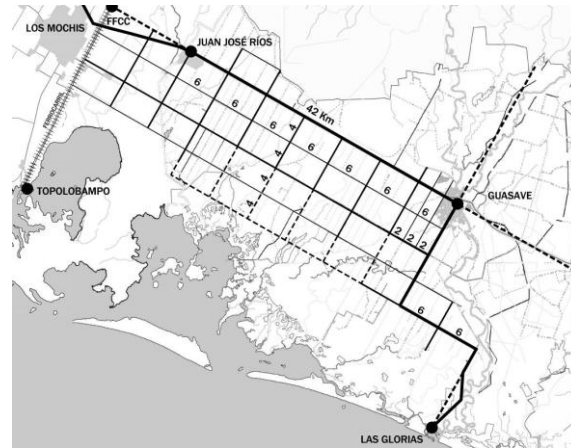


Figure 7. Planned structure of the territory. Own elaboration. Guasave, 2014.

In a first approximation, it is revealed the geometric colonization of a vast portion of the territory. It derived from agricultural planning started from the land reform of Lázaro Cárdenas in the late 1930s that opened the coastal plains of North Sinaloa to intensive cultivation. It also meant a major reorganization of the structure of ownership of the land because achieved the distribution of the major latifundia of the valleys of Fuerte and Sinaloa Rivers (Ortega, 1999), through the location of a large cloud of Mexican Collective Ejidos and the formation of agricultural colonies.

The Federal Highway Mexico 15 runs parallel to the coastline with an approximate orientation from NW to SE (slightly deflected from the orientation of the main grid which guided the growth of Los Mochis area), and is plotted as a straight line that connects the main urban centers of the region because the plain relief does not impose topographical restrictions that could break the trace in about 60 km. Only in the surroundings of Juan José Ríos town, the line takes a slight angle to reach also straightly to Los Mochis.

The mesh is constructed from parallel and perpendicular paths to the main road, and is structured from the cell base of 1 x 1 km square, the same which was adopted for planning urban development of Topolobampo and Los Mochis, that were agricultural developments originally. The hierarchical mesh extends to a length of 54 km and is about 20 kilometers wide.

The elements that compose the grid are linear infrastructures being the referred road of two carriageways the main one. It is recognized the higher order of the base module 6 x 4 kilometers, bounded by the main canals which run alongside traffic roads, which is divided into lots of 2 x 4 kilometers delimited by lower ranked irrigation canals. These are, in turn, divided into 1-kilometre square sub-modules whose limits are even smaller roads and ditches. The territorial structure is very strong and although is interrupted to accommodate the natural courses of rivers that cross the territory, these discontinuities only affect the geometry of the sub-modulation, and do not diminish the strength of the geometry. The main pattern overlaps and commands the constellation of rural villages (known as “Poblados”) of the municipality of Guasave, which are counted in a number close to 450. The majority of the Poblados were born under the structure of the Ejidos, whose inhabitants a piece of ground was assigned for cultivation as well as a plot to establish his dwelling in it, as Juan José Ríos in 1955 (Ramos, 2000); or from the urban consolidation of work camps, as Batamote in 1956, that were in charge of the construction of the large hydraulic infrastructure of the territory.

City scale

After focus the reading at the scale of the city of Guasave, it is revealed the presence of natural and historic traces, vying with the strength and rigidity of the territorial pattern described above, to configure its urban fabric. Among the natural ones stand out the course of Sinaloa River and

Ocoroni Stream; and among the last ones, the urban area of the original mission around the Main Church of Nuestra Señora del Rosario is barely perceptible; as well as the path network that start off from this point, that probably connected all the Mission Pueblos settled along the stream of Sinaloa River. Similarly, the first canals dug around the urban core to convey the waters of Sinaloa River to the crop fields next to the village, before it became the capital of an independent municipality. All that elements are constituted as the traces that are assimilated in its urban growth, that differentiate and sequence the stages of expansion.

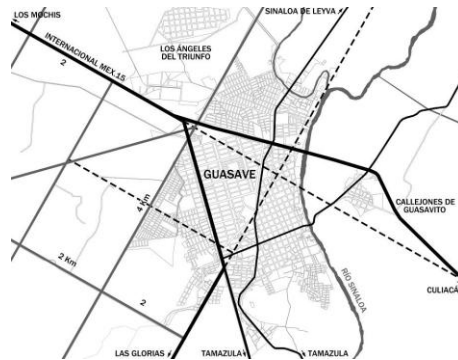


Figure 8. Urban development of city of Guasave. Own elaboration. Guasave, 2014.

The first planned development of the urban core, conducted by the authorities of the new municipality established on 30 November 1916, is known at present as Colonia Centro. It acquired a differential character in relation to the rest of the urban expansion because supposed the expansion of the old Misión core in a historic moment prior to implantation in the territory of the great geometric pattern of water infrastructures that rationalized the plain from the 1950s. It was created a urban fabric that was different from the one that was going to be generated subsequently in hand with the agricultural macroplanning, which will be specifically discussed in the next section. The above mentioned 2 x 4 kilometers territorial sub-module, precisely the one that is at the East end of the grid that already limits to the course of the Sinaloa River, penetrates into the town and imposes its traces on it. The main pattern along with the main diagonals of the mesh, are translated into an ordered disposition of canals, paths and drains that are called to organize the urban growth.

The defining elements of the sub-modulation of the territorial mesh itselfs constitute the West and South city urban limits, while the diagonal canal, almost coincident with the bisector angle of the Northern sub-quadrante of the mentioned 2 x 4 km module, is the main trace that orientates a new reticular mesh which is destined to consolidate the urban fabric produced from the 1970s in the extension of Guasave to the West of the Colonia Centro.

City core scale

As we have seen, the settlement of a small riverside village is conditioned by the presence of Sinaloa River. This primitive location is where a Jesuit Mission settled, a few years after, in 1608. According to Ortega (1999), Sinaloan and Sonoran Missions respond to a specific type of urban settings with a center where was situated the temple, which was the main point of the common life, together with the atrium, the cemetery, the belfry and the missionary house, all located in front and by the sides of the temple. Adjacent to the atrium, the main square served as a meeting place and around it, huts inhabited by Indians were lined. Beyond there were crop and grazing lands and pastures, forming perfectly delimited enclosures. The paths that connected the sinaloan missions form the historical road network that are incorporated into the urban planning of the 20th century, as it seems to be guessed regarding the Fig. 9. The first extension is developed under the geometric pattern of the colonial city with square blocks on orthogonal

grid; although its orientation is governed by the position of the old core mission: the Main Church of Nuestra Señora del Rosario. The axes of the religious building are slightly deflected in relation to the axes of agricultural macroplanning. The first ones guide an urban fabric that has been consolidated since the 1920s, presumably to the North of the current Street Doctor Luis García de la Torre whose eastern end wades the Sinaloa River. Its area is clearly confined, therefore, by the city of the 1920s, to the South, by the Sinaloa River, to the East and by Doradito Canal (now Central Boulevard), to the West. The mesh has a different metric to our known cases since its origin seems not to come from the rationalization of agricultural land. It also presents certain peculiarities. The regularity of the plot is based on the 100-meter square block, with 20-meter road section that seems accentuated by recognizing higher-order modules, super-blocks of 4 x 4 basic blocks. These higher order units have a dimension of 480 meters by 460 meters, next to the 1/2-kilometre square module, sub-module of those already used in Topolobampo, Los Mochis and in the agricultural planning of the territory. The mesh, however, has some flexibility because is defined in the urban environment and is adapted to the particular circumstances that the preexisting elements impose. From East to West, one block of 80 x 100 meters is included in every super-module that causes the undefinition of this higher order with pure square geometries. A row of these blocks arises in the pattern to accommodate the divergent paths that depart northwards from both long sides of the church square; and this narrower block appears repeated on the adjacent super-modules. We have seen that the limits of Colonia Centro are marked by natural accidents and historical traces. They abruptly cut the grid on the perimeter which is formed by triangular or trapezoidal plant blocks generating sometimes sharply angled chamfers.

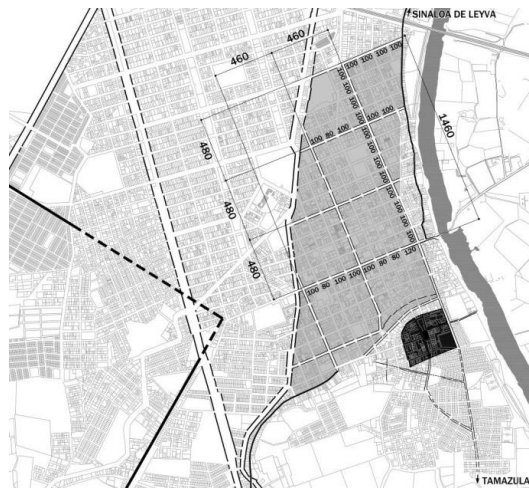


Figure 9. Urban structure of Colonia Centro. Own elaboration. Guasave, 2014.

Conclusion

At present, the territory of Guasave and Los Mochis appears characterized by elements that define a regular and potent geometry; because they come from the rationalization of the land for intensive agricultural exploitation. These frames also condition the urban growth of the main towns which adapt to them formulating urban fabric and block metrics on the basis of the lower sub-modules of the main agricultural structures. It appears, however, interesting peculiarities as the case of Guasave primitive core and its first extension, opening research paths towards understanding the territorial and urban structures of the Missions era and towards the study of planning, genuinely urban planning, that was held, certainly in North Sinaloa, as was the development of Colonia Centro.

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The memory of informality: the typological cycles in the self-built environment

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Abstract. *Informal or self-built settlements are concentrations of dwellings, built without compliance to official norms or urban planning. Today, it is estimated that there are approximately one billion people living in these conditions. This represents about one third of the world population living in cities today. Of crucial importance to understand these agglomerations is to capture their changes in time. However, such a task represents a challenge because these settlements are rarely documented in records or official sources. An attempt to track these changes based on the example of one of these cities: “Ciudad Nezahualcóyotl”, a one million people city, that during the last fifty years has been informally developed as part of the Metropolitan Area of Mexico City. Such a method is based on the identification and analysis of the typology of dwellings and their transformation through the time. Based on empirical evidences, we may say that morphological changes in informal settlements do not occur at random or chaotically. Rather, such changes are susceptible to be explained and traced back at the urban scale, by means of the observation of building types and the logic of changes they follow in time.*

Key Words: informal settlements, typology, consolidation, Mexico City.

The informal city and the morphological analysis

Traditional studies of urban morphology are based on the idea that certain rules of transformation over time dictate changes to the fabric, and that the organization and development of the fabric are not random, “but follows laws that urban morphology tries to identify” (Levy, 1999: 79). In his article, at the end of the last century, Albert Levy asked also the question, if such logics and laws were susceptible to identify not just in historical fabrics, but also on *modern urban fabrics*⁸, for which new tools of analysis were required.

Fifty years after this publication, the same question remains as relevant, because new types of cities and urban forms arise. One of this new urban agglomerations is the *informal city*, that “comprises the *slums* of the developing megacities, where the informal sector has its base; where services are poor or non-existent; and where residents are invisible to legal status systems” (Un-Habitat, 2003:23).

Quantitatively, this type of city represents a very extensive phenomenon. By 2003 it was estimated that about one third of the world urban population (approximately one billion people) was living in dwellings built without compliance to official norms or urban planning, and growing outside the conventional urban and constructive systems around the world (ibid, 2003).

After many decades of politics and actions used to tackle the phenomenon of informal urbanization, today the strategies to improve the livelihoods of slum dwellers are manifold: these include improvements on transport, generation of employment, empowerment of the inhabitants and improvement of the municipal finances, among many other strategies.

Spatially, allocation of resources to poor areas requires a geographical map of poverty. However, such a task represent a challenge because these settlements are rarely documented in records or official sources. Moreover, the urban fabric produced in the informal city is not

⁸ Levy describes the elements of the *new urban fabric* as completely autonomous, where constructed space no longer corresponds to the plot; where there is no longer a clear relation between one building and another, and between buildings and streets or open spaces (Levy, 1999:83).

simple and the social structure in irregular settlements is far from homogeneous within a single city or even within one settlement (UN-HABITAT, 2003:169).

The conditions described above have given rise to a series of attempts to map poverty, even facing the scarcity of official sources or census available. Informal settlements have been interpreted then as “urban texture” with the purpose of correlating morphological patterns with poverty (Barros and Sobreira, 2005). This concept is based on the quantitative analysis of the surface and configuration of the buildings as well as the internal emptiness or voids between buildings. Hence, the results based on the use of satellite images argue that the urban texture of informal settlements can be analyzed in terms of fractality and lacunarity. That is to say, informal settlements contain morphological characteristics which can also be found in the nature, properties which indicate a hidden order. In this sense, an estimation of the population density or the spatial patterns of informal settlements could be obtained from remote images, offering new possibilities for a mapping and classification.

Informal settlements have been also the focus of some morphological analysis at the scale of the building. A practical utility of this approach is the recognition of the design qualities of the informal settlements regarding the design solutions for the local environment. Such an analytical framework seems to be feasible, if we think about the informal settlements as a process and product of vernacular architecture (Rapoport, 1998: 351-377).

Considering the questions above, the field of urban morphology stands here as an opportunity to develop new tools of analysis based on the physical qualities of the territory. The objective then, is to show the main findings of a method to unfold the internal spatial differentiation of informal settlements.

Such a method should link the scale of the plot to the scale of the city. But most important, this tool should be intended to be based on non-skilled human resources or sophisticated data. In fact, information gathering about informal settlements (enumeration or mapping) is in many cases produced by the inhabitants themselves⁹ (Patel, 2012:3-12).

The informal construction process

In Latin America, informal settlements appeared mostly as a consequence of the rapid urbanization and industrialization occurring after World War II. In 1930, most of the population still lived in rural areas, whereas by 1980, over half the population lived in urban areas. This was due mostly to natural growth and rural-urban migration. In addition to this growth, there was a rapid social polarization that was reflected in the real estate sector.

Due to low wages and the precarious nature of economical development in real estate sector, housing for the working class was not a priority. Therefore, the urban poor acquired their housing in their own way, in some cases subdividing mansions abandoned by the wealthy. This was the case in some areas of Mexico City. Alternative low cost dwellings arose, with people building their own squatter dwellings and later on the quasi-legal purchase of land from people who illegally subdivided their property (Ribbeck, 2004, 35-43).

These settlements are spread throughout the urban area. In many cases, they are located on land that is inadequate for housing due to flood risks or steep hills where building is difficult and infrastructure is costly to provide.

As opposed to “formal” urbanization, which begins with an urban plan, a legal delimitation of property, infrastructure and services necessary to complete the building, informal urbanization begins backwards. First the informal settlers build the dwellings, then bring in the infrastructure and finally define the ownership. At the same time, in the structures as such, a series of constructive stages can be observed (Ribbeck, 2002; 2005: 159-171).

The network of streets in spontaneous urbanization is carried out in an orthogonal manner ensuring a relatively rational distribution of infrastructure. Within this orthogonal scheme, the

⁹ For more information, see the special issue of the Journal *Environment and Urbanization* 2012 24.

dwelling is developed with some freedom since there are no formal restrictions that limit or control the growth of the dwelling as such.

The building process can be carried out in a fragmented manner but a patio for lighting and ventilation purposes is generally used. The construction is usually based on a minimal concrete structure with modular cells measuring about 4 by 4 meters (about 12 by 12 feet). These are grouped either linearly or serially for a flexible use of space to accommodate: sleeping, living, a room for the children, shop or a storage area. Another use is for business: a small store, a micro-factory, or rooms could be rented out and thus become an important source of income. The continuous construction of cells doesn't follow any design scheme or floor plan; it is rather a cellular kind of growth.

Based on the principles of informal dwellings, a house develops by following a step-by-step growth pattern. It generally begins with the use of temporary materials. Growth usually begins in the form of an "I" or "L", usually with the creation of a multi-use patio. As more and more cells or rooms are added on, the patio usually disappears and is transformed into a hallway. The dwelling begins to grow vertically once about 2/3 of the surface has been built on. As the dwelling grows upward, windows are opened up for lighting and ventilation as the open inner areas have been drastically reduced.

A family's need for space can reach a limit and at that moment the dwelling stops growing or falls into disuse because some family members have moved away. In other cases, the dwelling continues to grow, not for the family, but to be sublet out to other families. In this case, comfort is drastically reduced since per person space has diminished and illumination and ventilation have also decreased.

The informal construction cycle stops with the complete substitution of the dwelling. This occurs in older settlements (around 50 years old), although it is also seen sporadically in younger ones when these are located in strategic areas- on main streets or in downtown areas.

The informal city Nezahualcóyotl

An example of the informal construction process is "Ciudad Nezahualcóyotl", a 1.1 million people city which during the last fifty years has been informally developed as a part of the Metropolitan Area of Mexico City. Ciudad Nezahualcóyotl (short named "Neza"), originally informal settlement, has been self-constructed over the last fifty years and with 25 km² and more than one million inhabitants, is one of the largest and most densely populated informal settlements in the world (see Figure 1-a).



Figure 1a. Location of Ciudad Nezahualcóyotl, Mexico City (source: Castillo).

The city locates on the former Texcoco Lake, which at the beginning of the 1950s had several kinds of proprietors including common share, federal property, national property, and private property. Amongst this confusion, the lots of land of the old Texcoco Lake were further fractioned into smaller lots grouped in neighborhoods or "colonias" and placed for sale by illegal developers, with prices decreasing in direct relation to the distance to Mexico City. In spite of the existing confusion regarding the property of land, the Mexican Government had

been authorizing developments since 1949 (García, 1992). Some of these developments needed to be regularized as the allocated lots of land were already sold and occupied.

Due to the massive amounts irregularly plotted lots in the old Texcoco Lake region (near to four thousand hectares), in 1958 a Law for Developing of Land of the State of Mexico was issued. Through this law the developers were forced to adapt their projects to certain urban planning measurements, such as the donation of surface for green areas and public services of at least 10% of the total surface area. Further, the law required streets with minimum width of 12 meters and a front of at least 10 meters.

A surface area of 4,000 hectares, bordered to the North by the remains of the Texcoco Lake, to the East by the Chimalchiuache mountain, to the South by the Zaragoza Avenue, and to West the latter built Peripheral Circuit.

The land surface was divided in more than 25 modules or “mega-blocks” of approximately 1 km by 1 km (see Figure 1-b). Free spaces for public areas for urban equipment such as public schools, clinics, markets, and churches was appointed towards the interior or perimeter of the mega-blocks. These public areas had the purpose to concentrate services for each mega-block. There was no space left for a main place or a recreational space for the whole city; the only place of this type was a space appointed to lodge the administration of the City. Each mega-block held approximately 90 blocks, and each block was divided into roughly 50 lots of land each, which had an average measurement of 150 m² (9 x 15 meters).

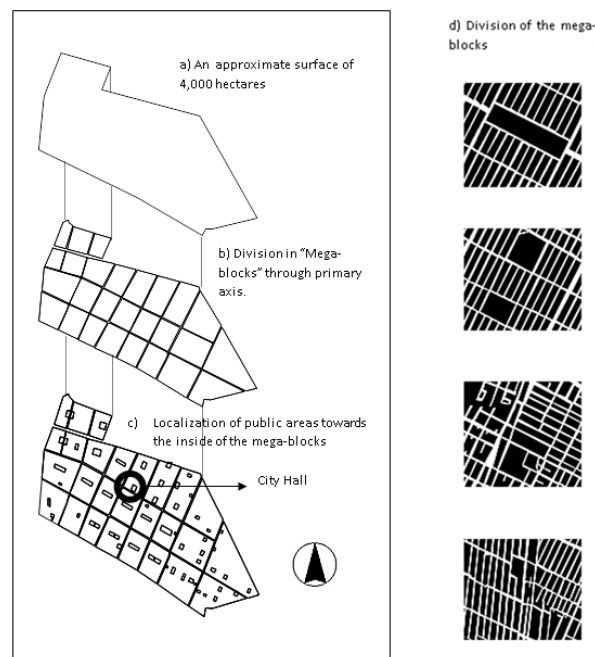


Figure 1b. Parceling of the Nezahualcóyotl City and the types of Megablocks (source: Castillo).

The parceling out of the land was not repeated in the same pattern for the entire surface. For some of the areas, which had already been occupied, the developers refused to donate lots for the creation of public areas. This resulted in mega-blocks with variations in the regularity of its plotting and in the distribution of their public areas. Some mega-blocks were created with spread public areas, and other mega-blocks were created with big orthogonal zones that measured roughly 500 x 120 meters. Other mega-blocks grouped their public areas in one, two, or three squares that limited the avenues. There was also the creation of mega-blocks with the primary characteristic of the planned division for commerce and public services in public areas of different location and surface.

After almost three decades of social struggle for services and legalization of plots, this large informal settlement finally became a municipality in 1962. With its legalization, a massive program for the construction of infrastructure started, and the inhabitants continued with the self-construction of their houses.

As a first step to document an intra-urban differentiation in Ciudad Nezahualcóyotl, a graphical documentation, of the dwellings was carried out. To undertake this study, the facades of 43 blocks from different parts of the city were first selected and photographed. Once photographed, the facades of each building were organized into blocks of drawn -approximately 1800 buildings. As a further step a typology of dwellings was defined. Some of the main typologies are in the following described¹⁰.

Buildings in process of consolidation

After 50 years from the beginning of its urbanization, one can still see the first steps of the informal building in Ciudad Nezahualcóyotl. At this stage the physical structure is the easiest to see: a 4x4 modular concrete skeleton, filled with bricks or stones of concrete. This structure may be covered with a concrete or a slightly sloping roof which outlines (when looking from the street) the limits between the room and an internal courtyard.

When the house acquires window openings, a visual relation to the street begins. The perforations may be placed on one or both sides of the door. The complete façade remains either without or only partially plastered. Particularly the corners may be used for small commercial activities. Due to the fact that many walls had not been completely finished, they are often used for commercial or political advertising.

The building process of the second floor of the informal building doesn't occur automatically but rather one step at time. An approximately 4x4 meters wide room on the second floor signalizes where the densification process begins. This room is built on one or the other side of the plot (see Figure 2). Sun exposure or wind direction seem to play no role in deciding which side of the plot will be built; even in contiguous houses the verticalization may start in opposed directions. The second floor may be illuminated and ventilated through the street or through the courtyard.

Later on other rooms are added to the already existing room on the second floor. The new rooms are all aligned on the same side of the house. Once the new rooms are built, the house is plastered and colored and an "L" form defines the new façade.

Especially if the first floor of the corner building is occupied by commercial activities, the densification of the plot develops faster. If this occurs, the entire second floor is built at once, leaving no internal spaces nor a courtyard. In this case half of the building that is plastered is used as a store, while the other half remains under construction.

Consolidated buildings

A saturation of the front side signals that the densification of the rest of the plot is still in progress. The new rooms on the second floor may be built on any place on the plot. The built spaces are articulated by balconies or terraces. With this densification the courtyard begins to lose lighting and ventilation.

Saturated buildings

To the original "L-shaped" façade other rooms are adhered in form of patches. On the top of the house a third floor may begin to form with a provisional iron-sheet roof supported by columns,

¹⁰Due to the fact, that the commercial activities are present in practically all the types of buildings, the mixture of land use was left aside in order to reduce the complexity of the categorization. For detailed information about the building typology, see Montejano, 2008.

precisely the same manner as in the very beginnings of the informal building. With time the iron sheets are replaced by a concrete roof and the skeleton is filled with bricks. In other cases the densification takes place but the courtyard remains and as a result the façade takes the form of a small tower.



Figure 2. Building typology in Ciudad Nezahualcóyotl, Mexico City (source: Castillo).

When the room on the top receives a plaster coating, the building and the perspective changes: the building seems higher because of the small erected tower. The building gets a different expression too, a different one than that of a house. Small windows on the top signify a complementary use.

Multi-storey buildings located on the corner of a block differs greatly from those located in its center. The ones in the middle are used as housing apartments with a repetitive typology, whereas the corner buildings are occupied by dense commercial activities, this in turn influences the size of the doors and windows, in order to take maximum advantage of the location.

The limit of the construction density seems to stop at the fourth or the fifth storey. This type of building may be built traditionally or professionally. The fourth storey may be built all at

once or it may start with a small room which develops step by step just as in the previous examples.

A morphological characterization of blocks

Based on the literature and the empirical evidences, so far we may conclude that the process of informal construction corresponds to a *typological change*, where ‘alterations and changes to existing buildings form the basis for a new concept of the house or leading type which, in turn, form the basis for the construction of new houses. Further alterations to those new, as well as previously built houses form the basis for another change in the leading type and so on through cycles of building’ (Kropf, 2001:33).

Departing from this assumption and in the absence of official records to measure the speed of change of the buildings, the approximated age of the city¹¹ was compared to the “morphology” of the blocks. To make this, and according to the typology described above, the facades of 43 blocks were categorized per block (approximately 1800 facades, and divided in three types of buildings: “buildings in process of consolidation”, “consolidated buildings” and “saturated buildings”). The result is a map indicating the proportion of buildings inside each block (see Figure 3).

As is seen in this figure, the majority of blocks consist mostly of “buildings in consolidation” (the white segments of the chart) which are mostly concentrated in the south-eastern and north-eastern areas. In other words, in the younger settlements areas, whereas in the old settlements area this proportion is lower.

At first glance, one would expect the different blocks to have the same quantitative distribution of buildings’ types. However a closer inspection shows that they don’t, in fact they were different and the proportions of building types varied in each block (chart). For example in some blocks, three quarters of the chart were white: in others, half of the charts were gray. This leads to the conclusion that one can further differentiate the types by finding “common denominators” (typical mixtures of buildings between the blocks), and for this reason, they have been organized according to three categories.

Low consolidated Blocks. These blocks consist of approximately three quarters of buildings in process of consolidation and the rest consists of consolidated buildings. Multi-storeyed buildings are seldom.

Semi consolidated Blocks. Approximately a half of these blocks are buildings in process of consolidation and the other half consists of consolidated buildings with a very few proportion of saturated buildings.

Consolidated Blocks. These Blocks contain the highest proportion of saturated buildings or buildings in a post-consolidation stage. The consolidated buildings represent from 25% to 50% and the rest (in variable proportion) consists of buildings in process of consolidation.

In order to geographically visualize the types of Blocks found in Neza, they were represented by points with different color (see Figure 4). Finally the points of the same color were joined. This way, it can be distinguish between six clusters with different levels of consolidation: three red clusters, two yellow and one orange.

Results

It can be seen that in a span of 50 years, Consolidated and Semi Consolidated Blocks can be found, whereas, in areas with an approximate age of 25 years, Low Consolidated Blocks are typical. An interpretation of these results makes necessary to consider the historical context of

¹¹This information was documented from aerial photographs.

the settlement and, all above, the relationship between this settlement and the growth and changes of the Megalopolis.

The red clusters, which are mostly comprised of *Consolidated Blocks*, were found in 3 different locations, which are describe in the following.

a) This area was developed before official restrictions on the size of plots, streets and public areas were introduced. For this reason, this area has a rather irregular spatial structure: there is no a clear hierarchy of streets; the streets are not parallel to the rest of the city and public facilities are not equally nor clearly distributed. Functionally, the type of commerce which developed in the area is relatively traditional and specialized: commercial strips of clothing, auto parts and a meat market, whose merchandise are introduced to the city by large trucks or food containers which pull over in the periphery of Ciudad Nezahualcóyotl, along the metropolitan ring

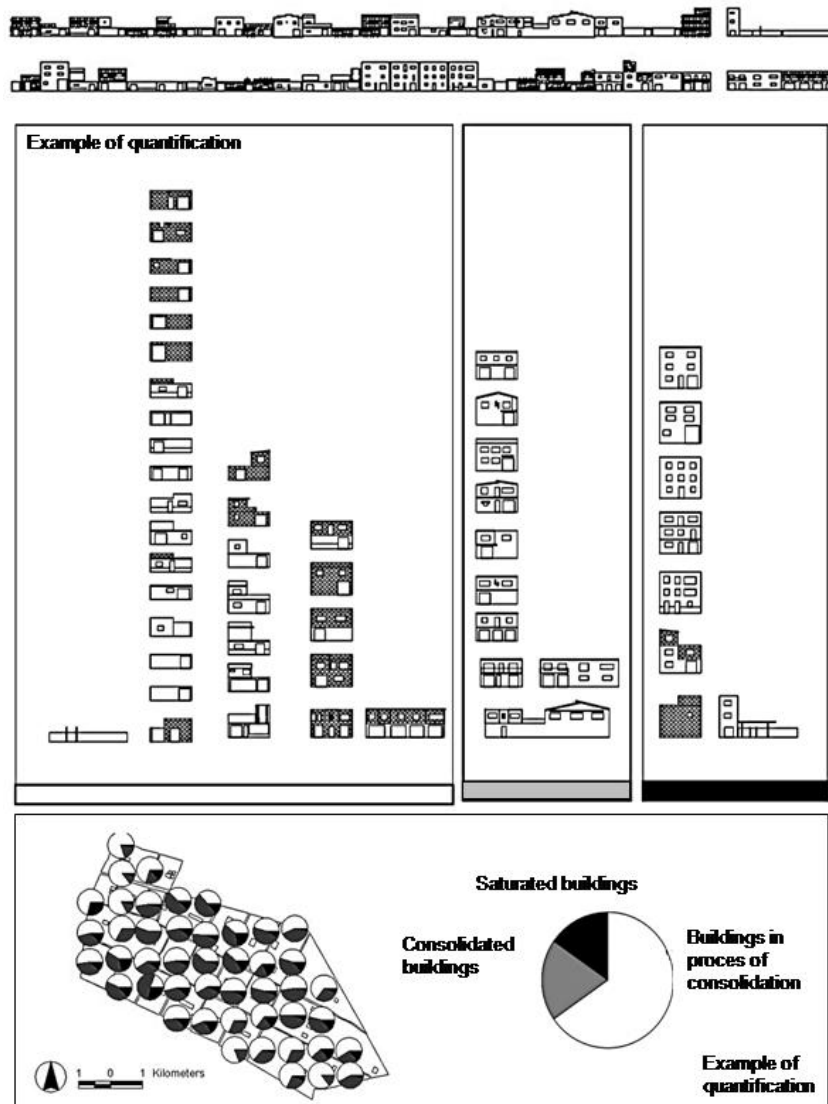


Figure 3. Quantification f building typology on the blocks (source: Castillo).

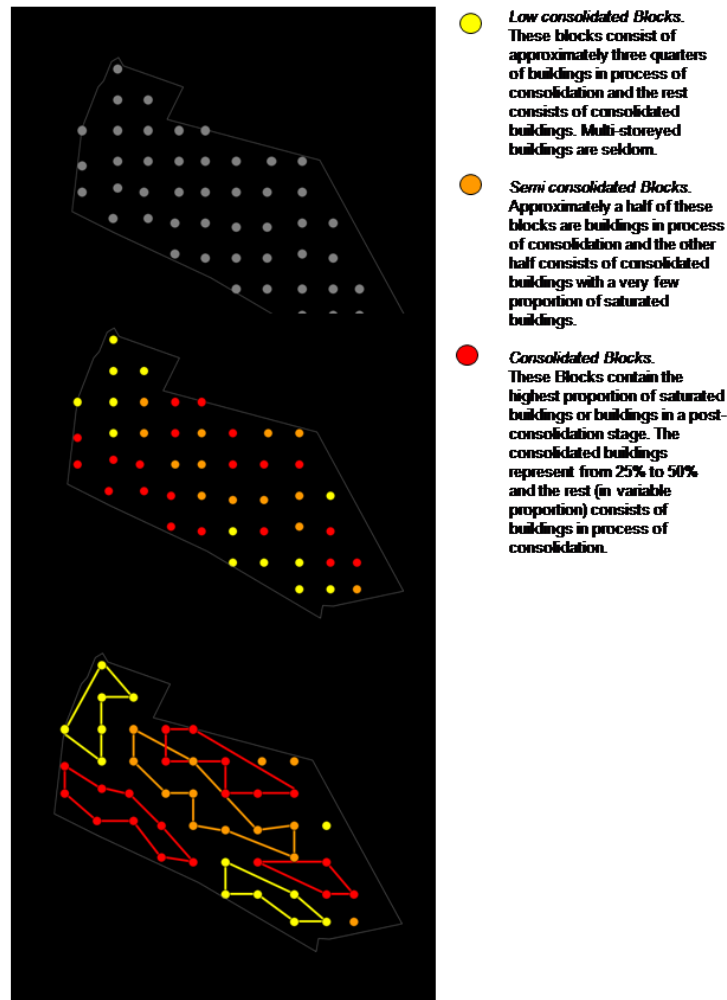


Figure 4. Mapping of block Typology in Ciudad Nezahualcóyotl, Mexico City (source: Castillo).

b) An area that has a regular spatial structure. It was occupied by the end of the 1960s. The connection between this area and the Metropolis is the best of all the areas. The avenue which goes through the middle of the area has the largest section of all the avenues and these connect Ciudad Nezahualcóyotl to the metropolitan ring. The accessibility here was further increased thanks to the construction of a metro station, just on the crossing between the main corridor and the metropolitan ring. Along the main corridor all kind of commerce is located: from specialized and traditional ones -like parts for sewing machines-, to fast-food chains and huge stores for construction materials. More than a half of the houses are consolidated, less than a quarter are multi-storey buildings, and the rest consist of houses in consolidation.

c) The area close to the City Hall. This area was occupied around the late 1960s. It has a regular spatial structure, with a clear hierarchy of streets and space left for public facilities. Spatially and functionally, the City Hall has influenced without doubt the land use and the consequent social arrangement of the area. Close to the City Hall, banks, furniture stores, restaurants, stores for office material and the like have appeared. Spontaneous centers have appeared not just in front of the City Hall, but also in the back: linear commercial centers which join together the Neighborhoods through an imaginary line. This intensive commercialization reflects in the morphology of the area: more than a half of the buildings are consolidated with approximately a quarter of them multi-storeyed; the rest is composed of buildings in process of consolidation.

d) An area that is located far from the Metropolis and belongs to both the oldest and to the youngest areas. Its spatial structure is neither regular nor the distribution of spaces left for public facilities; these distribute apparently by random and the spatial arrangement of the streets run parallel to the rest of the city, but these streets have no clear hierarchy in comparison to the other areas. In opposite to other areas, the buildings here at a first glance are not too old, and still the less consolidated houses are not deteriorated nor seem to be stagnated in the middle of the informal building process: more or less a half of the buildings are still in process of consolidation, while the rest consist of consolidated and multi-storey buildings. Curiously, commerce has not developed here as intensively as in the rest of the city. There is just a commercial strip in the main avenue and the concentration of banks and commerce is not the rule.

On the opposite end, the Young Settlements Area is mostly comprised of *Low Consolidated Blocks* with the following characteristics:

e) This area has a regular spatial structure with well distributed space for public facilities. It was occupied around 1980 but since then the living conditions have not improved much. This area is particularly isolated from the city of Nezahualcóyotl and from the Metropolis because this area limits with the rest of the lake to the north and it limits to the west with the metropolitan ring, which was built at a topographical altitude over the roofs of the houses. All this conditions have made of this place practically a cul-de-sac. Due to a relative low density, the speed of urban consolidation (drinking water and energy supply, drainage construction) was very slow and the area did not developed commercially, perhaps as a consequence of the same spatial isolation. Morphologically almost three quarters of houses are still in consolidation and there is a low amount of consolidated houses (more or less a quarter).

f) This area is also a young one, occupied around the 1980s. It has a regular spatial structure and the spatial distribution of public facilities is different to the other areas, in size, number and form of space for public facilities. Due to its relative low density, the urban consolidation, like the previous area, was slow. Considering the types of buildings, around three quarters of them are still in process of being consolidated and just a quarter consists of consolidated houses. Multi storey buildings here are seldom and that reflects in the almost absence of commerce. The social and spatial qualities of this area are mixed but in average the “indicators” for physical consolidation of the houses are predominantly low: in some parts of this area half of the houses have no drinking water into the house and the percentage of “cuartos redondos” or “one room dwelling” reach almost a fifth of the total. The structure of the population is either not homogeneous but it is composed of predominantly young families.

The rest of the City, the orange cluster, is a “buffer zone” which is composed of Semi Consolidated Blocks:

g) The area was occupied mostly at the end of the 1960s. The spatial structure is regular and the spaces for public facilities are homogeneously distributed. Thanks to a high density and the fact that the majority of the neighborhoods were included into a legalization program initiated in 1973, the urban consolidation process in this area was relatively fast. In 1970 the whole area was included into the sewage system network of the city and by the same year this area was supplied with energy. Ten years later, the number of paved streets here exceeded by far that of the younger areas. In this area no buildings for administrative purposes was built like the City Hall or similar, and the commercial corridors exist, but not as saturated as in the other areas. According to the typology used in this work, approximately half of the total houses have reached a consolidation level; just a few of the buildings are saturated, and the rest of the buildings, -almost the other half- are in process of consolidation.

Conclusions

The results allow us to conclude, that the morphological stage of “equilibrium” or “consolidation” may be a useful principle to identify some clues for the heterogeneity of the

social structure within informally developed settlements. The potential of the method developed in this work is nevertheless limited to the Ciudad Nezahualcóyotl case study. To research an eventual generalization of the method other settlements should be naturally considered. Each settlement has an own history and very specific local conditions. However, for the method exposed there are some variable conditions which could be considered in further detail.

Natural and topographical conditions influence without doubt the physical form of informal settlements. An informal settlement at a hill or at the coast will develop in form and constructive conditions very different from those developed at a plain terrain or in a city located thousand meters above sea level, for example the city of Mexico.

Another factor is the size and the form of the plot. How large or how small the plot is, will have a direct influence on the possibilities of internal development of the house as well as the proportion of the sizes of the plot.

The age of the settlement will influence also not just the changes in the house but also the land use of the building. Population in young settlement have needs which differ strongly from the needs of population in old settlements. The building thus may become a vertical commercial building, informal renting apartment, or it may remain with a residential use with the corresponding morphological typology.

In conjunction with the factors mentioned above, the location of the settlement into the city and induced planning measures will have also a direct influence on the way and the speed in which a settlement change.

With the latter, we may confirm the idea that urban morphology goes beyond giving answers to the logic of the built environment patterns, and may also provide us with powerful tools to decide and prioritize public upgrading actions.

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The positive dissemination: interpreting a new process for urban form analysis

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Abstract. *This paper discusses the role of the urban form for the positive dissemination processes inherent to urban phenomenon. Positive dissemination means the interrelation of urban elements/factors, so that an action is analysed according to its propagation effects, resulting in a continuous transformation over the urban system, with impact on its regeneration. Certain places, public spaces or buildings, by their syntactic, typological and/or functional features, have the capacity to trigger such processes. Throughout a diachronic study of Évora (Portugal) urban form, under the Space Syntax perspective, configurational changes were identified and interpreted as the reflex or origin of new urban dynamics which contribute to urban dissemination processes. The results and corresponding discussion enabled the creation of a conceptual and methodological framework to categorize the selected cases, aiming at the distinction between positive and negative dissemination focus, as well the differentiation of their morphological, functional and resilience characteristics. By integrating a wider research that aims the creation of an urban regeneration strategic model boosted by positive dissemination processes, this study intends to contribute to the understanding of such processes when directly dependent from the case type.*

Key Words: *Positive dissemination, urban regeneration, systemic perspective, urban morphology; Évora (Portugal).*

Introduction

Under sustainability and urban regeneration perspective, urban projects, surgical interventions or tactical actions in the city promote global and long-term changes. Such results support the assumption that city interventions trigger changes in urban dynamics and promote a prosperity atmosphere that radiates into the system, expressing “positive dissemination processes”. This idea means the interrelation of urban elements/factors which enables the effects propagation of a particular action, resulting in a continuous transformation over the urban system, with impact on its regeneration. It is assumed that certain places, public spaces or buildings, by their syntactical, typological, functional and/or resilience features, have the capacity to trigger such processes.

This paper explores the positive dissemination processes inherent to urban phenomenon, supported by the study of cases in Évora (Portugal), selected according to a diachronic study of the city form under the Space Syntax perspective (The Theory of the Social Logic of Space). Throughout this investigation changes were identified and interpreted as the reflex or the origin of new urban dynamics which contribute to positive dissemination processes. Considering that the effect propagation in the urban fabric is related to its ability to be more or less permeable to such process, syntactic descriptions about that urban fabric accessibility are explored as tools with the potential to promote the comprehension of positive dissemination processes.

Because the main purpose of this research is to understand such processes when directly dependent from the case type, it is intended to develop a conceptual and methodological framework to categorize the selected cases. Besides that, it is aimed to distinguish between

positive and negative urban dissemination focus, as well to differentiate their morphological, functional and resilience characteristics. The methodological approach implied the research and critical reflection of urban form theoretical references.

This study is part of a wider research that seeks to set cross parameters to validate and evaluate the positive dissemination phenomenon able to inform and support a city intervention model, oriented to its regeneration and sustainability. The subsidiary premise establishes that because positive dissemination processes has the ability to magnify the effects of implemented actions, their comprehension will help to achieve improvements in the environment, maximizing resources and reducing investment.

Methodology

The methodological approach has a first phase based on the results of a previous morphological study about Évora (Gonçalves *et al*, 2013a), under the perspective of Space Syntax (Hillier and Hanson, 1984), by which positive dissemination focus were identified. The syntactic analysis enables to study the arrangement and interrelationship of space systems elements, by assuming that there is a social logic underlying the built space layout, and describing it by topological features among these elements. Configurational issues also reveal functional and social aspects inherent to the urban system throughout the “potential of movement”. Movement here is analyzed as an indicator of the relational aspect in urban space, translating how the space configuration interferes (and suffers interference) in the city flows distribution (Medeiros, 2006), assuming a leading role in the impact evaluation of urban changes. The previous study included the construction of axial and segments maps, in order to model pedestrian movement for different periods of the city's growth. The axial map consists of a representation containing all possible routes within an urban fabric, based on its simplification by tracing the fewest set of the longest lines. The lines position and interrelation in the system allows the calculation of different syntactic measures. The segments map comes from the axial map, in which the lines are divided between intersections, allowing a more accurate prediction of the movement pattern because are considered the direction changes, or continuities, important factor to the distance perception and routes choice (Turner, 2009). The maps show a gray scale that measures the variable level at each axis/segment, being the darker tones the higher levels and the lighter tones the lowest ones (Figure1, 2, 3 and 4). The syntactic analysis allowed the identification of centralities – high level of potential movement – and segregated areas, contributing to select positive dissemination focus.

The second phase focused on the construction of a conceptual and methodological framework to categorize the selected cases, aiming at the distinction between the urban dissemination focus which carry positive and negative effects, as well the differentiation of their morphological, functional and resilience characteristics, i.e., an urban system capacity to incorporate change without losing its features (Walker and Salt, 2006). The proposed categorization framework is grounded by the syntactic analysis, positive dissemination cases/focus and theoretical references concerned with the urban elements classification.

Finally, at the third phase, through the results discussion, it is expected to achieve a sustained contribution to the understanding of positive dissemination processes and corresponding performances when directly dependent from each case features.

Évora urban dissemination focus

Interpreting a syntactic analysis

Évora city, located in Portugal inland, is characterized by its confined delimitation that grew by its attraction power over the surrounding regions. The settlement presents deep differences

between its parts: the historical zone (the inside-walls classified area), the consolidated area (walls adjacent areas) and the emerging city (formed by the territory discontinuous filling).

The syntactic study of Évora urban form evolution looked into the existing positive dissemination processes (Gonçalves *et al*, 2013a). Interpreting the morphological diachronic changes, it was assumed that the urban expansion and transformation can contain itself urban dissemination processes. It was also possible to evaluate and measure the potential movement patterns in the urban system using the Integration and Choice variables. Integration deals with the system accessibility. The most integrated axes are the most permeable, accessible and, probabilistically, the most used according the configuration role. It means that the most integrated axes will have a greater ability to create movement, which is crucial to urban dynamics, constituting a potential centrality and assuming a leading role to the attraction of movement flows and diversity of uses. Thus, Global Integration and Local Integration reveal, respectively, global and local potential centralities in the system. Moreover, Global and Local Choice indicate the most used segments in the global and local routes in the system, respectively.

The maps comparative study and corresponding correlations with the attractive characteristics of some urban stretches, under Whyte (1980) perspective, allowed the deduction of uses distribution and the most attractive areas with an effective ability to influence and contaminate positively the surrounding environment. Urban areas, public spaces and buildings of great attractiveness were identified by their physical and visual qualitative characteristics and by their configurational features. These ones correspond to high levels of accessibility and use, and leads to a non-conscious appropriation by individuals and a form of behaviour compatible with the potential movement pattern (Hillier *et al*, 1993). A more accessible and permeable space tends to be more used ending as a meeting, passage and usufruct place, easily subjected to transformations throughout social interactions which gradually disseminate the corresponding effects from space to space.

On the other hand, less accessible and segregated areas were also identified, corresponding to places with a tendency to be less used and with reduced functional and social diversity. These ones, when associated with marginal uses, insecurity and physical degradation may be classified as negative dissemination focus. Although these cases are not the study object, they are defined by opposition to the positive dissemination focus helping to consolidate their understanding.

Syntactical analysis reveals, through the Global Integration values, that “Ringstrasse” around the city walls (n.14) is the centrality of Évora urban system (Figure 1). By its strategic position in the urban fabric, attracts and articulates several functions: Polis (n.40), the city walls urban regeneration program, Horta da Porta Neighbourhood (n.33), Remédios Monastery (n.43), Bullring/Multipurpose pavilion (n.9), Epral school (n.34), Espírito Santo Hospital (n.24), Patrocínio Hospital (n.25), Public Garden (n.26), Rossio de São Brás Square (n.11), Cafe (n.23), Gabriel Pereira school (n.4) and Pingo Doce supermarket (n.17).

Syntactic study of Évora’s evolution (Gonçalves *et al*, 2013a) revealed that, in earlier times, the most integrated axes were coincident with those of Evoracom (n.7 – Figure 2), currently the most used paths for the journeys within the intramural city. Evoracom was an urban regeneration program implemented on historical streets and commercial buildings, and included interventions at Giraldo Square (n.12), Avis Square (n.13) and Porta de Moura Square (n.22). The position of Giraldo Square in the urban fabric works as an attraction point, recruiting the city users, and as a distribution node. The paths that depart from here towards city gates have a high use too, creating urban dynamics that affect the buildings nearby, e.g., residential buildings (n.1) and institutional, services or commercial buildings subject to conservation and/or rehabilitation actions. The Sepúlveda Palace (M’ar De Ar hotel unit - n.2), S. Domingos complex (n.6) and Garcia de Resende theater (n.42) are located in synergy with the path towards Porta da Lagoa (a city gate). Towards Rossio de São Brás square (another city gate), is located the Municipal Market (n.30), Verney College (n.36) and D. Manuel Palace (n.21).

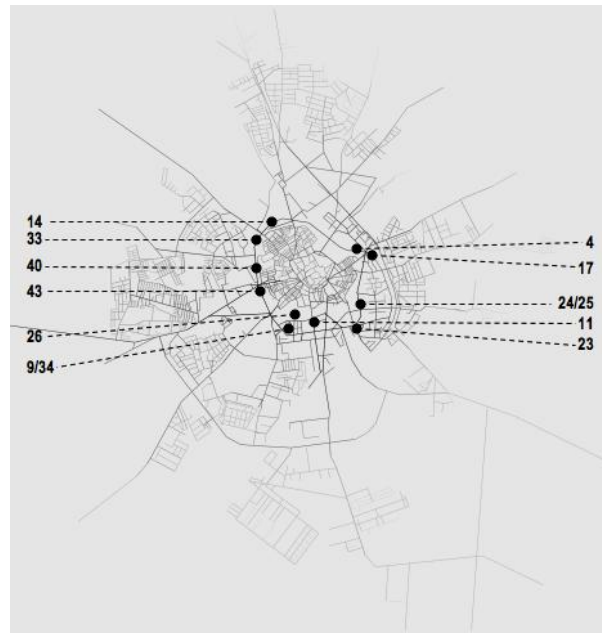


Figure 1. Syntactic analysis (axial) – Global Integration (2013).

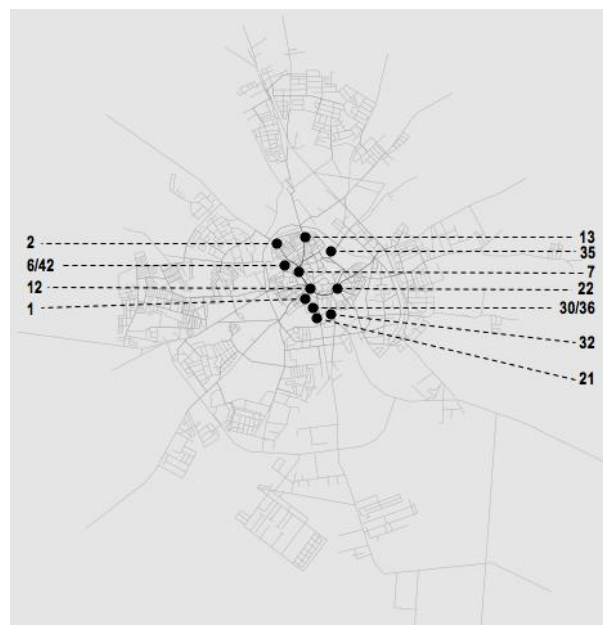


Figure 2. Syntactic analysis (segments) – Local Choice - R1200m (2013).

Near some of these high use routes are located the Eborim shopping centre (n.32) and Cerca de Santa Mónica private condominium (n.35). Although their privileged positions in the urban fabric, were selected for being classified as negative dissemination focus. Eborim shopping centre is now closed and going through a process of physical degradation. If working, it could be an attractor in the city. Cerca de Santa Mónica, because it is a private condominium, promotes spatial and social processes of segregation, with no relation with the surroundings (Ribeiro, 2012).

The maps and syntactic measures reveals that Roman core (n.15) is spatially segregated (Figure 3). However, it is a place of great influx of people, especially tourists. This is due, firstly, to the fact that the zone is bounded by the memories of the Cerca Velha (first city walls), the first ringstrasse, which have a high potential of movement. Secondly, because there are located monuments of great historical value, e.g., the roman temple (its surroundings integrates the urban regeneration program Acropole XXI - n.44), the Cathedral (n.19) and the roman baths inside the City Council building (n.20).

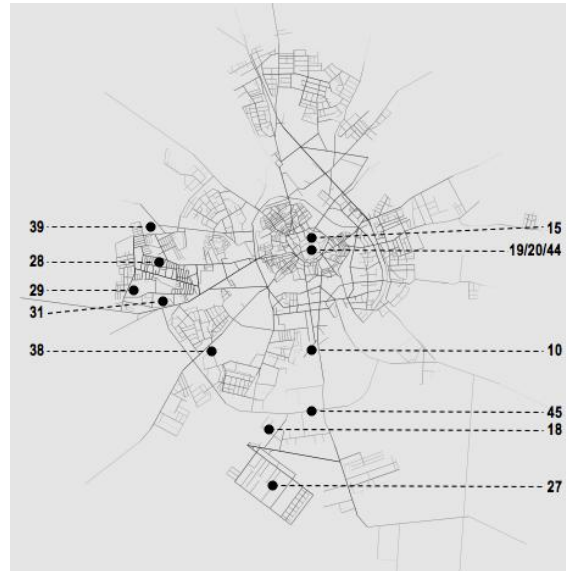


Figure 3. Syntactic analysis (axial) – Local Integration - R5 (2013).

The city expansion outside the walls consolidated some local centralities (Figure 3), the first of which, between Rossio de S. Brás Square and the Train Station (n.10).

Another local centrality is the industrial zone where are located the Évora Industrial and Technological Park (n.27), Intermarché supermarket (n.18) and Almerim industrial area (n.45).

Malagueira (n.28), Santa Maria and Alto dos Cucos residential neighbourhoods constitute another local centrality which attracts other uses, e.g., the Maintenance Lane (n.29), a precinct for the sport activities. Nearby these neighbourhoods are located the Municipal Swimming Pools (n.39). At the south of this area, but with accessibility low levels, therefore more segregated, is located the Cruz da Picada social neighbourhood (n.31). This case is considered a negative dissemination focus, because it has a negative connotation due to insecurity feeling and some physical degradation.

Ecopista (n.8 - Figure 4), a pedestrian and cycling pathway resulting from a recycled railroad, is also contributing to new local centralities formation, the north residential areas. Ecopista articulates spatial heterogeneities (Gonçalves *et al*, 2013b) and presents itself as a constant choice in the daily routes. Adjacent to Ecopista is the old “Leões” Factory (n.3), built in a direct relationship with the railroad. The old factory is now the Architecture School and keeps the connection with the new Ecopista – the preferential pedestrian access.

The Turgela stream (n.38), despite the syntactic values below average, like the Ecopista case, introduced configurational changes to the urban fabric. What previously constituted a barrier became permeable and generated a new movement pattern and consequently new urban dynamics (Figure 3).

The Global Choice variable analysis (Figure 4) enables to conclude that, outside the walls the routes that come from the city gates are the most used. At the pathways that come from Raimundo gate articulated with the southern variant road (the third city ring road) are located

distinct functions, e.g., Bus Central Station (n.41), Severim de Faria school (n.5), Horta das Figueiras commercial area (n.37) and Continente supermarket (n.16).



Figure 4. Syntactic analysis (segments) – Global Choice (2013).

The conclusions of configurational study by syntactic analysis demonstrate that accessibility is an important factor to conform local or global centralities (and usage densities). This study is also an instrument for the selection of positive dissemination focus (and negative – cases n.31, n.32 and n.35) in Évora which are to be evaluated and classified (Table 1).

The proposed classification system seeks to answer to specific purposes of the research and it's not supposed to be a single taxonomy of physical, formal and functional urban elements. In this context, and always considering the selected cases, use was made of the analysis and reflection of relevant theoretical references to support the proposed classification system.

Urban dissemination effect classification

The study focuses on positive dissemination cases, which are places, public spaces or buildings, that generates and attracts movement, promotes social interaction and are useful and profitable for the urban system. Are identified by the positive influence on the urban surroundings at multi dimensions: environmental (built environment regeneration, accessibility, diversity of uses), social (diversity, influx of people) and economical (trade, diversity of activities). In turn, negative dissemination focus are the place, public space or building, devalued and counterproductive in the urban system, that promotes movement dispersion and dissuasion of social interactions. In contrast, are identified by its uninhabited and devoid content at multi dimensions: environmental (degradation of the built environment, poor accessibility, lack of uses), social (absence of people or affluence of problematic and delinquent groups, insecurity feeling) and economical (lack of activities and no trade).

Morphological classification

The morphological approach aims to study the settlements through their urban fabric configuration, its volumetric characteristics, land use and subdivision, including configurational changes observed over time, focusing the growth and transformation patterns and processes (Heitor, 2001; Carmona, 2003).

Urban form studies have specificities that enable the identification of distinct approaches: historical, historical-geographical, descriptive and normative approaches, this last one through mathematical techniques, in which Space Syntax fits (Heitor, 2001). With reference to Rossi (1966), Conzen (Whitehand, 2001), Lynch (1960), Krier (1975), Kostof (1992) and Carmona (2003) studies, articulated with the syntactical analysis results and facing the selected cases/focus, morphological categories proposed are arranged by scale, type and form (Table 2).

Table 1. Urban Dissemination Focus

	Designation	Location		
		Historical City	Consolidated City	Peripheral City
1	Housing Rehabilitation at Historical Centre	x		
2	Sepúlveda Palace/M'ar De AR Hotel	x		
3	Leões Factory/Architecture School – Évora University			x
4	Gabriel Pereira school		x	
5	Severim de Faria school			x
6	S. Domingos Complex	x		
7	EVORACOM – Comercial Urban Regeneration Program	x		
8	Railroad/Ecopista		x	x
9	Bullring/Multipurpose pavilion		x	
10	Train Station		x	
11	Rossio de São Brás (square)		x	
12	Giraldo Square	x		
13	Avis Square	x		
14	Ringstrasse		x	
15	Roman Core/1 st ringstrasse	x		
16	Continente Supermarket			x
17	Pingo Doce Supermarket (Rotunda do Bombeiro)		x	
18	Intermarché Supermarket			x
19	Cathedral (century XIII)	x		
20	Évora City Council	x		
21	D.Manuel Palace (century XVI)	x		
22	Porta de Moura Square	x		
23	Coffe shop (R.Chafariz Del Rei/Av.S.João de Deus)		x	
24	Espírito Santo Hospital	x		
25	Patrocínio Hospital		x	
26	Public Garden	x		
27	PITE - Évora Industrial and Technological Park			x
28	Malagueira Neighbourhood			x
29	Maintenance Lane			x
30	Municipal Market	x		
31	Cruz da Picada Neighbourhood			x
32	Eborim Shopping Centre (closed)	x		
33	Horta da Porta Neighbourhood		x	
34	Epral Professional School		x	
35	Cerca de Santa Mónica Private Condominium	x		
36	Verney College – Évora University	x		
37	Horta das Figueiras Shopping Area			x
38	Turgela Stream			x
39	Municipal Swimming Pools			x
40	POLIS – City Walls Urban Regeneration Program		x	
41	Bus Central Station			x
42	Garcia de Resende Municipal Theater	x		
43	Remédios Monastery		x	
44	ACROPOLE XXI – Urban Regeneration Program	x		
45	Almeirim Industrial Area			x

Table 2. Morphological categorization

Category	Definition	Cases
Scale		
Urban Area	Group of built elements and public spaces, in an area more or less bounded physically, of similar properties, continuity and spatial features, formal and/or typological homogeneity, to which is associated a common vision (Lynch,1960; Rossi,1966).	7;15;27;28;31;33;37;44;
Public Space	Includes all open spaces, all kinds of spaces between buildings (Krier,1975) and open access spaces, regardless of their shape and/or function.	8;11;12;13;14;22;26;29;38;40.
Built Structure	Buildings or physical structures, urban phenomenon element, which implementation, aggregation and/or alignment conforms the system of open/public spaces.	1;2;3;4;5;6;9;10;16;17;18;19;20;21;23;24;25;30;32;34;35;36;39;41;42;43.
Type		
Morphological Unit	Group of streets, plots and/or buildings, which presents uniformity regarding its formal characteristics that distinguish it from the surrounding areas (Heitor,2001; Whitehand,2001).	6;7;15;27;28;31;33;35;37;44;45.
Path	Public space of linear features which constitute circulation channels. The paths are the elements by which the whole can be organized (Lynch,1960).	8;14;40.
Node	City strategic location, constituting a confluence place, focus of attractiveness and movement distribution (Lynch,1960).	11;12;13;22.
Precinct	Open space, with public access, but bounded by physical barriers such as walls or hedges, may having or not restricted timetable.	26;29.
Autonomous Element	Isolated/independent building or physical structure. Sometimes are elements of singular characteristics that distinguish it from the others and works as a landmark (Lynch,1960). Are autonomous elements, buildings surrounded by open space and monumental structures that stand out and enable an autonomous reading, even when physically connected to other buildings.	2;3;4;5;9;10;16;17;18;19;21;24;25;30;32;36;38;39;41;42;43.
Dependent Element	Building or physical structure aggregated to other buildings, part of a group or a facade, with no autonomous reading.	1;20;23;34.
Form		
Regular	Space, place or urban structure with linear features or pure geometric forms, understood as the ideal shape (Carmona,2003).	
Irregular	Irregular, natural or organic shapes, corresponding to spaces, places or urban structures implemented according to the urban fabric availability which arises throughout its history and by an improvised process (Kostof,1992). Not corresponding to any pure geometric form, seem generated by a natural and non conscious process, based on pedestrian movement and influenced by the topography (Carmona, 2003).	
Loose	Space, place, or built structure, not closed or physically constrained, with flexibility characteristics and formal adaptability (Carmona,2003). According to Peña (1987) flexibility can be assessed under extensibility, convertibility and versatility criteria.	
Tight	Space, place, or built structure, physically constrained, or controlled, rigid and inflexible (Carmona,2003).	

Functional classification

The study of urban form is not indifferent to the functional dimension. The literature review showed that functional classifications proposed by many authors rarely are dissociated from the spatial form. According to Kostof (1992) an exclusively formal approach has limitations. The functional dimension is about how the spaces work, i.e., how the environment supports the uses (Carmona, 2003).

Syntactic analysis reveals a hierarchy of movement established by the urban fabric configuration, defining areas of greater or lesser concentration of flows. The areas of greater concentration of movement tend to be more attractive and to draw uses and functions that take benefit from this movement (Medeiros, 2006). Though, it is believed that positive dissemination processes are not exclusive of configuration features, movement patterns and densities, i.e., can be generated and boosted by attractiveness features of certain uses and activities. So attractive uses have the ability to attract and to create new and more movement flows which can promote changes in the spatial configuration (Medeiros, 2006), and have the ability to trigger and boost positive dissemination processes. Thus the functional attractiveness refers to the space occupation when determined by the attractiveness power of a function or activity inherent to that space, regardless its morphological characteristics (Ünlü, 2009).

In view of theoretical considerations of Lynch (1960), Rossi (1966), Krier (1975), Kostof (1992), Carmona (2003), Brandão (2008), Ünlü (2009) and Gehl (2010), and the selected cases/focus, the proposed functional categorization considers two levels: the first related to diversity and, the second, related to specific functions that each case/focus can include (Table 3).

Resilience classification

The resilience concept is a sustainability key attribute. In the urban phenomenon context resilience is associated to the idea of durability, maximization of resources, requalification of problematic areas and urban regeneration. In this matter resilience is an important condition for the urban system elements. Though, facing negative dissemination focus, the system resilience is not a desirable condition because it can put the system in a situation of persistence even when interventions are implemented aiming the change towards a positive dissemination process. Vulnerability in such cases is an advantage because it works as a facilitator of a transformability process to reverse the negative and counterproductive situation.

Urban system resilience or vulnerability is related to its basic morphology and infrastructures that support its growth and dynamics. Experience suggests that urban areas with higher permeability, mixed uses, diversity of buildings and shared public spaces, tend to have greater ability to accommodate change (Carmona, 2003).

In view of these considerations each case/focus is classified, firstly, as resilient or vulnerable, secondly, as robust, diverse and/or accessible (Table 4).

Results and discussion

This study led to the definition of a conceptual and methodological strategy to categorize positive dissemination focus in Évora (Figure 5). The strategy requires, firstly, the translation of the syntactic analysis results, secondly, its correlation with the discussed theoretical references and with the observed phenomena *in situ*.

The syntactic analysis, through graphical and quantitative tools, enabled the study of urban fabric configuration and revealed characteristics such as centrality, continuity, segregation, confluence or dispersion points. The study allowed the classification of positive (and negative) dissemination focus, contributing also to their morphological classification. The resulting movement pattern denounces the most accessible places and, consequently, the areas with an higher probability to be attractive for users and activities and to be places of diversity, with

implications for the functional classification. The most accessible places tend to present a greater ability to incorporate changes and new uses, a relevant factor for the resilience classification.

Table 3. Functional categorization.

Category	Definition	Cases
Functional Diversity		
Multifunctional	Space, place or building in which different activities take place simultaneously. Are also considered multifunctional the spaces that, because of its flexibility characteristics, support several uses, planned or not, at different times (Carmona,2003).	6;7;8;9;11; 12;13;14;15; 20;26;33;38; 40;44.
Monofunctional	Space, place or building for a single use. The monofunctional spaces tend to be physically constrained or controlled spaces (Carmona,2003). Includes industrial areas and residential neighbourhoods, even when there are some local services and activities of proximity.	1;2;3;4;5;10; 16;17;18;19; 21;23;24;25; 27;28;29;30; 31;34;35;36; 37;39;41;42; 43;45.
Function		
Movement	Space or urban structure for car and/or pedestrian flows, i.e., for circulation function. The pedestrian movement also contains cultural, social and economic functions (Carmona,2003). Movement corresponds to a necessary function which occurs regardless the exterior conditions and the physical environment quality (Gehl,2010). According to Rossi (1966) movement is one of the key functions of the city. This category also includes "travel spaces" as stations, interfaces and parking (Brandão,2008).	7;8;10;11;12; 13;14;22;38; 40;41.
Social	Space or urban structure where activities that depend on the people affluence and interaction occur, e.g., festive events, games, kiosks and cafes (Brandão,2008; Ünlü,2009; Gehl,2010).	6;7;8;11;12;13; 15;23;26;33; 38.
Economic	Space or urban structure where people and activities affluence correspond to economic flows, by goods or services trade. The economic function comes also associated with industrial areas intended to confer economical benefits to the city.	2;6;7;9;11; 12;13;15;16; 17;18;22;27; 30;33;37;45.
Institutional	Space or urban structure that works as public or institutional equipment and seeks to meet the needs of the population, e.g., health, education and culture. Includes hospitals, schools and cultural equipments. Act as catalysts due to their contribution to urban dynamics (Rossi, 1966).	3;4;5;20;21; 24;25;34;36; 39;42;43;44.
Residential	Built element, neighbourhood or building, with residential characteristics, satisfying a city major function (Rossi,1966).	1;6;28;31;33; 35.
Leisure	Space or urban structure where occur activities related to the contact with the nature and landscape contemplation or related to cultural, memorial, historical, and symbolic function. Includes a functional dimension of aesthetic and/or visual nature. Correspond to optional activities carried out under favorable external conditions and/or attractive physical environments (Gehl,2010).	8;9;11;12;13; 15;19;20;21; 22;26;29;38; 39;40;42;43; 44.

Table 4. Resilience categorization.

Category		Definition	Cases
Resilience And Vulnerability			
Resilient Consolidated	And/Or	Spaces, places or buildings, with capacity to absorb disturbance and to undergo change, retaining essentially the same function, structure and feedback, i.e., systems capable to be subject to changes without crossing the threshold that puts the system in a new different regime (Walker and Salt,2006). Resilience depends on robustness, diversity and accessibility factors.	1;4;5;7;10;11; 12;13;14;15; 16;17;18;19; 22;23;24;25; 26;27;28;29; 30;31;32;33; 34;36;37;39; 41;42;44;45.
Vulnerable Object Of Intervention Cionado – New Life Cycle	And/Or	Spaces, places or buildings, vulnerable to disturbance and change acquiring a new function, structure and/or feedback, i.e., systems that cross a threshold towards a new distinct regime when subjected to certain changes (Walker and Salt,2006). Includes the cases with a new life cycle due to an intervention. Vulnerability depends on factors such as the lack of robustness and diversity. Accessibility is also a crucial issue for the space vulnerability.	2;3;6;8;9;20; 21;35;38;40;43.
Factors			
Robust		Space, place or building, with ability to accommodate change without significant changes to its physical form, often impregnated with value, meaning and/or symbolism, resisting to functional obsolescence (Carmona,2003). Robustness depends on adaptability and flexibility features, typical of loosen forms.	
Diverse		Space, place or building that supports different types and patterns of social and/or functional activity. Diversity strengthens the system resilience once it allows greater variety of responses, greater ability to absorb disturbances and greater flexibility (Walker and Salt,2006).	
Acessible		Space, place or building, with a permeable and central position in the system. Accessibility influences how the consequences of a change implemented in one part of the system are felt and answered by others, in terms of speed and firmness (Walker and Salt,2006). Accessibility levels, in this research are quantified by syntactic measures.	

The articulation between the proposed categorization system and the cases/focus indicate that their features have direct implications for the performance and dimension of the transformation processes experienced by the city. Urban areas and public spaces with high levels of accessibility and usage tend to be more efficient to trigger positive dissemination processes. Built structures, tends to be more permeable to such processes when triggered by surrounding public spaces. And attractive uses are a key factor to trigger these processes, once they have the ability to attract and to create new and more movement flows which can promote changes in the spatial configuration.

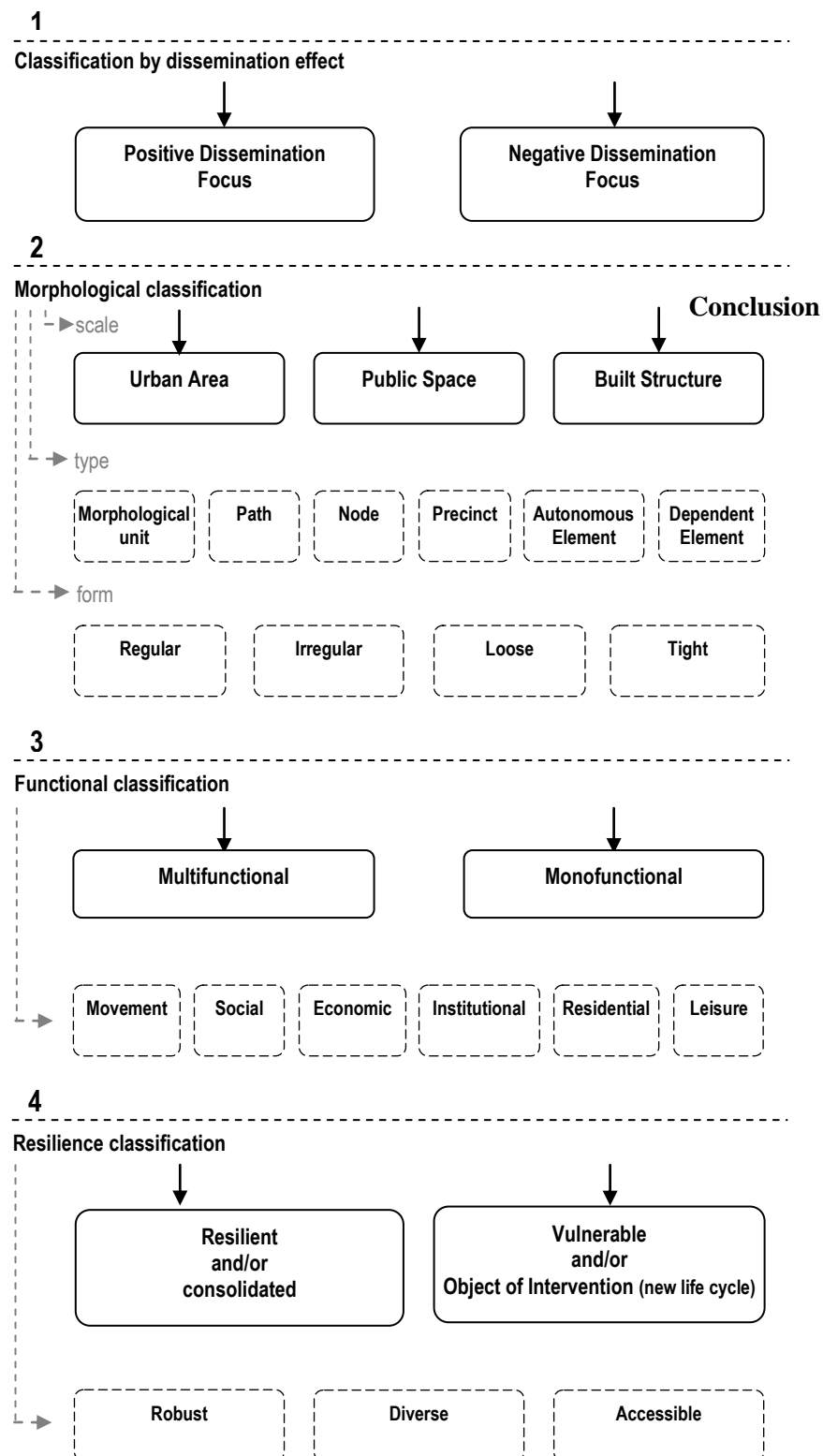


Figure 5. Categorization System.

Referring to positive dissemination focus in Évora which deals with the urban dynamics affecting the environment, this study searched the definition of morphological, functional and resilience categories. The aim was a contribution to the positive dissemination processes, and corresponding performances, understanding when directly dependent from the case characteristics. Once categorized the cases/focus, the future goal is a new selection, in the universe of positive dissemination focus, that were subject to intervention in the past and shows, today, transformations in the surroundings directly related to the intervention. Then it's intended to apply an evaluation and evolution model of positive dissemination processes and create past, present and future scenarios. Once confronted these scenarios and correlated with the categories inherent to each case, the objective is to achieve an accurate assessment of the transformation processes performance in the city. Through this approach, it will be possible to construct a theoretical framework, illustrated and sustained by the study of cases in Évora. The final aim is to develop and validate a generator model of urban regeneration strategies boosted by positive dissemination processes believing that these processes are natural facilitators of the urban system sustainability.

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The sociability of the street interface - revisiting West Village, Manhattan

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Abstract. *This paper examines the micromorphology of street interfaces, considering how street life is shaped by the emergent pattern of built form and spatial layout. In an effort to reassess Jane Jacobs's conception of liveability, the study uses urban form and space syntax methods to record the changing micro socio-spatial texture of West Village, Manhattan. The paper discusses the way in which pedestrian experience varies and changes as the characteristics of street facades change: from the postmodern solid block front to an alignment of short row house facades or from a wholly domestic setting, to a street lined with shops and businesses. In order to understand the urban streetscape as a place of social activity, the study examines the built volume in terms of building-street connections aggregated within a block frontage. The resulting pattern is analysed to consider how morphological properties might give rise to street interaction. The study also maps the mixture of buildings by age and relates this pattern to the spatial distribution of non-domestic land uses, the street network configuration and associated urban interfaces. Conclusions suggest morphological features of the built form which are more likely to generate and support a vibrant street-life over time.*

Key Words: *Micromorphology, urban interfaces, Jacobs, West Village, row house.*

Introduction

The field of urban morphology has fundamentally contributed in a morphological reading of the built environment identifying the basic components of urban form: the building, the plot and the street (Conzen, 1960; Caniggia and Maffei, 1979; Korf, 1996; Çalışkan and Marshall, 2011). One of the main inquiries of morphological studies refers to the organisational rules of the way building units are aggregated to consist urban space. Space syntax studies on the other hand, aim to shed light on the social output of spatial patterns, to interpret 'the social logic of space' (Hillier and Hanson, 1984). Combining principles and methodologies from both fields, this paper aims to examine the way the urban components work together (the building, the plot and the street) to configure varying spatial and in turn social situations in the street domain. The study focuses on the role of building-street connections in creating sociable places.

In one of the earliest publications of the subject, *The Social Logic of Space*, building-street interfaces are seen to shape social encounter. (p.143). Subsequent work by Julienne Hanson's (2000, 2009) identifies the potential role of building morphology, as an extension of urban interfaces¹², in creating sociable places. This street scale focus, lies within the wider context of the way in which cities are theorised in the field of space syntax, where the spatial and physical properties of urban space are seen as generators of movement patterns, which in turn shape patterns of potential co-presence and encounter, creating the 'virtual community' (Hillier 1989, p.13). The author suggests that space distributes the physical presence of users and thus organises the potential patterns of co-presence and encounter. Co-presence and encounters are thus two basic preconditions for social events to be generated within space. The aim of this

¹² In Hanson's words regarding non-lively streets: '... the whole story is one of a ruptured interface between dwelling and street' (2000, p.113). This relates to Jacobs's observations regarding the importance of 'eyes on the streets', namely of a building-street interface that allows for interaction between the users of the building and the street occupiers or moving pedestrians.

study is to build on this work by looking at the way varying types of interface bring about varying potentials for interaction. The analysis here focuses on a detailed analysis of how buildings aggregate along block faces, testing the hypothesis that building-street interface corresponds to the street's wider connections within the city's street network.

The discussion in this paper is based on mapped and quantitative data collected for the area of West Village in Manhattan, New York. Acknowledging academic critiques that seek for an evidence-based investigation regarding the validity of some of the mostly cited, yet empirical, urban design theories (extensively discussed in Marshall, 2012), this study revisits West Village to take a step towards reassessing Jane Jacobs's conception of *liveability* using quantitative data and a morphologically informed approach.

Furthermore, leaving aside theoretical motives, West Village is an interesting case in its own right due to its particular built form properties. Restrained by the physical limits of a fixed geographical area, urbanisation processes in the Manhattan Island have been continuously challenging the building volume, building densities and the potentials for a vertical expansion of the city. However, West Village stands out as a special case within the Manhattan metropolis. Since 1969, Historic District Designations have protected the historic building stock of West Village. The surviving row houses in the Village are not just reminiscent of the neighbourhood's picturesque qualities; instead they are living carriers of the past and the present. Being used, altered and re-used over time to house shifting densities, uses and lifestyles, the historic built form works as an incubator for street liveability. At the same time, the non-historic parts of the area, lying at the urban blocks of the west waterfront, have faced far more extensive transformations which included block-scale demolitions and redevelopments as well as gentrification projects. As a result, the present state of the Village streetscape brings together varying morphological urban settings; from row houses and tenements, to post-modern blocks and former industrial buildings. In this respect, West Village consists a rather interesting case study where we can explore and compare the levels of social activity that varying morphological settings appear to support and develop over time.

In what follows, the discussion introduces briefly the role of citywide urban forces in shaping the spatial and physical context in West Village historically. Then, the properties of the historic built form in terms of the building-street interface are described. Following this, the current Village streetscape is analysed in terms of the social encounters organised by the built form. In particular, the study looks at the properties of the street interface in historic and non-historic parts of the case study area. Finally, the paper discusses the role of the street network in configuring varying street profiles.

West Village

With its street gridiron dating back to 1790 (almost 20 years earlier than the Commissioners' Plan of 1807-11), West Village is considered one of the oldest parts of Manhattan. Located in proximity to the financial district and downtown city centre, the Village was challenged by the pressures of urbanisation as early as 1830s (Ware, 1965, p.9). In its early development the area was building up a profile as a desirable neighbourhood for the wealthier parts of the population, which soon attracted an extensive spread of row housing. At the same time the piers and transport depots were forming the industrial west waterfront. This strong functional split – and correspondingly, morphological split in terms of the built form – has since played a definitive role in the history and development of these two contrasting districts: the Village heart, later to become part of the Historic District Designation, and the west waterfront which has faced large scale demolitions and redevelopments.

From the earliest period onwards, the varying socio-economic forces of the spreading urbanity started to shape the diverse architectural profiles of the neighbourhood (Dolkart, 2009:115-116). Figure 1 summarises the contrasting urban forces which were challenging West Village at the turn of twentieth century. Most of the row houses were gradually converting into

multiple-occupancy, if managing to escape demolition by giving way to tenements, apartment buildings and small industrial units¹³. Building development varied in order to accommodate the needs of shifting populations, functions and economic standards. The row houses (both new and existing) were converted into work-live units¹⁴ or apartments for single living. Tenement building spread around the area to house manual labourers, creating challenging densities, high lot coverage and consequently leading to poor living conditions. High-rise apartment buildings with commercial ground floors filled up the north-south citywide street alignments, such as Sixth and Seventh Avenues. And finally, warehouses and small manufacturing units to support industrial uses were constructed on the western Village blocks close to the piers. The profile of the neighbourhood changed even further with the extension of Seventh Avenue in 1914 and Sixth in 1918. These street extensions increased the area's centrality within the Manhattan grid and turned the Village into more of a passage, rather than just a self-contained area. Figure 2 shows space syntax analysis of the Manhattan street network before and after the street extensions (darkest colours represent higher values in accessibility and permeability¹⁵), illustrating the sudden increase in the area's significance within the city network. During the second half of the twentieth century, the physical unity of the neighbourhood underwent dramatic transformations, some of which had a significant impact on the social image of the streets. An example of such redevelopment was the demolition of all buildings in the block bounded by Barrow, Morton and Washington Streets to be replaced with post-modern housing (construction started in 1969 and completed in 1974).

Notwithstanding all these pressures, a significant number of row houses survived in the area¹⁶. Protected by the Historic District Designation in 1969, the row houses in the heart of the village are today intermingled with younger buildings, creating vibrant street qualities of functional and morphological mixture. Mapping the features of the West Village streetscape in the present times (c.2011-2013) and comparing the historic and non-historic parts, the following analytical parts of the paper aims to address properties of the built form that have a potential impact on street liveability. The role of the street network in shaping a street's social profile is also discussed.

The historic building-street interface

Before looking at the urban streetscape in the Village as a whole, it is important to look solely at the historic building typologies that this study takes into account and to discuss some of their morphological properties. More particularly, the study considers the row house and tenement building types (Figure 3). Descendants of the row house typology (Davis, 2006:151-153), tenement buildings can be divided into two further typological groups: the 'old-law' tenements (including the 'railroad' and 'dumb-bell' types) and the 'new-law tenements' (Plunz, 1990:13, 49). Old-law tenements are five- to six-stories high and cover up to 90 percent of a typical 25-by-100-foot Manhattan lot (coverage reduced to 80 percent after the Tenement House Act of 1879). Living conditions in these buildings were characterised by severe lack of light and ventilation. Slightly improved - to match standard plans approved by the Tenement House Act of 1901 - the new-law tenements are taller buildings with a façade length almost twice the size

¹³ For instance, the construction of Union Terminal Freight Station and of U.S. Appraises Stores (c.1950-52) at the south-west blocks of the Village led altogether to around 140 building demolitions.

¹⁴ Work-live units refer to artists' houses and studios as well as to commercial-residential buildings.

¹⁵ Space syntax analysis calculated in Depthmap software (Turner, 2001). The measure of combined integration and choice at different scales of analysis represents the potential for a given street section to be used for movement through and around the area within that given distance.

¹⁶ For a discussion regarding the spatial and social factors that enabled the continuity of the historic row houses in West Village see the discussion in a previous ISUF conference paper: Palaiologou and Vaughan, 2012.

of row houses and old-law tenements. New-law tenements usually cover around 70 percent of a 40- or 50-by-100-foot lot (*ibid.*, p.47-49).

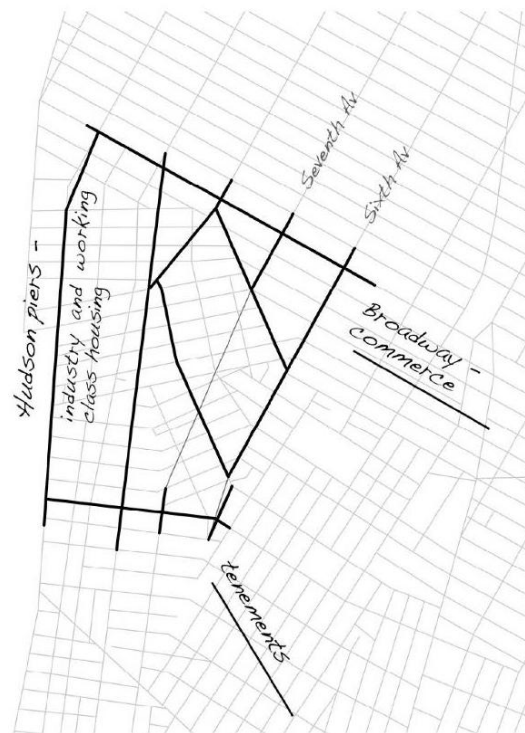


Figure 1. West Village - urban challenges at the turn of twentieth century.

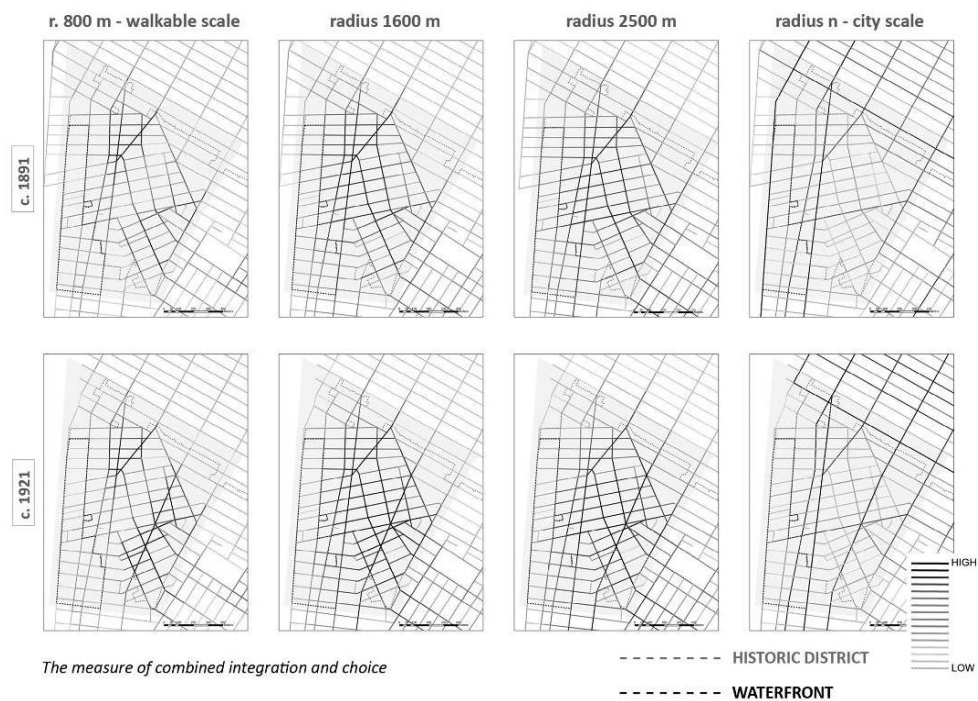


Figure 2. West Village - analysis of the street network properties before (c.1891) and after (c.1921) the extension of Sixth and Seventh Avenues.

Besides row houses and tenements, there are other historic buildings as well with long presence in West Village. Such buildings are small industrial units, factories, schools etc. However, the primary focus of this study is the façade organisation of row houses, and consequently, their building-street interface. For this purpose, the analysis here distinguishes between the row house and tenement typologies for two main reasons: on the one hand, these building types present regularities and typological consistencies in terms of the façade treatment. And on the other hand, row houses – and tenements as their descendants – represent the most common residential building type of the Commissioners' historic Manhattan.

Figure 4 illustrates a survey of the historic built form presence in West Village. The map shows the row houses and tenement buildings still existing in c.2013. The buildings' colour range (dark-oldest, light-youngest) represents four main typological groups: the shell of a single-family row house (black); the railroad and dumb-bell¹⁷ types of old-law tenements (dark grey); the new-law tenements (grey); and finally, the remaining buildings which do not belong to a particular building type and are mostly later developments. It is clear from the map that the Historic District Designations capture the majority of the historic rows and tenements within the study area.

More particularly regarding the façade organisation (Figure 3), in the early row houses the building frontage is characterised by a trilateral vertical alignment of casements. The domestic door entrance lies at either side and is usually accessed via the *stoop* (stepped entrances or porches). In the cases of an additional function occupying the ground floor – usually commercial – the non-domestic entrance is once again aligned under either the central vertical zone of windows or to one side. Accordingly, alignment with windows is also retained in the case of an additional separate domestic entrance when the single-family row house is turned into multi-dwellings. There are also examples where the second domestic entrance is placed underneath the elevated stoop of the main old entrance (like in the more grandiose Italianate style row houses). Due to the small scale of these buildings, façades present in most cases a maximum of two thresholds. The railroad and dumb-bell façades (old-law tenements) which are slightly bigger in scale (both for façade length and height) are organised in four columns of windows, with the main building entrance located in the middle of the façade length. Often, this building type presents additional commercial uses in the ground floor which are placed at the sides of the central domestic entrance. Finally, the new-law tenement typology, covering larger plots, introduces a more solid ground floor, with fewer openings to the street. In other words, the older narrower building types are found to present a denser pattern of building-street connections squeezing as many thresholds as possible into the façade.



Figure 3. West Village - row house, old- and new-law tenements.

¹⁷ Variations of the old-law tenement building type; for details see Plunz, 1990:13, 49.



Figure 4. West Village - row houses, old- and new-law tenements (c.2013).

The record of building thresholds collected from a survey of West Village conducted by the first author in 2011 confirms this last observation regarding façade length and density of thresholds (see Table 1). In order to form a general overview of the *density of thresholds* in the area of West Village for each one of these three historic building types as well as for the non-historic buildings, we can look at the ratio of the *total façade length* for each type to the *total number of building entrances* in each case. Based on the features of row houses in West Village (1325 row house units, 1469 sides facing streets), results show that in a streetscape completely built up with row houses a pedestrian would anticipate passing a building threshold approximately every 3.8 meters. A similar spacing between thresholds is expected in a hypothetical route constructed alongside old-law tenements (245 units were recorded and 272 façades), where a door would be expected every 4.1 meters. This slight deviation between the two building types is explained by the slight increase in plot size for the latter. A new-law tenement streetscape would be looser in terms of building-street connections, with doors lining up every 4.5 meters. In general, these historic building types commonly form a rather dense building-street interface. Summarising the previous results, the estimated frequency of thresholds for the historic built form is a doorway every 4 meters on average. In contrast, the analysis shows that the remaining buildings in West Village are likely to present an entrance every 10 meters on average. Considering results comparatively, we understand that the building-street interface of row houses and tenements supports more than twice the potential for building-street interaction than the rest of the buildings in the area.

The key observation from this analysis does not refer to the building types *per se*, rather to their morphological properties. More particularly, what is important to understand here is that the narrower the façade (and in effect the plot width), the higher the potential for a denser building-street interface is observed. The mean façade length for row houses and tenements in West Village is calculated at 8.4 meters. On the other hand, the remaining building façades are twice as longer with their mean length reaching as high as 22.4 meters.

Table 1. Row houses, old- and new-law tenements; door encounter rate (c.2013).

	Buildings	Doors	Tot. Façade Length (m)	Door encounter rate (m)
Row house	1324	2477	9523	3.8
Old-law tenement	244	523	2139	4.1
New-law tenement	101	326	1463	4.5
Historic	1669	3326	13125	3.9
Non-historic	982	2156	21982	10.2

The image of the streets

The aforementioned analysis is based on a theoretically evenly constituted urban streetscape; namely, it assumes an equal number of door entrances across all urban block-fronts in the case study area. Although this analysis provides an idea regarding the impact of morphological properties on the street interface, it does not capture the fine-grained complexity and morphological diversity of real urban settings. In order to configure a better representation of reality, the following section studies the built form properties at the scale of street segments. This time, analysis considers each segment side separately in order to study in greater detail the properties of the constituted *street interface*. Lying behind this is the proposition that whilst the configuration street network itself shapes – all things being equal – the varying distribution of people around an area, the building-street connections organise potential interactions between inside/outside (private/public) spaces. The study looks firstly at the *frequency*, and secondly, at the *mixture* in terms of morphology of building thresholds and the function each building contains. The study then also considers these results alongside straightforward space syntax measures of potential flows (as will be shown in section 5, below).

The survey record of building thresholds is illustrated in Figure 5. The map shows building entrances in the area of West Village coloured according to building use type. Considering the Village's historic split in terms of functional and morphological character – into the west waterfront on the one hand and the Historic District on the other (where the majority of rows and tenements lie within) –, results are summarised for each one of these areas to then be discussed comparatively.

To begin with, in order to form an overview of the building-street interface density for each district within the Village, we can summarise the number of building entrances and relate this to the total length of façades (Table 2). In terms of the building properties, the mean façade length of buildings within the Historic District is almost half the length of frontages in the non-historic Village parts. This in turn impacts on the street interface: within the Historic District, where pedestrians are likely to encounter a building entrance every 6 meters on average, in contrast to the significantly more sparse street interface of the west waterfront where building entrance spacing increases to 13 meters on average.

Following, in order to measure more precisely the *threshold frequency*, we can look at the number of building entrances per street segment side in relation to the block frontage length¹⁸. Figure 6 illustrates the calculated threshold frequency for street sides in West Village. Lighter colours reflect lower frequency and thus a looser street interface. As indicated by the threshold frequency map, the streetscape within the Historic District is constituted by a denser building-street interface (dark greyscale). The strong presence of rows and tenements which take over the

¹⁸ The block frontage length equals the sum of the length of building façades calculated separately for each segment side.

majority of historic blocks supports higher threshold frequencies, and thus higher potential for inside/outside encounters. In contrast, building thresholds become sparser towards the waterfront (light grey block sides). Building footprints in the waterfront blocks appear larger, and this implies longer building façades. This morphological feature, in combination with the sparse building-street connections, creates a less porous ground floor emphasising further the historical split of the Village streets.

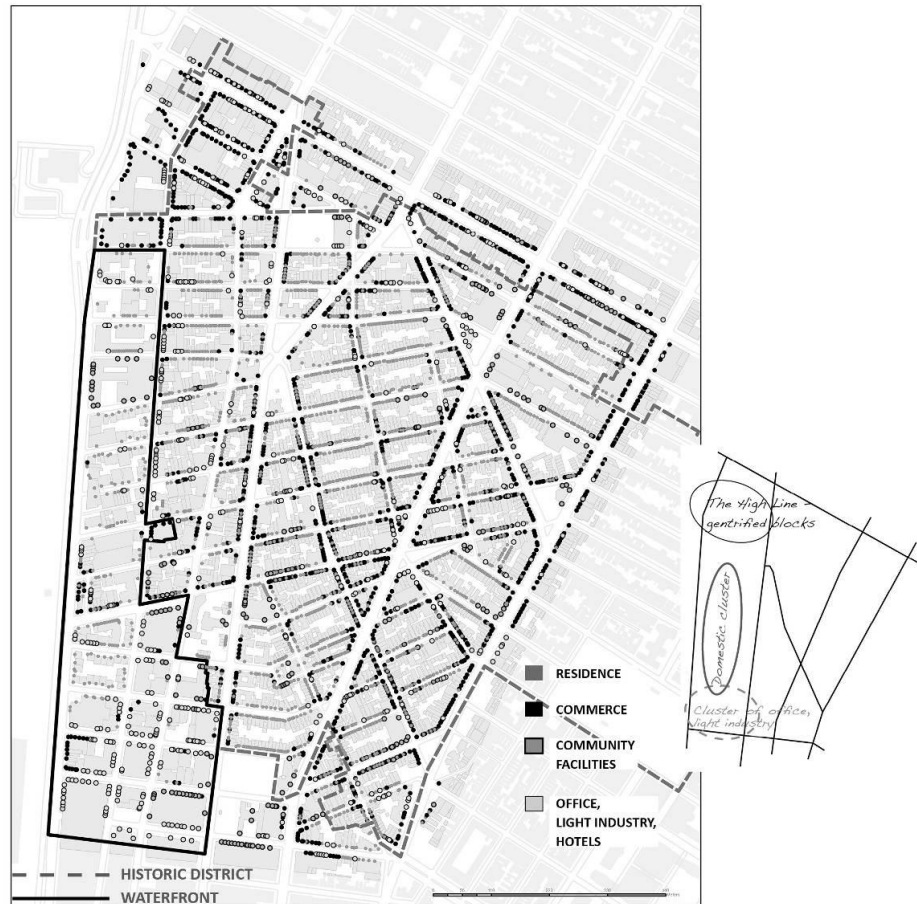


Figure 5. West Village - threshold map and land use distribution (c.2011).

Table 2. West Village - threshold record for Village parts (c.2011).

	Façades	Doors	Tot. Façade Length (m)	Mean Façade Length (m)	Door encounter rate (m)
Historic District	2354	4449	26742	11.4	6.0
Non-historic	494	1064	10871	22.0	10.2
Waterfront	249	518	6554	26.3	12.6



Figure 6. West Village - threshold frequency (c.2011).

The next step is to understand the street interface as an aggregate of varying uses overlooking at the street domain. Building use has an impact both on the morphology of the building-street interface, as well as on the social profile of streets. There are building uses which aim to engage the pedestrian and hence open up the building interior to the street domain visually or accessibly (like retail and commercial uses in general). There are also uses with a more private character which aim to protect the interior function from the pedestrian traffic. Depending on the uses aggregated within a block front, pavements become more or less private or public in their morphology; also, depending on the mixture in uses aggregated within a block front, pavements become mono-functional or mixed-use. These properties (morphology and function, respectively) have an impact on the potential social profile of the street segment.

Studying the threshold map of West Village, we can explore the social profile of streets within the Historic District and outside, firstly in terms of uses *per se*, and secondly in terms of the mixture of uses (Figure 5, Table 3). The most predominant uses within the Historic District are the domestic (57.2%) and commercial (32.5%) types. Retaining the historically more industrial profile, non-domestic uses in the west waterfront refer mostly to offices and light industry (60.9% of the non-domestic uses). In general, for parts lying outside the Historic District non-domestic thresholds cover the majority of pavements (64%).

Table 3. West Village - threshold use record for Village parts (c.2011).

	Façades	Doors	Domestic uses	Commercial uses	Community services	Other uses	Vacant	Stoops	Primary thresholds
Historic District	2354	4449	2547 57.2%	1430 32.1%	134 3.0%	308 6.9%	30 0.8%	908 20.4%	3447 77.8%
Non- historic	494	1064	353 33.2%	319 30.0%	109 10.2%	253 23.8%	30 2.8%	98 9.2%	927 87.1%
Waterfront	249	518	205 39.6%	63 12.2%	54 10.4%	182 35.1%	14 2.7%	58 11.2%	442 85.3%

However, the most important observation arising from this map refers to the mixture of uses. Looking at the distribution of thresholds, it is interesting to point out that within the Historic District, in many street segments a mixture of varying uses is observed across the length of a block frontage. In the waterfront district on the other hand, thresholds of the same uses seem to cluster at the block scale: see for instance, the offices and light industry at the south, the residential blocks moving northwards, and finally, the gentrified district of The High Line (see Figure 5). Here, it is of relevance to recall references that highlight the importance of ‘heterogeneity’ as a significant characteristic of urban life (Hanson and Hillier, 1987). Urban space becomes livelier and more sociable when it brings together in close proximity varying uses that support one another in everyday rituals (Jacobs, 1961, p.153). Functional mixture at a finer scale (like the building and the segment) is one of the features lost in the redevelopments of the waterfront area in West Village.

Functional mixture leads to morphological mixture of varying building-street relations. The private-public transition can be configured in terms of access in many ways depending on the level of privacy required by the building function¹⁹. A basic distinction of thresholds is considered here between *primary* and *secondary* ones (based on the work of Hanson, 2000; Hanson and Zako, 2007). Primary boundaries are direct entrances (the building line coincides with the plot line). Secondary boundaries refer to indirect building-street relations, where in order to access the building entrance a user needs to pass firstly from an additional space (like a staircase or a yard) bounded by a secondary threshold (like low or high fences). Table 4 shows the relation between building function and the type of building-street transition (direct or indirect). Commercial uses in the area of West Village have almost exclusively a direct relation with the street domain (94.5% primary thresholds). Offices, hotels and buildings with light industrial uses (land use category named ‘other’) also have in their majority direct building entrances (92.5%). Community service buildings (like schools and churches) have in some cases (22.6%) a protected and more private interface. Finally, as expected, domestic uses are the most prominent in having an indirect relationship with the street, with one out of three residences in the Village distinguishing the private interior from the public domain. Overall, the degree of privacy of the building-street interface depends on building use and purpose which in turn influence the morphological treatment of the private/public transition.

Morphological mixture is also an outcome of architectural variations. In this respect, morphological diversities are more likely to occur when a block frontage is the assemblage of many building façades. Consequently, building units with narrow façades (meaning more building units per block) and of different architectural styles contribute to creating a complex micromorphology on the street pavements. For example, row houses themselves present many morphological variations regarding the building-street interface. Ascending and descending stoops, grandiose or modest porticos, direct entrances, areaways etc., all consist variations of the row house interface based on architectural style. These morphological variations can create in turn different social situations. For instance, when accessibility to the stoop is free from barriers (like low railings), then stoops can work as informal places of social encounters (people meeting, seating, talking etc.). Likewise, a commercial use might extend outwards and take up parts of the pavement area. Looking at row houses and tenements in West Village, we can form an idea of the complex spatial relations that these building types can generate over time. Figure 7 shows varying threshold types for the row houses and old-law tenements (which have the narrowest façades). Data in Table 3 confirm as well the more significant presence of stoops within the Historic District, while the west waterfront is mostly constituted by direct entrances.

¹⁹ Consider here the varying levels from publicity to privacy as discussed by Newman 1972, 1975: from a social utility perspective a space can be characterised as ‘public’, ‘semi-public’, ‘semi-private’, ‘private’.

Table 4. West Village - threshold type according to land use (c.2011).

	Domestic uses	Commercial uses	Community services	Other uses
Primary thresholds	1953 67.3%	1652 94.5%	188 77.4%	521 92.9%
Secondary thresholds	947 32.7%	97 5.5%	55 22.6%	40 7.1%
Total Doors	2900 53.2%	1749 32.1%	243 4.4%	561 10.3%

**Figure 7. West Village - type of entrance for row houses and old-law tenements (c.2013).**

In a sense, analysis in this section has treated the block frontage as a morphological unit. It has been argued that the properties of the building-street connections within a block frontage regarding relate to the potential social encounters organised by the built form: blockfronts with denser and more diverse (functionally and morphologically) building thresholds are more likely to generate street liveability. Comparative analysis for the current historic and non-historic streetscape in West Village has suggested that the narrowest façades of historic building typologies support higher densities and mixture of building thresholds in relation to the solid, larger in footprint and often monofunctional non-historic buildings.

The role of the street network

Following these observations, it becomes of interest to explore the reasons why some street sections develop a vibrant and sociable interface over time and others fail to do so. This section discusses the role of street network in distributing functional mixture (and consequently morphological built form). The relation of land use allocation and street configuration has long been established by space syntax studies (Hillier, 1996, Chapter four; Hillier and Vaughan, 2007). According to space syntax theory, streets with higher potential for *accessibility* and

permeability are more likely to attract uses requiring higher footfall, like retail, and to generate ‘multiplier effects’ over time.²⁰

A straightforward way to address the potential relation of a street segment’s interface with its role within the street network is to group street segments based on their space syntax (‘syntactic’) values (high, medium, low) and then explore the features of thresholds for each group. Accordingly, Tables 5 and 6 show results from this analysis performed for the area of West Village. Analysis is calculated for the measure of ‘combined integration and choice’, both for the local and the city-wide context of street network performance: firstly, analysis addresses the walkable radius of 800 meters in order to estimate the performance of the street network at a neighbourhood scale; and secondly, the wider city surroundings are considered with analysis calculated for the whole of Manhattan (radius n). Results for both studied scales indicate that segments with higher syntactic values contain higher numbers of commercial thresholds (almost twice higher on average) in comparison to segments with low values. It is also interesting to observe that the percentage of secondary thresholds (namely entrances with a more private character) is significantly lower in segments with high values. In effect, it is indicated that in the case of West Village segments with higher potential for pedestrian traffic have developed a more public street profile.

In order to interpret accessibility and permeability (namely the configurational properties of the street network) in terms of morphology, the study looks in addition at the physical characteristics of street segments which might influence the chances for a street part to develop high potential in attracting pedestrian movement (and thus attract more urban-like uses). Jane Jacobs’s observations and interpretations provide a morphological hint regarding the characteristics of permeability: the author argues that short blocks enhance pedestrian flows, become livelier and consequently, support greater socio-economic mixture. Here, we interpret this morphological property of the built form (namely, the short block front) as a configurational property of the street network (short segment length). Indeed, looking at the syntactic map of the Manhattan street network illustrating the values for the measure of ‘combined integration and choice’ (for radius 800 – namely the walkable scale) we can observe that shorter block sides have measurably higher potential for pedestrian flows (Figure 8, Table 7). To examine this further we summarise the properties of building thresholds based on segment length (Table 8). Results confirm a potential impact of street segment length (and respectively of block size) in the land use allocation. In the Village, shorter segments (with length below 100 meters) have a prevailing non-domestic character, with the majority of commercial uses allocated there. Longer segments on the other hand are more domestic in their social profile and are constituted by more private building-street interfaces with secondary boundaries.

Pedestrian flows themselves confirm the role of street network in terms of the generated street liveability. As mentioned in section 1 above, spatial patterns are considered to give rise to the ‘virtual community’. The theory of ‘natural movement’ discusses how the configurational (namely, the relational) properties of the street network generate a primary distribution of movement patterns (Hillier et al., 1993). Movement patterns relate in turn with phenomena of co-presence. Physical co-presence is a fundamental precondition for social life to be generated in the street domain. Additionally, from a morphological perspective it is important to note here that not only the building function has an impact on the morphology of the building-street interface; the street function as a pedestrian route and its levels of utility also play a role in determining the type of the configured micromorphology of the sidewalk. For instance, depending on the levels of pedestrian traffic, building thresholds can occupy the pavement width (like in the case of stoops and areaways) or stand back at the building line (direct entrances) giving way to passing through users.

²⁰ In Hillier’s words (1996:127): “The urban grid through its influence on the movement economy is the fundamental source of the multifunctionality that gives life to cities”.



Figure 8. Manhattan - short/long segments and permeability. Segment angular analysis for combined measure of integration and choice for radius 800 meters.

Table 7. Manhattan - mean values for the measure of combined integration and choice for radius 800 meters according to segment length (c.2011).

	0 < 50 m	50 – 100 m	100 – 150 m	150 – 200 m	200 m and over
Segment Count	1138 14.6%	3851 49.5%	1151 14.8%	726 9.3%	919 11.8%
Combined integration and choice radius 800 m	31.408	28.715	18.548	10.666	3.487

The morphology of a sociable street interface

This paper was an effort to address properties of the built form that relate to street liveability. Stemming from the work of Julienne Hanson in ‘Urban Transformations’ (2000), where the author interprets spatial and morphological properties of the built environment as social properties of urban space, this study aimed to explore further the morphological features of a lively street interface. Considering building-street connections as potential points of social encounter between the ‘static’ (interior) and the ‘moving’ (pedestrian realm), between the private and the public, the study suggests that building thresholds reflect the potential vibrancy and sociability of the building-street relation, and accumulatively of the street interface.

Examining the case of West Village, the effort was to decode the role of urban components in bringing together the spatial and physical affordances for co-presence and social interaction in the area. To summarise the key observations, throughout the analysis of West Village it was discussed that the following built form properties are to be considered when aiming for a vibrant sidewalk micromorphology: i) the plot size; narrow plots mean narrow building façades which in turn increases the potential for a high threshold frequency across the block frontage; ii) functional mixture; the mixture of building uses within the block frontage length; iii)

morphological mixture; buildings with varying architectural styles and consequently varying treatment of the private/public transition.

Table 8. West Village - threshold use record according to segment length (c.2011).

	0 < 50 m	50 – 100 m	100 – 150 m	150 – 200 m	200 m and over
Segment Count	47 15.1%	172 55.3%	74 23.8%	10 3.2%	8 2.6%
Total length	1.723 km 6.2%	12.922 km 46.5%	9.480 km 34.1%	1.618 km 5.8%	2.058 km 7.4%
Total façades	124	1220	1065	184	254
Total doors	219	2322	2070	397	501
Domestic	86 39.3%	1012 43.6%	1317 63.6%	219 55.2%	266 53.1%
Non domestic	133 60.7%	1306 56.2%	731 35.3%	178 44.8%	234 46.7%
Commercial	105 47.9%	994 42.8%	418 20.2%	119 30.0%	146 29.1%
Community	4 1.8%	75 3.2%	93 4.5%	22 5.5%	48 9.6%
Other	24 11.0%	237 10.2%	220 10.6%	37 9.3%	40 8.0%
Blank	12 5.2%	209 9.0%	222 10.7%	70 17.6%	45 9.0%
Secondary	30 13.7%	346 14.9%	511 24.7%	93 23.4%	155 30.9%

In addition to these properties, it was highlighted that short segments (and thus short block sides) enhance pedestrian flows and consequently increase co-presence. Finally, the effect of the street network in a street's profile has been discussed: movement patterns influence land use allocation and levels of pedestrian traffic having and impact on the morphology of the building-street connection. In other words, the street interface is the morphological unit where all urban components (building, plot, street) overlap, work together and potentially interact.

Overall, the study emphasised the role of density as well as of functional and morphological mixture in building thresholds within a block frontage as key properties for creating a sociable street interface. Considering the post-modern redevelopments in the west waterfront in West Village it can be understood that these urban blocks present the opposite morphological features: with building footprints covering large plots (which can be sometimes equal to the entire whole block area), lower threshold frequency and a more opaque ground floor, concluding that these redevelopments present far less potential for functional and morphological heterogeneity, for the oft desired 'urban diversity'.

Acknowledgements

This research is funded by an EPSRC scholarship.

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The ‘Projeto Orla’ (Lake Paranoá, Brasília/Brazil): the creation of an exclusionary lake shore

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Abstract. *The present paper examines the morphological aspects of two developments of “Projeto Orla” in Brasília – Brazil, in order to understand how the configurational characteristics affect the local vitality. The relations between the constructed form and movement are explored, following the concepts of the Theory of Social Logic of Space or Space Syntax. The variables present in the research are land use, relation between full and empty spaces, density, axial structure, legibility/orientation, blind spaces, transport, infrastructure, imaging potential, monumental scale and bioclimatic aspects, with focuses in four dimensions of architecture: perception of the place (“topoception”), functionality, copresence and symbolic aspects. The findings allow us to place the area under study within the paradigms of formality (Brasília Palace) and urbanity (Pontão do Lago Sul), thus fostering the discussion about the differences between pre-modern and modern cities. In addition, it is possible to use these findings for project exercise, conceiving strategies or recommendations that can be applied to the implementation of the remaining developments.*

Key Words: Morphological features, vitality, formality and urbanity.

Introduction

Projeto Orla is an urban development program alongside the shore of Lake Paranoá, in the city of Brasília – Brazil. This article researches two developments of Projeto Orla and their relationship with the city. Out of the eleven developments originally designed, the Brasília Palace Complex and Pontão do Lago Sul were selected for discussion, as they are the only ones which have already been implemented in most part.

The relationship between the traditional city and the city resulting from modern urban planning is explored, and Brasília is exemplary in that regard. Thus, it would be a way of analysing the reasons associated to the space which potentially lead to the abandonment of certain places. In addition, the studies seeks to research the relevance of spatial configuration in order to explain – or at least contribute to the debate – the success (or lack of) of certain areas, which may provide insight for issues of urban dynamics and decline of these urban spaces.

Therefore, we believe it is possible to evaluate the success or failure of these developments based on a preliminary analysis of configurational features, such as: land use on the immediate surroundings, relation between empty and full spaces, density, street infrastructure, distance from the urban center, segregation vs. integration etc.

Methodology

Theory and concepts

The conceptual scope adopted in this research is based in the Technique of Dimensional Analysis, which allows the morphological interpretation of spaces, based on six dimensions, or

aspects: functional, financial-economic, expressive-symbolic, bioclimatic, copresencial /sociologic and topological perception (Holanda et al., 2005; Holanda, 2010). The study, whose aim is to analyse the lake shore and its relation to the city, undertakes the view that the reading of the urbanization process and the dynamic of the resulting spaces can be better understood based on its morphologic dimensions.

In order to understand the connection between urban morphology and the different processes associated to it, we used the concepts of formality and urbanity (Holanda, 2002). The formal spaces are those whose configuration is less prone to encourage interpersonal encounters than urban spaces. This is a fundamental aspect in the organization of the elements of space that can either foster or hinder vitality, taking into account the arrangement of the parts in relation to the whole (Medeiros, 2013).

Methodology/procedures

A configurational analysis of the spaces is carried out with a qualitative emphasis in order to reach the scope of the results. An exploratory reading of the developments and their relation to the city is established considering the identification of existing typologies and land uses and their relation to the space, the presence of a street network and its degree of articulation, the definition of integrated or segregated areas, amongst others. Such findings encourage the construction of hypothesis, questionings and paths to subsidize future researches about the theme.

In order to do so, we start from the basic premise that possibly the configuration of these spaces and their articulation with the city are predominant aspects for higher or lower vitality of the waterfront of Lake Paranoá. Thus, the analysis of the two developments is carried out on a micro and macro scales. The first is restricted to the legal area of each development and the second corresponds to a radius of 2 km from the geometric center of the unit. This radius of coverage was defined so as to cover the main roads as well as the land uses and occupations of the immediate surroundings.

In the micro-scale, aspects of land use, relation between full and empty spaces, the existence of barriers, hygrothermal comfort, sense of security or insecurity, density and infrastructure are addressed. On the macro scale, four dimensions / aspects are analyzed for being considered most relevant to understand the relationship of the developments with the rest of the city: topological perception (performance of configuration regarding the legibility and orientation – cf. Kohlsdorf, 1996), functional (performance on the operational level of the space), copresence/ sociological (performance regarding features which foster or restrict interpersonal encounters) and expressive-symbolic (the capacity of places to forge in emotional and affective bonds in people).

Tools/Instruments

Bibliographic survey;

Photographic Survey

Diachronic analysis of aerial photographs of the area under study (Source: Google Earth);

Interpretation of the axial map of Brasília and its surroundings, with special attention to copresence aspects (Source: DIMPU/UnB with adaptations by Medeiros, 2013);

Analysis of the Master Plan for Transport and Mobility of the Federal District – PDTU/2011.

Formality vs Urbanity

According to Holanda et al. (2005), “human settlements throughout history, from indigenous tribes to the great metropolis, can be classified according to the nature of their syntactic

attributes". Therefore, the author uses concepts of formality and urbanity in order to name the morphological types from the standpoint of Space Syntax Theory (Hillier e Hanson, 1984; Holanda, 2002; Medeiros, 2013).

"Formality" is a word derived from 'formal', related to 'form' – 'the outer limits of the matter that constitutes a certain thing, and that grants it a configuration, a peculiar aspect' – but that in a particular way: "that is not spontaneous; that is attached to pre-established formulas; conventional". "Formality" is also "a specific way of proceeding, that which is conventional, routine". In turn, "urbanity" refers to the city as a physical reality, to which the qualities "courteous, friendly, with continuous negotiation of interests" is added. (Holanda et al., 2005).

In regard to the built space, formality has been consistently characterized by factors such as: a) maximization of open spaces on the total area of the settlement, b) higher percentage of blind spaces, c) an extremely integrated or extremely segregated axial structure/ high or low levels of incoming streets (as opposed to an intermediate position in regard to this scale of variability), d) low intelligibility, e) low variety of land use, f) higher presence of empty spaces compared to full spaces, g) low density, h) great distances to the urban center, i) socio-spatial isolation/segregation, j) the monumental/symbolic aspects are the main object, etc. The features that refer to urbanity encompass characteristics that are opposed to those listed.

The 'traditional' city

The so called "traditional" city differs from the standards of "modern city" advocated and embodied in the 50s and 60s of the 20th century. Solutions such as Brasilia and Chandigarh broke the historically recurring urban model, assuming more formal and less urban features.

In the traditional cities, there is a balance between full and empty spaces, in a proportion defined by many authors as being 50/50. The concept of full space refers to the private spaces, such as residences and offices, etc., and the empty spaces refer to public areas, including, but not limited to, streets and squares.

Both in the regular grid pattern as well as in organic ones, lots are contiguous and distributed in blocks, having a direct relationship with the street. This allows a greater flow of people and hence larger amount of interpersonal exchanges in the open spaces. Such configuration is what makes us consider a city to be "alive".

Moreover, attributes such as the variety of land uses and activities, high density, integration (at least in the central parts), higher percentage of open spaces, for example, are common features in "traditional" cities. According to the literature (Jacobs, 1970; Salingaros, 2006; Alexander, 2013; Gehl, 2013), these features make settlements more urban (and therefore less formal), awarding greater vitality to open spaces.

Brasília: a modern city

In the modern city, despite the eventual use of regular grids, lots are not distributed in blocks, but in isolation, with no direct relationship with the street. Here the empty spaces, represented by green areas, paths and terraces prevail. This relationship is the big break that the modern movement brought to the way of thinking about the city: full spaces correspond to 30% of the total area of the city on average.

There are lessons to be learned from the urban design of the Pilot Plan of Brasilia especially regarding the features that confer strong global legibility. However, for the object of study of this article, we aim to examine the design issues that weaken the local dynamics, especially those arising from the fragmentation of the city, i.e., the disruption its fabric. The scenario is the product of the configuration of space, such as the presence of large voids that result in open spaces with little or no vitality.

With regard to the urban system in its entirety, over the years Brasília became a "morphological mosaic" (Holanda et al., 2013), where various morphologic types coexist. Its classic modernism immediately provided a sharp contrast with the vernacular configuration of the surrounding urban centers (Planaltina from 1810 and Brazlândia 1930) and with the farms close by.

The capital is nowadays a "polynuclear metropolis" (Holanda, 2002; Holanda et al., 2008) and the classical modernism or "modern city" is restricted to the Pilot Plan, where less than 10% of the inhabitants of the Federal District live (IBGE, 2010). However, the region concentrate 44% of the jobs in the Federal District, higher level of income and benefits of urbanization, which legitimizes its role as Centre for Commerce and Services, that is, the main active urban center.

The overall structure of Brasília discloses a system characterized by eccentricity, dispersion and socio-spatial segregation (Holanda et al., 2008; Holanda, 2010). The trends of fragmentation are not restricted to the macro-scale, they are also identified in the micro-scale, present in the internal areas of the Pilot Plan.

Projeto Orla

The project under study, Projeto Orla, – also known as Master Plan for the Occupation of Lake Paranoá Shores or Plan for Touristic Ordering and Structuring of Brasília – was elaborated by TCI Planejamento, Projeto e Consultoria Internacional Ltda., a company hired by the Government of the Federal District – GDF and by Embratur in the year 1992. The goal was to forward the use of the remaining free areas located on the shores of Lake Paranoá, increasing its touristic, economic and cultural relevance. The development encompasses a broad project for the whole area around the lake, developed in partnership with the private initiative, having as the main goal the implementation of quality public spaces.

In its first phase, the ten developments were supposed to be implemented, in an area of approximately 78,000.00 m². In 1995, this number was increased to eleven. In addition, a promenade, called 'boulevard', was designed, in order to integrate them all. These attractors were planned to have diverse land uses and activities, including leisure, entertainment and lodging, which would include hotels, restaurants, piers, an area for playing sports and support facilities for water sports, cultural centers, museums, concert venues and a heliport.

Connecting the eleven developments, four circulation systems were proposed, the first being a pedestrian boulevard, the second a cycle lane, the third option would be a low speed street for cars, and last, the public marinas and small piers, providing infrastructure for water transport.

However, until the present moment, Projeto Orla has not lived up to its goals. Due to the slow pace of the Government and the lack of political will, the implementation was partial. The circulation systems proposed, for example, were never executed.

Brasília Palace Complex

Description of the area and the development

Brasília Palace Complex – Development 3 (Figure 1) is located between Clube da Imprensa and Bosque dos Leões, near the Alvorada Palace. The original concept encompassed an area for 4 hotels, amongst which, Brasília Palace, designed by Oscar Niemeyer. The place is characterized as a cultural center, where the Art Museum of Brasília – MAB, the Acoustical Shell, and the Pavilhão da Bienal e Arte are already in place. Together, the three of them would be a part of the Praça das Artes (literally translated as Arts Plaza). In addition, an area for commerce, pubs, restaurants, cinemas and marinas was previously envisioned. The urban project was registered and partially implemented. However, nowadays the place is partially abandoned.

The flats and hotels that are part of the complex are mostly surrounded by walls and its recreational areas invade the shores of Lake Paranoá, forming a barrier that prevents the flow of pedestrians within the complex and the free access to the waterfront. Such is the situation of the development called Ilhas do Lago, "Lakeside" (Figure 2), "Premier" and "Royal Tulip" (formerly "Blue Tree"). The exception is Brasília Palace Hotel, which has a higher permeability, since it is a building on pilotis and grants free access to the public: it is the only one that kept a desirable distance from the water surface.



Figure 1. Aerial photograph of the Brasília Palace Complex – Development 3.

Configurational analysis (micro scale)

Roughly speaking, these typologies act as barriers, due to the walls and blind spaces, thus affecting the articulation and interaction between the public spaces. These free spaces for the general public have few buildings, which are isolated and distant from one another, and the empty spaces prevail. However, due to the total absence of street furniture, except for the streetlights along the waterfront, the place is dark and lifeless at night – unless there is an event happening at the Acoustical Shell.

It is possible to notice that the flats and hotels are taking over the place, and the public areas are in a state of partial abandonment without the assistance and infrastructure necessary for becoming a touristic and cultural complex. Moreover, there is no diversity of uses, once the project was not fully implemented. The immediate surroundings present homogeneity, with a predominance of institutions - Press Club, Air Force Club - and residences - Alvorada Palace and Vila Planalto.

Despite the large parking lots, there are some clusters of trees scattered around the area. These trees and the breeze from the lake generate a certain hygrothermal comfort. However, the issue could be substantially improved with the addition of trees to the parking lots and the implementation of the landscape project previously designed for the site.

There are virtually no well-defined sidewalks or paths, except for the cemented promenade being built by GDF along the waterfront. However, it does not meet the requirements of an environmentally friendly coverage (higher permeability, reflection X absorption of sunlight etc.). Moreover, the materials and colors do not define the routes well and do not aesthetically improve the site.

Configurational analysis (macro-scale)

When analysing the development in a macro scale, that is, in relation to the rest of the city, it is possible to notice that Development 3 is very central, once it is near Vila Planalto, in the

surroundings of the Esplanade of Ministries. The street that gives access to the Esplanade, N1 East, is one of the options for reaching L4 North and the Hotel and Tourism Road, the main Access to the complex.



Figure 2. “Lakeside Convention Center and Resort” – Development 3.

Although Vila Planalto works as a good reference point to reach the desired location, the signs of way are not very clear for those who are going there for the first time. After reaching the access road, one has only to follow it to the end, which may also cause certain insecurity, since there are no reference points or visual landmarks – there are far more empty spaces and the existing constructions are mainly horizontal. Thus, we can conclude that although the development is located in a privileged area and the route is fairly straight forward, the place lacks visual legibility (strong identity) and adequate signs, which could offer better conditions for orientation.

In terms of functionally and accessibility, the only ways to reach the destination is on a private vehicle or by bus, there not being any cycle lanes or any other means of public transportation. The water transport is only destined to those who have their own vehicles, despite the presence of a pier on the site.

According to data from PDTU-DF/2011, only two bus lines go through the complex. They are: 1401C (Circular - Vila Planalto – L2 / W3 Norte) and 1042C (Circular – Esplanada / Palácio do Jaburu / Palácio da Alvorada).

Copresential aspects are tightly associated to a higher or lower level of integration of a certain area with the rest of the city. Thus, the integration measure ‘refers to the higher or lower accessibility between the parts of a city, based on the minimum number of turns of a route between two points’ (Holanda, 2010)

“These values can be expressed numerically or by a color scale with a gradation from red to orange to green to blue – where the axis with a higher integration value tend to red and the lower to blue” (Medeiros, 2013).

Therefore, analysing the Axial Map of Brasília (Figure 3), it is possible to notice the main roads that grant access to the complex are green, that is, they have an intermediate level of integration (between 0,647 and 0,809), except for the axis S1 East and L4 South – of orange color – which have a higher integration level (between 0,809 and 0,970). Most of streets inside the development under study are represented by light blue lines, since they present low level of integration (between 0,486 and 0,647). Thus, it is possible to conclude that the area under study is more segregated than integrated, being closer to the concept of formality than urbanity.

The symbolic aspects are related to the architectonic elements that translate in images that represent the site, such as the Brasilia palace Hotel (whose name extends to the whole site), the Acoustic Shell and the MAB. Therefore, we can come to the conclusion that the place has a

strong imaging potential, but the symbolic aspect needs to be better explored and valued, specially due to its proximity to Alvorada Palace, an icon of Brasília.

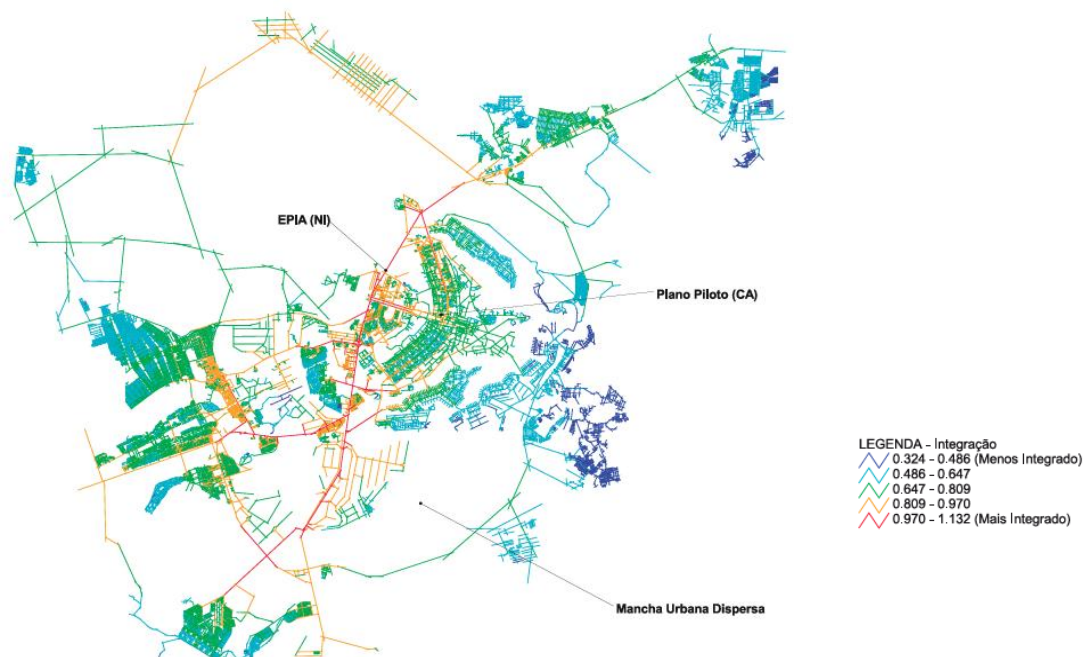


Figure 3. Axial Map of Brasília – global integration Rn.

Pontão do Lago Sul

Description of the area and the development

Pontão do Lago Sul – Development 11 (Figure 4) is located close to the Costa e Silva Bridge. Since its conception, the development was created to house restaurants, pubs, small stores, antique shops, arts and crafts shops, equipments for sports, and a pier for boats. The place is run by private entities and has been attracting an average of seven thousand people on weekends.

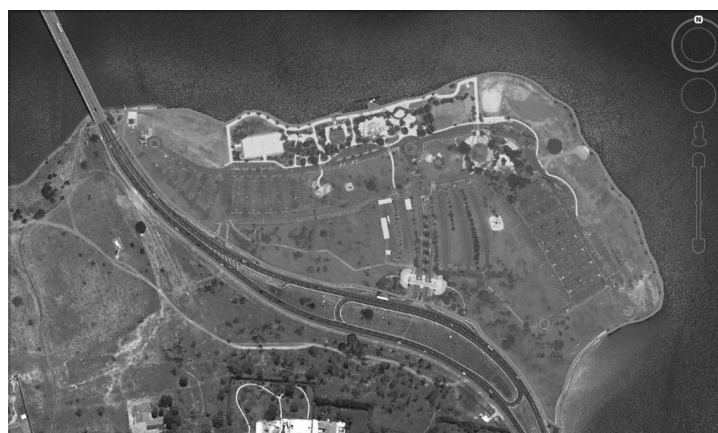


Figure 4. Aerial photograph of Pontão do Lago Sul – Development 11.

Configurational analysis (micro scale)

On quick configurational reading of the entire Complex, it is possible to notice that the use is mainly commercial, but it is set in a region that lacks establishments of this kind, since the residential use is prevalent in South Lake Administrative Region. Despite the predominance of places dedicated to the Classes A and B, currently, some kiosks have emerged as more affordable alternatives for Classes C and perhaps D.

The buildings are concentrated along the waterfront and are interconnected by paths for pedestrians. Although the floor coverage of these paths not being permeable, there is a concern with materials and colors to better define the paths and aesthetically improve the place. In general, the wide open spaces for the public already have a reasonable number of constructions, but empty spaces still prevail. These buildings are opened to the public spaces with their porches and balconies mainly facing the existing promenade along the waterfront. Therefore, the open spaces prevail over the blind spaces.

The site is well equipped with street furniture, to include bins, benches, street lighting, ATMs, etc. Therefore, the site works well, both in during the day and at night, when the sense of security is constant.

In regard to bioclimatic aspects, the space has a fairly good quantity of trees, however the asphalt surface of the parking lots is what prevails. There, the tree coverage is still young, and has not yet reached an appropriate height. The breeze and moisture from the lake help hygrothermal comfort, especially at night when the air is cooler.

Configurational analysis (macro scale)

From a macro perspective, the place is quite central and stands out in the landscape as it is located on a peninsula of Lake Paranoá, right next to Costa e Silva Bridge. The main access roads are Avenida das Nações, Dom Bosco Park Road - EPBD and finally Costa e Silva Avenue, the access road to the development (there is adequate signs).

Despite the buildings being mainly horizontal in Setor Habitações Individuais Sul - SHIS and the large green area that separates from the main access road, Costa e Silva Bridge serves as a good reference to reach the site, and it is possible to see much of the gastronomic complex. In addition, the entrance portico acts as an important visual marker, although some consider it of questionable taste. Thus, we can conclude that in addition to its privileged location and few turns during the route, the signs on the route are present in adequate number and there is great visual legibility (strong identity), which offers good conditions for orientation.

With regard to the functional aspects, the only way to get to the venue is a private vehicle or bus, since there are no cycle lanes (inside and outside the complex) or any other means of public transport. The water transport is only destined to those who have their own vehicles, despite the presence of two or three piers on the site (Figure 5).



Figure 5. Pier of Pontão do Lago Sul.

According data from PDTU-DF/2011 there are twelve bus lines that serve the development: 0772i, 1005i, 1005v, 1007i, 1473i, 1473v, 1474i, 1474v, 1477i, 1477v, 1971i and 1974i. All of them go through the Pilot Plan, being that six go through the city of Paranoá, four through São Sebastião and two through Agrovila.

In regard to the copresential aspects, analysing the Axial Map of Brasília (Figure 3), it is possible to notice the main roads that grant access to the complex are green or light blue, that is, they either have an intermediate level of integration (between 0,647 and 0,809) or a low level of integration (between 0,486 e 0,647), except for the south portion of Avenida das Nações – orange line – which has a higher integration level (between 0,809 and 0,970). All the streets inside the development under study are represented by light blue lines, since they present low level of integration (between 0,486 and 0,647). Thus, it is possible to conclude that the area under study is more segregated than integrated, being closer to the concept of formality than urbanity.

In regard to the symbolic aspects, we must mention Costa e Silva Bridge, designed by Oscar Niemeyer as the main structure that represent the immediate surroundings, as well as Brasília. The bridge was chosen to become a brand of Projeto Orla, since it embodies the connection between the city and the lake. Therefore, it is possible to say that the place has imaging potential.

Conclusions

The article examined two developments of Projeto Orla – the Brasilia Palace Complex and Pontão do Lago Sul – and their articulation to the city of Brasilia (Brazil). Based on the findings obtained, Table 1 was drafted to summarize the attributes examined in the configurational analysis, so as to facilitate the compared reading and the placement of each development within the framework of either formality or urbanity.

Based on the analysis of the previous items, the qualifications identified are listed below. In some cases, the feature for a certain development can be considered in an intermediate level. In that case, for this attribute two concepts we marked, but they were not counted in the total sum presented at the end of the table 1.

In face of the results obtained, we can conclude that the Brasília Palace Complex is a space of extreme formality, since it has almost all the morphologic attributes associated to this concept. Therefore, it is a place less favorable to interpersonal encounters and potentially presents little vitality, except during some events that are held at the Acoustic Shell.

In the case of Pontão do Lago Sul, there was a relative balance between the number of attributes associated to each concept. However, the concept of formality prevailed by a small margin. Thus, although this development is more closely associated to the concept of formality, it still has more urbanity attributes that make it an environment more prone to the flow of people and their interactions. Therefore, it is a place of great vitality in some periods of the day, for most of the week.

Nevertheless, Pontão do Lago Sul may deserve the classification of urban magnet, present in the Space Syntax Theory, to explain some developments which show some vitality, despite not having the configurational attributes favorable for such. They are potent flow and movement attracting developments: not only do they concentrate commerce and services, but also refer to a certain social status, in no small part due to the security of its facilities – which seems to fit perfectly to the scenario of Pontão do Lago Sul. After all, the surrounding fence and entrance portico, the security guards all around and the prices practiced at the pubs and restaurants are elements which clearly restrict the access.

The city is socially diverse and heterogeneous, historically built by differences and these reflect directly upon the configuration of its spaces. This way, the spaces are built according to this variation, directed to the public it is meant to serve. However, the spaces must not be excludent, after all it is a public space, and every citizen has the right to enjoy them. In the

specific case of Projeto Orla, free access to Paranoá Lake must be granted to everyone, without causing any embarrassment or hindrances, created by barriers of any kind.

Table 1. Attributes of formality x urbanity.

ATTRIBUTES	BRASÍLIA PALACE COMPLEX		PONTÃO DO LAGO SUL	
	FORMALITY	URBANITY	FORMALITY	URBANITY
Land use	Low diversity		Low diversity	
Full X empty spaces	Predominantly empty		Predominantly empty	
Density	Low density		Low density	
Axial structure	Low integration		Low integration	
Legibility /orientation	Intermediate	Intermediate		High
Spaces: blind x open	More blind spaces			More open spaces
Transport	Predominantly private		Predominantly private	
Infrastructure	Insufficient			Satisfactory
Socio-spatial segregation	Intermediate	Intermediate	High	
Imaging potential		Strong	Intermediate	Intermediate
Interpersonal relationship	Intermediate	Intermediate		Human relations prevail
Bioclimatic	Intermediate	Intermediate		Good performance
Total	07	01	06	05
Results	Very formal space		Formal space	

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Mapping urban space based on visual perception

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Abstract. *Urban space plays a very important role in urban morphological studies, while 2-dimension based urban patterns were often used as a research basis. Many researchers have tried different ways to make urban pattern with 3-dimensional information as study basis, however the results were not entirely satisfactory until now. Isovist is a method used for testing visibility of the plan or space, which has been used for describing spatial character of urban street. Along that line our research tries to develop a method to read urban pattern with height information, to create better urban physical space model for further spatial study. 3D urban physical space model is built by Matlab, and new database for the space is formed simultaneously. Our approach is setting a viewpoint forming a Viewsphere within the urban physical space built by Matlab, which can measure the urban space and collect 3D information as well. Based on isovist idea, new mapping method is developed. This paper tries to show our working process and do some analysis of the data.*

Key Words: *Urban space, 3-dimentional information, isovist, viewsphere.*

Introduction

Mapping of urban space is an important part in urban morphological studies, while 2-dimension based urban patterns were often used as a research basis. Many trials have been made to include the 3rd dimension in the mapping method; however the results were not entirely satisfactory until now. Isovist is one of the mapping methods based on visual perception. It has researches based on both two dimensional and three dimensional.

Benedikt (1979) is the first to introduce the isovist to architecture field. An isovist is the set of all points visible from a given vantage point in space and with respect to an environment. The shape and size of an isovist is liable to change with position. Numerical measures are proposed that quantify some salient size and shape features. These measures in turn create a set of scalar isovist fields.

After his introduction, many space analysis methods based on isovist have been developed. Turner et al (1999) described a new method for syntactic analysis of isovists that complements existing space syntax methodology by allowing the automatic generation of integration values from 3D CAD models. Batty (2001) began with a formal representation of isovists and their fields, introducing simple geometric measures based on distance, area, perimeter, compactness, and convexity. He suggested a feasible computational scheme for measuring such fields, and illustrated how we can visualize their spatial and statistical properties by using maps and frequency distributions. Turner (2003) uses an agent-based model of visual actors within the configuration to analyse an urban environment. Llobera (2003) used Geographical Information Systems (GIS) to study human visual space based on isovist. Arthur et al (2005) studied relating the dependent variables of 'spaciousness' or 'enclosure' to independent variables calculated from the mathematical construct of an 'isovist'.

But the isovists used in all these studies above are two dimensional and so do not test for height. Many trials have been made to include the third dimension in isovist studies later. Teller (2003) introduced a mathematical modelling technique that is capable of mapping the variation of the sky visible from points distributed throughout space. It is based on spherical projections and, more specifically, on measures applied to spherical views. Compared with existing field-oriented approaches (isovists, e-partitions, and so on), the main advantage of this method lies in the fact that it is truly three-dimensional. Fisher-Gewirtzman (2005) introduces a model 'spatial

openness index' (SOI). It is a quantitative metric – expressed in terms of 3D visual spatial information: it measures the volume of free spaces potentially seen from a given point. In addition, it enables the simulation of weighted landscapes for a more realistic estimation of the view. This model can also be described as a 3D isovist. It enables the ranking of alternative built-up configurations. Yang (2007) developed a new tool 'Viewsphere analysis' to test how a GIS-based 3D visibility analysis can be conducted to evaluate different urban design scenarios.

In all these 3D-isovist methods, people studied mostly on the sky open index of a space, but none of them collected the detailed shape of the space. This paper finds a method to collect the detailed data of skyline of a street, and analyze the data of different space to find the meaning of the data.

Method

We use MATLAB to collect the data of the street skyline from one viewpoint. (figure 1) Starting from the viewpoint, to the skyline, a series of rays is generated. The horizontal angle between two rays is one degree. And the degree is recorded as " α ". For every ray, the intersection points between the ray and the building are extracted. The horizontal distances between the viewpoint and the intersected points are calculated and the minimum distance is recorded as " d ". The angles of elevation between the viewpoint and the intersected points are calculated and the maximum angle was recorded as " θ ".

Setting the angle of rays as X-axis, the distance as the positive Y-axis, the angle of elevation as the negative Y-axis, the Street Space Outline Diagram (SSOD) is generated (figure 2).

There are two curved lines in the diagram, which show how the distance and the elevation angle changes correspond to the change of the horizontal angle. The upper one shows the distance changes from far to near, and to far. After a break, repeat the process, and then appear another break. This means from a viewpoint in the middle of street, we can see how the buildings along the two sides of street approach or away from us. The nether one shows the elevation angle changes from 0 to nearly 40 degree, then back to 0. After that, repeat the process. This means from a viewpoint in the middle of street, we can see how the skylines of the buildings along the two sides of street become up and down. Both of the two lines in the diagram are symmetrical. It reflects the symmetry of the street model. Comparing these two lines, they changes synchronously. It reflects a kind of regularity of the street model.

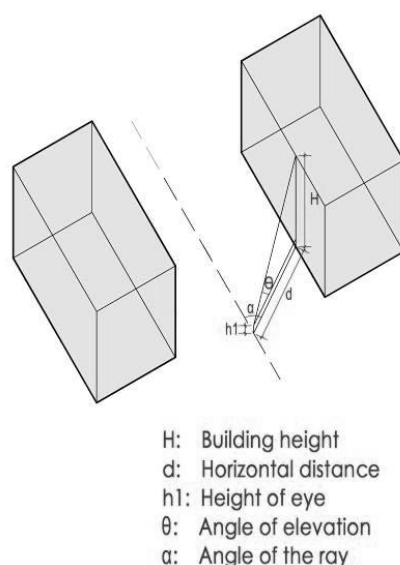


Figure 1. Formula used to collect the street outline data.

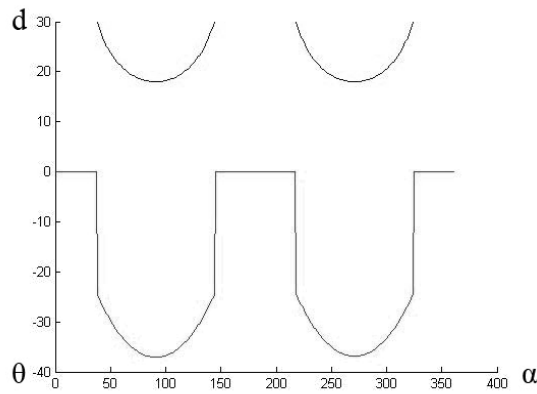


Figure 2. Street space outline diagram (SSOD).

This is the basic model of a street. The diagram displays some characteristics of the model, but it may include some more information in it. So we would like to test some more models to find the potential uses of the diagram. And this model may be used as the standard one to judge the new characteristics of the subsequent models.

Experiment

We usually get the third dimensional information through axonometric drawing or perspective drawing. It is a direct viewing, but do not have accurate data. This time, we try a different method mapping the space including the third dimension, and expect to find some more information hidden behind the normal view.

We draw 28 Street space models, which is abstracted from the real world, to do the experiment. Figure 3 is the axonometric drawing of the models. Figure 4 is the plans of the models. Figure 5 shows the Street space outline diagram (SSOD) of the models. Each model is drawn in a square. It includes two parts, the building and the viewpoint. The viewpoint is exactly in the middle of the square. SSOD is calculated in MATLAB.

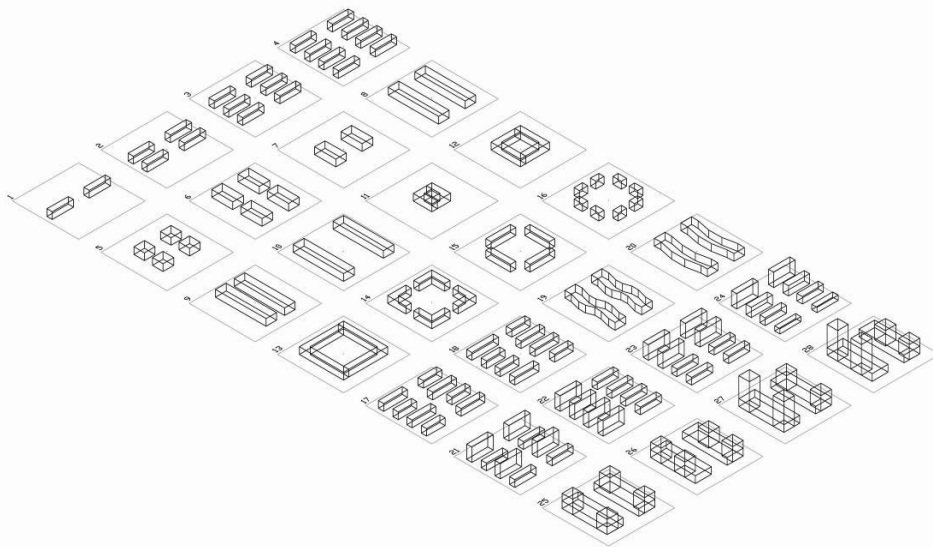


Figure 3. Street space models.

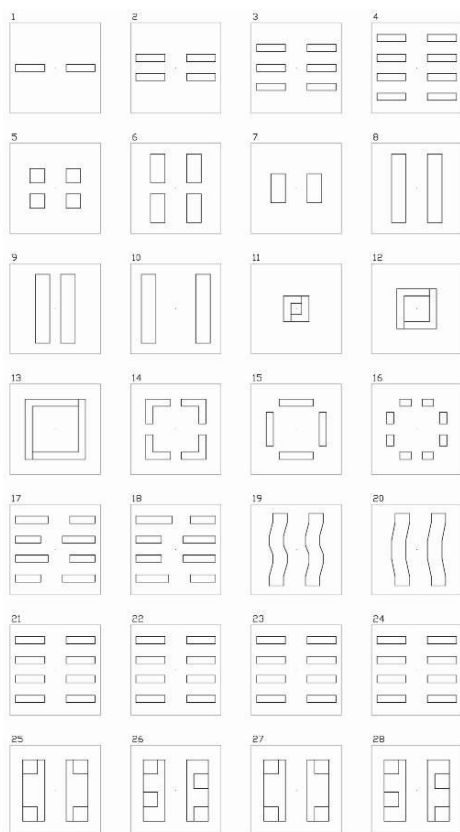


Figure 4. Plans of models.

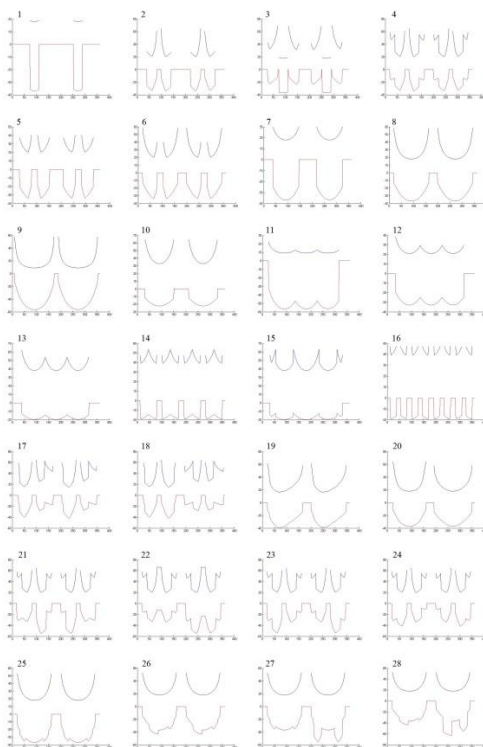


Figure 5. SSOD of models.

In order to find the rules between the model and the SSOD, we compare figure 4 and figure 5. In SSOD, the upper line means the horizontal distance change relative to the horizontal angle. The nether line means the vertical angle change relative to the horizontal angle.

From model 1 to model 4, the number of buildings increases. Relevantly, in SSOD, the upper line separate to several pieces or have several peaks. When the viewpoint is facing a side of building, the piece of line may be very short, because from that viewpoint we may not see other side of the building, but only one side of it. The lines connect together doesn't mean that the buildings are connecting, just because we may not see the break from that viewpoint. So we see the number of peaks not the number of pieces of lines as the character. The number of peaks corresponds to the number of buildings. One building refers to one peak; two buildings refer to two peaks, and so on. The nether line's peaks are also corresponding to the number of buildings. We can judge how many buildings are there in the street according to the peaks of line in the diagram.

From model 5 to model 8, the length of the buildings facing the viewpoint increases. Relevantly, in SSOD, the length of the upper line increases too. The nether line does not have significant change. Another discovery is that if the viewpoint is facing the corner of building, the peak of line is sharp. Oppositely, if the viewpoint is facing the side of building, the peak of line is smooth. We can judge the length of a building according to the length of the lines in the diagram, and decide whether the viewpoint is facing the side of building or to the corner of a building according to the shape of inflexion on the line in the diagram.

From model 9 to model 12, the distance from viewpoint to building increases or we can say the street become wider. Relevantly, in SSOD, the upper line has bigger break if the buildings are separate or deeper fold if the buildings are connected. But the nether lines rarely have difference. We may judge the width of a street according to the size of the breaks in the line. But it is not so obvious. So we may not see it as the character of the diagram.

From model 13 to model 16, the breaks of building increases. Relevantly, in SSOD, breaks of the upper line increases, and the fold of the nether line increases. The same with model 1 to model 4, the number of lines related to the number of buildings, no matter whether the buildings are along the street or around the viewpoint like a circle. But there is a problem that if the buildings are connected together and they have so many turning point, it is difficult to judge how many buildings there are. The connection between number of buildings and number of lines or peaks is only suitable for simple shaped buildings.

From model 17 to model 20, the buildings alongside the street have advance and retreat. Relevantly, in SSOD, both the upper line and the nether line are not symmetrical anymore. They change corresponding to the advance and retreat. If the building advances, the curve becomes smaller. If the building retreats, the curve becomes larger. Both the upper and the nether lines change synchronously. We may judge whether the buildings are ranged in a line along the street according to the synchronous change of both the two lines in the diagram.

From model 21 to model 24, the plan patterns of the models are all the same, but the height of building in each model are different. Relevantly, in SSOD, the nether line changes correspond to the height of building. If the building is taller, the curve becomes larger. If the building is shorter, the curve becomes smaller. But the upper line has no difference. The two lines do not change synchronously. The nether line which is the performance of the angle of elevation of the skyline is sensitive to the height of building. We can judge the building height according to the solos change of the nether line in the diagram.

From model 25 to model 28, the buildings have both tower and annex. One building has two kinds of height. Relevantly, in SSOD, the nether line changes correspond to the height of towers. But the line is not so regular. It seems as a mixture of two curves. One is corresponding to the height of the annex; another is corresponding to the height of tower. But the upper line has no difference. The two lines do not change synchronously. We can judge the building height according to the solos change of the nether line, and decide whether the building has only one tower or have both tower and annex according to the regularity of the nether line.

The most interesting part of this series of models is model 4 and model 21 to model 24. These five models have exactly the same plan. As we usually describe a space using plans, which do not have the height information, we can not find the difference between them. But from SSOD, we can see the difference from the lines in the diagram.

Through all these analysis, we can summarize the rules between SSOD and the models. The number of peaks refers to the number of buildings. The size of every piece of curves refers to the length of buildings. Synchronous change of both the two lines refers to the advance and retreat of buildings along the street. The solos change of the nether line refers to the height of buildings. We can grasp the main character of the street from SSOD without seeing the plan or the axonometric drawing, if the street pattern is quite simple. We can even tell what kind of buildings are there along the street, only by watching the lines in the diagram. But the models in this experiment are abstracted from the real world. They are not the real world. If we use real urban street to do the calculation, it may be not so easy to recognize the character.

Conclusions

Based on isovist idea, this paper developed a new method SSOD (Street space outline diagram) mapping the urban space. This method collects the data of urban street skylines based on a viewpoint. The data include three parameters of each point on the skyline. They are the horizontal angle " α ", the elevation angle " θ ", and the distance " d ". All the data are stored in MATLAB, and can be calculated. In this paper, we draw a diagram of the elevation angle and the distance change based on the horizontal angle change, which can show the characteristics of different street patterns.

Different from previous isovist method, this method includes the third dimension of urban space, and all the data is accurate and can be calculated. Teller's (2003) method is three dimensional, but it is not so accurate, and the mapping result can not restore to the original space. Fisher-Gewirtzman's (2005) method only collected one parameter of the space that is 'spatial openness index' (SOI). Ratti (2004) created the raster analysis of urban form which can show the third dimensional data of space. But the raster image does not have precise data, too. In SSOD, all the data of space is stored in MATLAB. We can find the exact data of any point of the skyline, and the data can be restored to the original space if we want. The accurate data can be used to analyze the rules between diagram and real space, or the relationship between the parameters.

But there are still some difficulties in further study. For example, it is easy to recognize the characteristics of the diagram of simple pattern of street, but when the pattern become complex, it may be difficult to identify the character in the lines of the diagram.

Our further work may focus on the issue that how to analyze complex street pattern using SSOD. Another interesting issue is to find more information in the data such as the relationship between parameters.

Acknowledgments

We would like to thank the supporting of the Special Research Found for the Doctoral Program of Higher Education (Program No. 20120091110055) .

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Changing form of the Baltic cities: resurrection of the suburbs

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Abstract. *Urban sprawl is one of the dominant types of urban development in advanced and developing world (Bruegmann, 2005; Clapson and Hutchison, 2010). It is described as a process of gradual conversion of rural areas into partly urbanized environment. Although outer growth started from the outset of cities (Mumford, 1968), international community of urban researchers, planners and policy makers is highly concerned about the current extent of this phenomenon (EEA, 2006). Extensive urban growth is often considered as uncoordinated process creating fragmented suburban landscape (Sieverts, 2003; Meeus and Gulink, 2008), which is frequently associated with an increased traffic flows, environmental pollution, inefficient use of public funds and formation of homogeneous living environment (Couch, Leontidou and Petschel-Held, 2007). Current development of the Baltic cities and especially trends of their suburban growth have been analyzed only partly, because of the relative novelty of the phenomenon and well-established dominance of North American cities in this field. The article attempts to fill this gap and present a research on conditions and consequences of extensive development of major cities in the Baltic States. This study is based on a hypothetical model of the Baltic city as successor of the Soviet city in the Baltic region. Evidences from the recent growth of Lithuanian cities show that suburban sprawl is a dominant trend in major urban regions with long-term consequences on their spatial structure (Cirtautas, 2013). Therefore, this article advocates a need to revise urban policy in the Baltic countries and promote coordinated development of urban, suburban and rural areas in the context of prevailing negative demographic trends and limited economic capacity of both, central and local governments.*

Key Words: Urban sprawl, suburban development, post-Soviet city, Baltic States.

Introduction

Over the last century cities in the Baltic States have experienced several fundamental transformations of their urban form. From historical compact towns they became large cities with distinct characteristics of late Soviet era. Although maintaining some weaknesses (disparities of population concentration, low quality housing, monofunctional land use, transport infrastructure unintended for mass usage of cars, etc.), these cities had rather completed polycentric structure of scattered residential, institutional and industrial complexes. This physical and functional layout was based on multi-level system of services and has provided urban population with basic amenities for living, working and recreation (Šešelgis, 1970). In recent decades, Baltic cities, as all post-socialist cities in Central and Eastern Europe, have been exposed to multiple transformations (Milerius, Tornau and Dranseika, 2009). This encourages researchers to pay more attention to processes which are shaping urban areas in these countries.

Studies of current development of the Baltic cities frequently involve description of suburban areas. However, evaluation of emerging semi-urbanized landscape is often limited to a simplified interpretation of the phenomenon, based on experience from the Western countries. Usage of untenable arguments prevents closer investigation of exclusive characteristics and targeted solutions for problem solving in these urban regions. Therefore, the article examines changes around major Lithuanian cities assuming that gained morphological knowledge can upgrade urban planning and design principles for suburban areas.

The study covers analysis of centrally collected statistical (demography and housing) and geographical (land cover) data with detailed analysis of urban structure of settlements. This helps to identify zones of intensive suburban development and establish a link between

development processes (as condition) and the prevailing form of the suburban settlement (as consequence). Giving the scale of the suburban growth and the negative demographic trends in the Baltic States, current development of suburban zones in long-term can lead to environmental deterioration and social decline of central cities. Therefore, investigation and monitoring the development of these areas are necessary. The study does not try to be a comprehensive work on external growth of the Baltic cities. However, it presents a wide range of challenges of urban sprawl in the region and highlights possibilities for further and more detailed research of the phenomenon.

Characteristics of the Baltic city

Historical development of the Baltic city

Baltic States – Lithuania, Latvia and Estonia – are located on the eastern coast of the Baltic Sea. Because of the specific geopolitical situation urban development in this region for a long time has been exposed to cultural influence of both, Western and Eastern Europe. However, during the 20th century, when growth of cities reached the peak, the Baltic countries were directly influenced by communist urban development. Therefore, local urban landscapes are perpetuated with physical and ideological signs of that period. Separate urban development of the Baltic countries took place during the interwar period (1918-1940) and has continued after the restoration of independence (since 1990), in the course of European integration and globalization processes. The latter marks accelerated social and economic transformations in the broader space of post-Soviet Central and Eastern European countries (Stanilov, 2007). Some of the changes in action were planned and carefully guided, while others – including urban development – took place under self-regulation of free market.

Transformation processes which took place in the Central and Eastern Europe after 1990 influenced changes in spatial structure of the Baltic cities. During the second half of the 20th century urban development of the Baltic countries was mostly related to the concept of the Soviet city, which, according to some authors, significantly differs from cities in the capitalist world (Hirt, 2006; Burneika, 2008). In a physical sense, the city of late Soviet period was characterized by two fundamentally different morphological zones: the historic centre and large housing estates on the periphery, supplemented by industrial and institutional complexes. The main difference from Western analogues was that Soviet city did not possess a suburban ring of low density residential constructions. This distinct feature was determined by the centralized urban and regional planning system of the Soviet period, which promoted specialization of large industry as a base for development of urban networks and encouraged construction of unified and standardized housing within cities.

According to a simplified view, morphological evolution of the Baltic cities can be divided into three major phases: pre-Soviet (till 1945), Soviet (1945-1990) and post-Soviet (since 1990). This division is very general, yet it represents essential differences in the principles of town planning.

The pre-Soviet period covers a long time span – from the emergence of the states till the end of World War II. It also manifests very different socio-cultural conditions of urban development, e.g. from medieval feudalism to democracy in the interwar period. However, during this phase towns were relatively small and compact. The Baltic countries at that time were still dominated by rural population. Towns in this period usually were multicultural settlements, which acted as centres of trade, defence and administration (Miškinis, 1991).

During the post-war period cultural and social landscape of the Baltic States changed dramatically. Concentration of industry in the major cities and large inflows of population stimulated their growth. Regarding the pace of urban expansion and dominant construction principles, urban development in the Soviet period can be divided into early (1945-1960) and late (1970-1990) stages (Ramanauskas, 2011).

In the early stage, continuing the traditions of interwar period, urban areas were planned by quarters, but they were build-up already with new types of buildings, which represented architectural style of “socialist realism”. Later, after the adoption of common guidelines for urbanization of the Baltic countries (in Lithuania regional planning scheme was issued in 1964) and introduction of new standardized technologies for residential, public and industrial constructions, cities started to grow mechanically. Due to the absence of private property, there were no restrictions on location and scale of new developments in the Soviet city (Bertaud and Renaud, 1995). At the same time ideas of urban and architectural heritage preservation started to spread among local architects and urban planners (Jurkštas, 1994), so they tried to enrich projects of new buildings with features of national identity. However, poor quality of construction materials and works limited these attempts to just design of architectural details or more contextual layouts of free standing buildings. Nevertheless, the overall picture of new parts of the cities was gaunt and, with small exceptions, similar to other cities in the Soviet Bloc.

After political changes in 1990, the urban development of the Baltic countries has abandoned the former course. Although the polycentric urban systems, which more or less have been developed during the Soviet period in the Baltic States, are identical to the conception of decentralized concentration (Daunora, 2007), further centrally governed development of major urban centres became impossible (Juškevičius and Valeika, 2007). Thus, previously centrally planned cities had to adapt to a completely different political and economic situation. Land privatization, decentralization of governance and competition at the national and global levels were essential features of this new reality. The further development of physical structure of the Baltic cities was also affected by economic restructuring, deindustrialization, negative demographic trends, traffic problems and, of course, the lack of planning standards for controlling land-use development processes in cities and around them (Nuisl and Rink, 2005). All this has led to the strengthening of private and commercial interest in the urban development processes (Juškevičius and Vitkauskas, 2001). Therefore, recently the Baltic cities, as all post-socialist cities in Central and Eastern Europe have experienced intense commercialization of central parts and suburbanization of their peripheries (Sýkora and Ouředníček, 2007).

Current form of the Baltic city

Current form of the post-Soviet city is frequently conceptualized as consisting of three rings (Sýkora, 1999; Hirt, 2006), which represent central, middle and peripheral zones. These zones correspond with historical stages of growth and serve as a basis for evaluating current urban transformations. Since the Baltic cities had mostly expanded during the second half of the 20th century they have also inherited this particular structure.

According to the example of Lithuanian cities (Figure 1), the central part is a result of city's organic growth till the middle of the 20th century. It spans throughout an old town and other historical neighbourhoods (new town with rectangular street pattern, historical quarters of villas, etc.). The second half of the 20th century in the Soviet city was dominated by the construction of large housing estates which form the middle part of the Baltic city. This area also includes industrial and specialized complexes (hospitals, universities, etc.) with large forest parks and other open green spaces situated in between. Suburban periphery is often referred to as the most recent zone of the post-Soviet city (Burneika, 2008). Its physical fabric is framed by historical homesteads and villages, garden communities, quarters of single-family housing, highways, modern warehouses and recreational complexes. There are also many fragments of former agrarian and natural landscape, which formerly dominated throughout the suburbia.

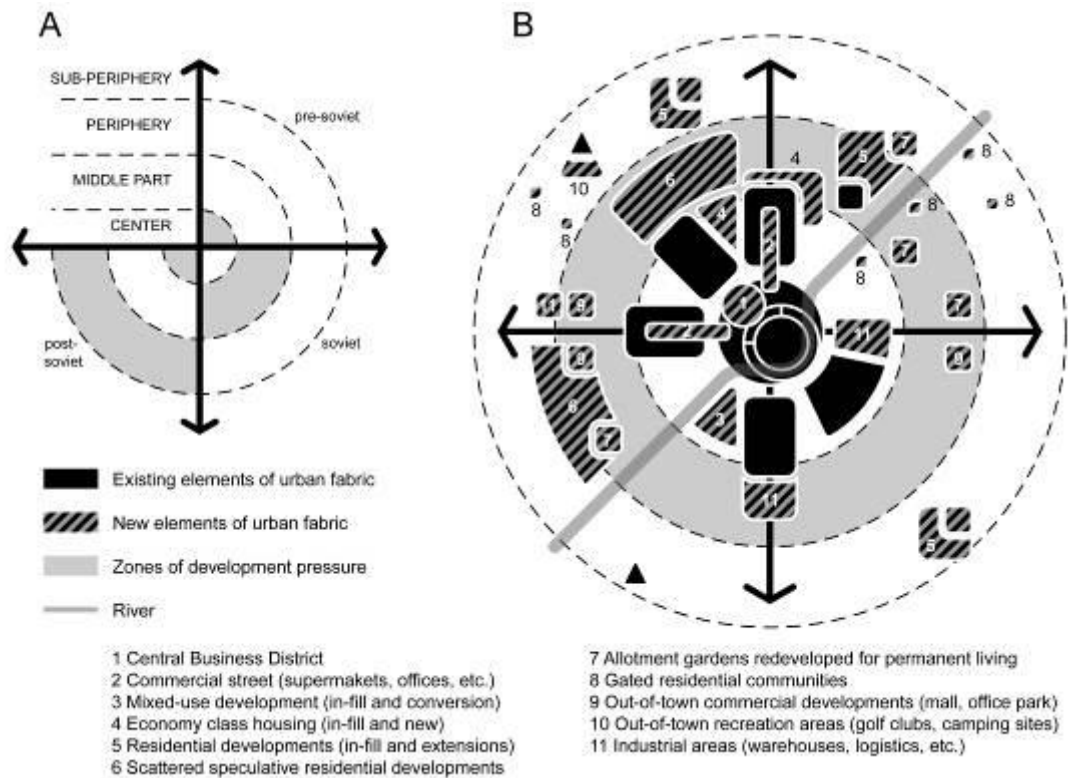


Figure 1. Development model (A) and current form (B) of the Baltic city.

Currently the Baltic cities face three major challenges which will determine their future form: regeneration of central parts, modernization of large housing estates and development of emerging suburban zones. The first two subjects are frequently discussed in the political and professional field (Aistratovaitė, 2004; Džervus, 2013). Although urban sprawl is recognized as the predominant type of urban development (Cirtautas, 2013), suburban structures are still poorly investigated because of their relative newness and complex form.

Research of urban sprawl around the Baltic city

The main question asked in the research was, what shape the suburbs of the major Lithuanian cities do acquire in the context of active socio-demographic, cultural and economic transformations in the Baltic States? Referring to the previously presented characteristics of the Baltic cities, suburban areas can be described as one of the most dynamic parts of these cities. Therefore, the current phase of urban development in the Baltic countries can be partly described as resurrection of the suburbs. Growing demand for better housing has increased importance of peripheral parts of the Baltic cities. Although, development of these areas is an antithesis of sustainable urban growth, there is a need to find ways and means for evaluating strengths and weaknesses of suburbs and discussing their future development scenarios. In this case significance of morphological knowledge needs to be acknowledged as it is obvious that urban environment with well-established social structure and more or less traditional urban form should be a prior objective while regenerating the existing and planning new suburban settlements.

Phases of the research

Suburban areas are often analyzed indistinguishably from the metropolitan region which they belong to. However, researchers are often faced with the problem of availability of information, when studying urban forms at such great scales (Talen, 2003; Clifton et al. 2008). Since urban sprawl studies examine large areas, it is convenient to split research process according to monitored data sets and their accuracy. Research of extensive growth of major Lithuanian cities was divided into two phases. Firstly, the analysis of centrally collected data on socio-demographic trends, changes of housing structure and land cover has been performed, which helped to draw preliminary conclusions about development conditions in preselected suburban areas. Later, this was followed by detailed analysis of physical characteristics of suburban settlements.

Data sets and their accuracy

During the first phase of research, information of two recent population and housing censuses has been used. The data set of 2001 consisted of 77 indicators aggregated for smallest administrative units – settlements. The second data set included 36 indicators generalized for cells of 1 km² and representing development conditions in 2011. Both sets of statistical information cover all populated areas of the Republic of Lithuania. Although different in their content and accuracy, information in these data sets represents conditions of socio-demographic and (partly) physical transformations in Lithuania after 1990.

Trends of land cover changes were analyzed by using national data sets of Corine land cover data sets of 1995, 2000 and 2006. Corine land cover data is widely applied to study urban sprawl around European cities (Vaitkus, 2005). This is done by rendering extend and change of urban morphological zone, which is defined as a set of urban areas laying less than 200 meters apart (EEA, 2010). Typical procedure of identification of urban morphological zones has been slightly adjusted, adapting it to the case of Lithuanian cities. Changes of individual types of land cover were analyzed in accordance with similar studies performed by other researchers (Chuman and Romportl, 2008). Results were generalized to represent rate of land cover change as percentage of the total area in a particular cell of 1 km².

Transformations of suburban settlements were analyzed using georeferential data, representing urbanized areas, buildings, road network and other major physical elements. The extent of growth of built-up areas was adjusted according to the orthophotographic material of respective year (1995-2001 and 2012-2013). In this stage additional investigation of the register of territorial planning documents has been performed as well.

Although the study included examination of different data, the illustrations presented in this article were prepared at the same scale. The aim was to demonstrate the relationship between development processes and physical changes in suburban communities.

Research cases

Suburban development trends around major Lithuanian cities (Vilnius, Kaunas and Klaipėda) are demonstrated through description of situation in three local administrative units of 2nd level (LAU2, former NUTS5). Suburban sprawl led by influence of Vilnius city is analyzed by examining demographic and physical transformations in the community of Avižieniai. Changes around Kaunas are analyzed in the community of Ringaudai. The community of Sendvaris illustrates drastic consequences of uncoordinated urban expansion just outside the city of Klaipėda (Figure 2). All communities represent politically autonomous territorial units – they are parts of rural municipalities, which surround major cities. These communities are directly exposed to economic and functional influences of adjacent urban centres, because they are located at about 5-15 km from the city centres.



Figure 2. Case studies – suburban communities of major Lithuanian cities.

Conditions and consequences of suburban change around Lithuanian cities

Trends of demographic change (population size and density)

Suburban communities which were examined in the research, belong to areas with highest residential growth in their municipalities. In 2011 Ringaudai and Sendvaris had up to 5000 residents, and Avižieniai – more than 7500. Over the last decade population in these areas increased from 40 to 90 percent. During this period, structure of settlements has remained quite diverse with just few settlements reaching more than 500 residents (Figure 3). However, changes also occurred in less populated places – increased number of settlements with population over 200 residents has been noticed as well.

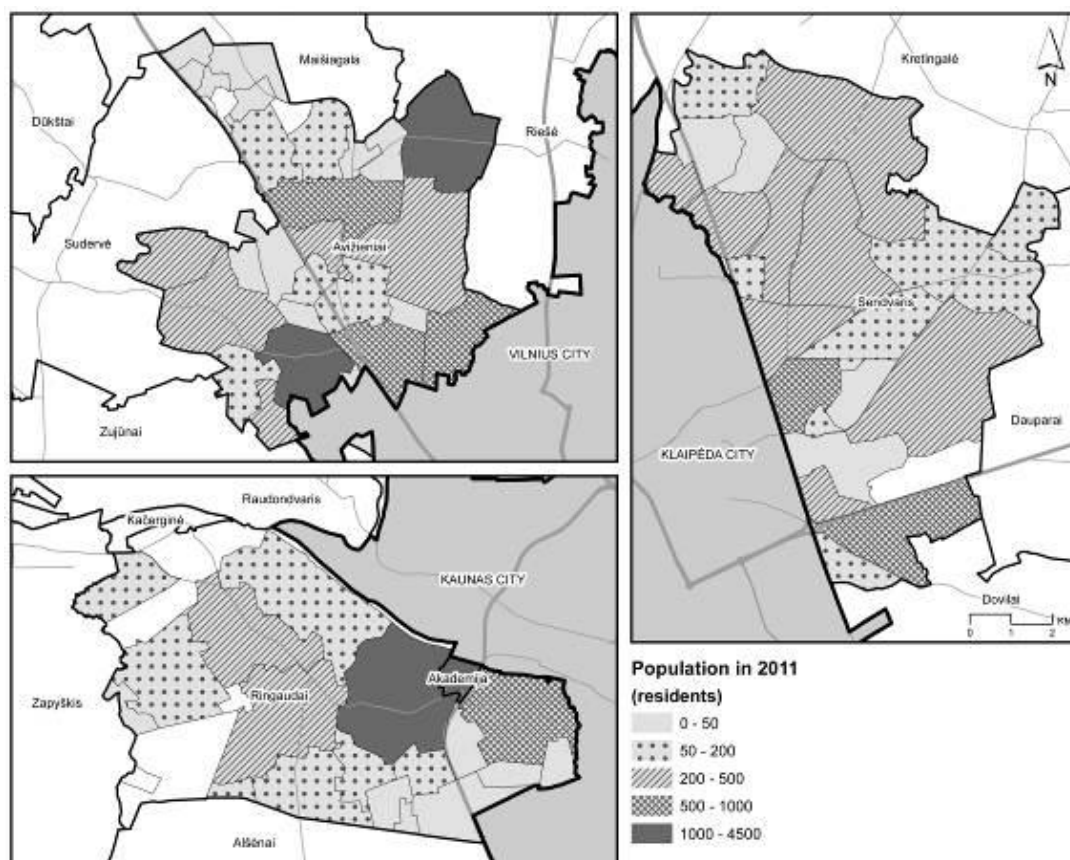


Figure 3. Population in the suburban communities in 2011.

Unfortunately, population density in the suburban communities remained low – in 2011 outside larger settlements it has not reached two persons per hectare. Population density in built-up areas showed higher rates, but rarely reaches five persons per hectare. During the last decade in some parts of Ringaudai and Sendvaris this ratio even declined. This suggests that in some locations due to higher land prices residential areas are more compact. This might also be caused by the fact that part of new suburbanities had not officially declared a change of their residence.

Changes of housing structure (single-family housing)

According to the traditional suburban image, it should be dominated by single-family houses. Already in 2001, the communities in question showed high share of low density housing, which accounted for 50 or more percent of all dwellings. One-fourth of these were built after 1990. During the Soviet period low density housing was forbidden in large cities, therefore in 2001 this type of dwellings accounted just about 10 percent in Vilnius and Klaipėda, and only in Kaunas ratio was higher (10 to 30 percent). However, significant part of single-family housing in central cities was constructed during the first decade of independence, with higher numbers registered in Klaipėda (up to 50 percent). This trend could be influenced by incorporation of rural areas into the cities. On the other hand, new blocks of detached houses have been built inside cities as well.

In 2001 detached houses dominated in major part of settlements in Avižieniai and Ringaudai (Figure 4). Only in larger settlements and areas near the city border it was lower than 70 percent. A smaller amount of individual housing can be attributed to higher ratio of dwellings in low-rise block of flats. Apparently, similar reasons, determined the housing structure in the community of Sendvaris near Klaipėda. Here in 2001, detached houses dominated only in several older or newly emerging settlements. However, data from 2011 shows that individual dwelling dominated in almost all parts of the analysed communities. This suggests that ongoing expansion of the major cities in Lithuania is mainly associated with construction of single-family housing.

The analysis of the structure of residential buildings in the suburban communities shows, that during the first decade of independence it became more diverse, but generally still was dominated by buildings of the Soviet period. In 2001 settlements in Avižieniai were dominated by the buildings of 1946-1970. However, in areas located closer to the city limits, higher numbers of residential buildings of later periods have been noticed. The same trends are specific for settlements in Ringaudai and Sendvaris, but here significant share of pre-soviet buildings has existed.

It is likely that considerable part of construction works in the suburban areas after the 1990 consisted of upgrading the existing building stock in order to meet the changing needs of households and businesses. However, data sets of the population and housing censuses do not possess this information. Therefore, these trends can be observed only on a very detailed level of analysis.

Trends of land cover change (residential and commercial sprawl)

The analysis of expansion of urban morphological zones around the major Lithuanian cities in 1995-2006 shows, that at first growth of built-up areas progressed inside the cities or in places located near their administrative boundaries, but later outer expansion embraced large portions of suburban areas. In this case, the community of Avižieniai with adjoining territories became part of north-west development axis of Vilnius city. Sendvaris started to represent the eastern sector of urban expansion in Klaipėda region. These areas were gradually affected by processes of suburban sprawl. Despite lesser extend of urban sprawl in the community of Ringaudai, Kaunas city still experienced high degree of uncoordinated outer growth.

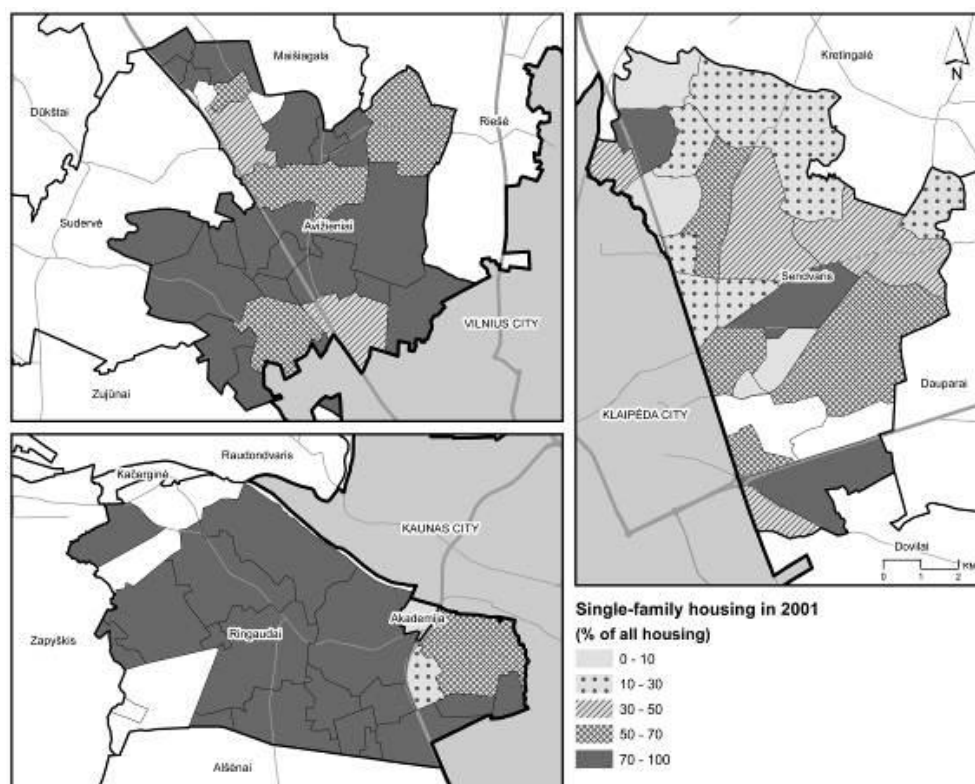


Figure 4. Single-family housing in the suburban communities in 2001.

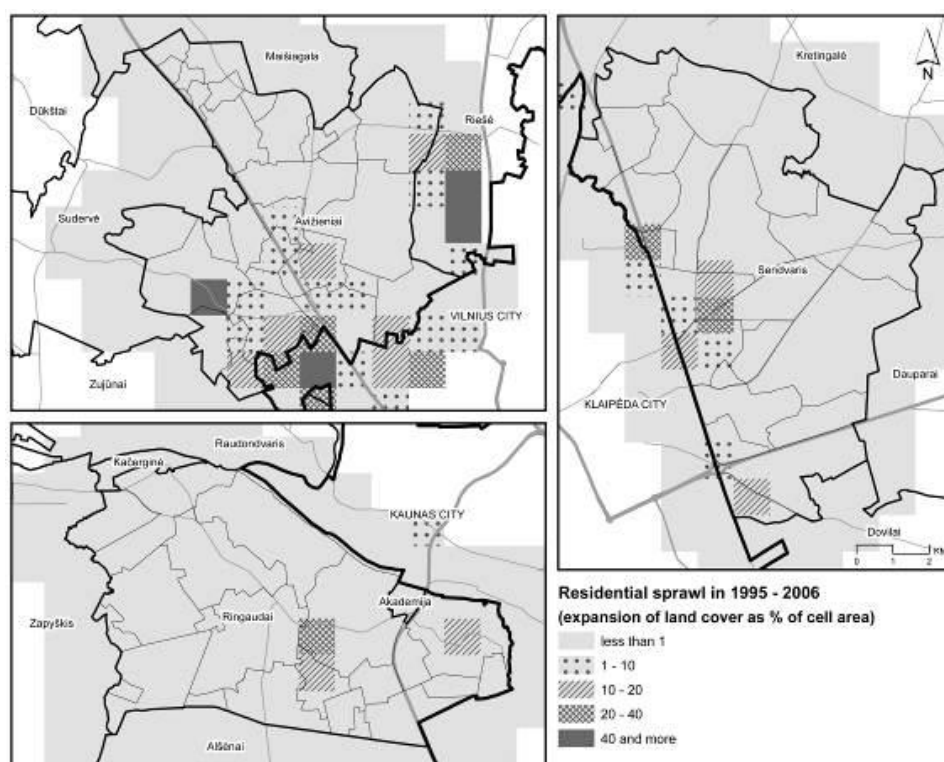


Figure 5. Residential sprawl in the suburban communities during 1995-2006.

Urban sprawl is a heterogeneous phenomenon. It consists of growth of residential, commercial and infrastructural areas. Although these processes represent distinct functional domains of the urban landscape and usually operate at the same time, their spatial patterns can diverge. The comparison of different processes of land cover changes reveals that majority of alterations can be attributed to residential sprawl. The case of Avižieniai is exceptional. Here growth of residential areas was quite intensive and affected settlements adjacent to Vilnius city and also in some remote locations (Figure 5). In Ringaudai residential sprawl was observed in several locations around larger rural settlements. In case of Sendvaris, this type of urban sprawl dominated in settlements neighbouring Klaipėda city. In general, the growth of residential areas around Lithuanian cities is characterized by both nuclear and dispersed patterns. During 1995-2006 territorial expansion of commercial and industrial areas also featured some degree of concentration, however it was insignificant. In most cases, this type of development occurred near highways leading to the cities or appeared in the vicinity of major transport nodes.

Concentration or dispersion of land cover transformations reveals disparities of urban development. However, the pattern of urban sprawl depends on spatial structure of metropolitan and (road network, natural constraint, etc.) local scale (land-use, land ownership, etc.) Residential and commercial sprawl usually take place as a greenfield development and drastically changes the landscape of suburban areas. Therefore it is necessary to examine physical features of emerging suburban settlements.

Physical transformations of suburban settlements

As the review of development conditions in the suburban areas of major Lithuanian cities has shown, external growth of urban areas is quite noticeable, especially after 2000. Therefore, we can observe formation of the suburban landscape, which is characterized by mosaic of urban, agricultural and natural areas. Fragmented urban fabric in peripheral zones can be described and analyzed using basic elements of urban fabric: buildings, streets and plots (Levy, 1999).

The higher or lower pressure on urban development can be noticed in various places of the wider space of the suburbia. According to their distance from the central city, three types of suburban settlements can be identified: 1) residential areas on the periphery of city, 2) residential areas located immediately behind the administrative boundary of city and 3) self-sufficient suburban settlements. However, development pressure can also be visible at more distant locations of metropolitan region, e.g. periphery of the remote towns and large villages. Similarly, there are other specific types of semi-residential environment, which can be affected or even created in the course of suburban sprawl, e.g. garden communities and areas of seasonal or second housing. Respectively, communities in question are dominated by the second and third type of suburban settlements, which represent former villages and newly emerging areas of low density housing.

Comparing patterns of built-up areas in the suburban communities near major Lithuanian cities in 2001 and 2013, high increase of new constructions is visible (Figure 6). These new developments usually appear near the older settlements or occupy former agricultural fields. In many cases, it is evident that new suburban residential structures favour locations in the vicinity of major transport corridors and natural features. However, residential areas expand in a very chaotic way and usually leave large fragments of undeveloped land in between. New settlements could acquire more regular urban form, but as long as these speculative voids prevail, suburban areas will remain incomplete and fragmented.

During the last decade, formation of new low density housing blocks and expansion of older rural settlements in the communities of Avižieniai, Ringaudai and Sendvaris can be noticed. In the case of Avižieniai, new residential structures were built across the border of Vilnius city, so that adjoining urban and suburban fabric started to merge. Construction within built-up areas was not common, but occurred in all communities.

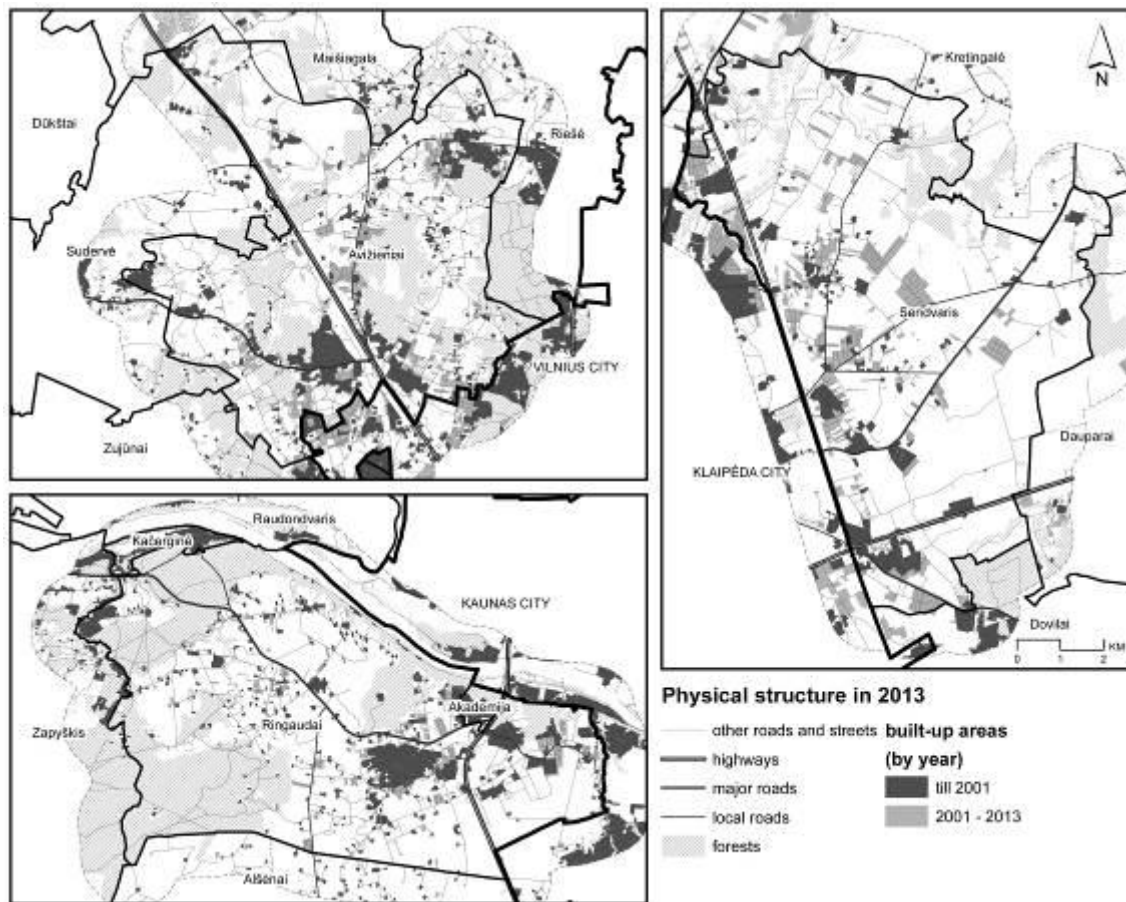


Figure 6. Physical structure of the suburban communities in 2013.

In general, all new residential formations can be divided into several morphological types. According to their relationship with the pre-existing suburban fabric, they represent infill, extending and outlying structures (Figure 7). The infill structures are usually small in size and appear on previously undeveloped land, which is fully or partly surrounded by built-up areas.

Extending structures usually border and expand older residential areas. This type of suburban tissue can be subdivided into regular and linear formations. Regular structures are formed mostly by extending pre-existing street grid of settlement, while linear structures form around separate cul-de-sacs. In some cases, small enclosed residential structures create leapfrogging patterns, which incorporate former homesteads or even small rural settlements. Such extensive and complex formations could be considered as additional subtype of extending suburban structures.

When new residential constructions appear in locations, which are relatively distant from current settlements (for example, more than 200 meters), they can be considered as outlying structures. These greenfield developments can acquire various spatial configurations and greatly differ in size, because usually they are separately planned and relatively instantly built on any undeveloped land.

There is also a trend to construct single residential structures on large plots of agricultural land. It partly reminds the dispersed pattern of historical farmsteads, which is considered as valuable element of rural landscape of the beginning of 20th century (Ramanauskas, 2011). However, currently emerging single residential structures are just another example of suburban housing.

To sum up, the infill and extending structures can be considered as more traditional than outlying formations, which are typical for intensive suburban development of the Western

countries during the 20th century. In reality, these morphological types are not so easy to distinguish. The main reason for this is the dynamic nature of suburban development, which is characterized by the time lag between planning and construction works. The analysis of land-ownership structure suggests that the amount of pre-planned plots for residential construction in the suburban communities is impressive. For example, in the community of Sendvaris, which is located near Klaipėda, supply of residential plots is high enough to house ten times more new residents than this community has received during the last decade. Therefore, it can be said that currently the prior direction of urban development in Lithuania is suburbanization. However, spatial and functional structure of suburban settlements still does not meet standards of high quality residential environment.



Figure 7. Fragments of emerging suburban fabric: extending (A), infill (B) and outlying (C and D) structures.

Conclusions and discussion

The model of the Baltic city, as successor of the Soviet city, can be used to study trends of urban development in the Baltic States after 1990. This model consists of three concentric zones, which reflect different stages of city's growth and helps to describe distinct morphological features of urban form. In recent decades, periphery of the Baltic city experienced significant transformation, therefore latest phase of its development can be describes as resurrection of the suburbs.

As stated in the article, intensive development of suburban areas around major cities in the Baltic countries is problematic phenomenon. First of all, the process is politically uncoordinated (especially at municipal level), and secondly – it is not based on any demographic presumptions. This leads to the situation, where all more or less negative effects of urban sprawl can occur, e.g. decline of central cities, inefficient use of suburban areas and so on.

From a morphological point of view, suburban growth is complicated as well. The main problem is that resulting semi-urban structures acquire chaotic and fragmented shape. For example, peripheries of the Baltic cities is dominated by large patches of greenery and opens semi-natural spaces, dispersed pattern of former rural settlements and newly constructed low density commercial and residential areas. And all this is superimposed by the networks of major and local roads. Nevertheless, tools of morphological research can be adapted to study contemporary suburban fabric around the Baltic cities, as it has been done in other counties (Southworth and Owens, 1993; Moudon, 1998; Sheer, 2001). This allows identifying regional characteristics of suburban form, which can be useful considering possible development scenarios for territories adjacent to major urban centres.

In general, major cities in the Baltic States represent examples of semi-compact cities evolving towards a dispersed urban form. Regarding this, three scenarios for their future development can be discussed. The first scenario – further expansion and urban dispersal – represents continuation of urban sprawl with all possible negative outcomes. The second scenario – fragmented regeneration and densification – stresses the possibility to apply area based measures for renewal and regeneration of pre-selected inner city zones, as well as densification of progressive settlements on the periphery in order to concentrate financial capacity of national and local government to deal with problems in these urban and suburban areas. Finally, the third scenario – urban renewal and reurbanization – enables the application of compact growth measures to strengthen existing urban cores of metropolitan regions, but it can only proceed as agreement between representatives of urban and adjoining suburban municipalities, because it requires political means to restrict or at least discourage processes of uncoordinated outer growth.

Overall, it is necessary to continue promoting public concern and share information about negative consequences of urban sprawl and discuss possible measures to sustain a more compact form of cities in the Baltic region. Therefore, results of this study could be adapted to further examination of the identity of the Baltic cities as well as comparing its historical evolution with cities in other regions of the world. Also, there is a great need to continue research on the current trends of urban transformation in the Baltic States in order to create models designated to coordinate further development of major cities and their suburban regions. And finally, it is crucial to perform closer morphological analysis of emerging suburban fabric and distinguish origins, physical characteristics and transformation possibilities of different settlements.

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Mind the gap. Multi-scale landscape approaches

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Abstract. *The expression “mind the gap” refers to the act of paying attention to crossing pass from one element to another. In urban transformation and architecture project it is necessary to reflect on the concept of distance and crossing in particular in relation to the theme of the change of scale and especially from urban design to the architectural design and detailed design. The method is based on a deep morphological analysis of the territory and the landscape and detections of elements and invariants inside, after establishing the invariants you are able to define a formal grid that keeps continuing at all scales of design, starting the territorial scale up to reach the scale of architectural detail. Supporting this reflection may present a set of projects that participated in the competition European 12 which show that the multi-scale approach can be a way to control an urban transformation. The project at multiple scales can be a basis to monitor and study the existing urban form and to reflect on the possibilities of future transformations going to define development scenarios and guidelines for the territories.*

Key Words: *Multi-scale, urban morphology, geography, urban project, landscape.*

Introduction

Mind the gap represents a sign of the world-famous London Underground, it is a warning to pay attention to the distance between this platform and the train. This research aims to reflect about this warning to pay attention to the distance in terms of the intervention scale in landscape design, and architecture of the city. So *mind the gap* becomes the categorical imperative of an approach method of city design through a multi-scale system that crosses all scales. This can be a useful support system in decision-making and design, through the reconsideration of technical, thematic and relational characters of the project. The idea came from the need to find a binder between the various stages of project linking the analysis on territory than on detail. We start therefore with a strong multidisciplinary system that goes from historical and economic to the morphological, hydrographical and environmental point of view, until the scale of the object that can be a building retail or a piece of furniture; the idea is precisely to find a *fil-rouge* that addresses all scales and in particular supports the thesis of the project's consistency and its relationship with the place. The issue, therefore, is a part of landscape architecture strongly directed towards the project.

Scale adherence

The scale is a need for understanding, but not a principle in itself. So, it follows from the principle of relative invariance of a system "all organic", in relation to the increased variability of its components. The consequent organization in space-time depends on the irreversibility of time, which leads to a sequence of scalar processes, because the flow of time is not homogeneous (Ingegnoli, 2000). In fact, if the processes are thought of as "verbs", in other words the potential becoming of a subject, for example: moving, dispersing, evolving, and many others. The working out of a process is scale-dependent, while the process itself is invariant under the scale (Sanderson and Harris, 2000).

The theme of scale adherence is crucial in the design of architecture and landscape design, in particular with the possibility to identify a link between territory and architectural object, and above all between place, landscape and architecture.

Roberto Gambino talks about scaling-up, referring to those processes and techniques of analysis and plan that are based on multi-scalar and multi-temporal approaches, extending the reference system to the 4-dimensions. In this regard the analysis of scaling-up follows an inductive approach that deals with the themes of the regional scale to arrive to the urban scale, across the various scales of analysis arise various problems that often fall into the dichotomy of global/local and with the changing identities of contemporary territories (Gambino, 1997). These are the so-called *in-between* spaces. In these fields indefinite contemporary design is tasked to act, to produce its rhizomes and create a network of relationships with the existing one (Farina, 2006).

Gambino talks about multiscalarity as a need that must be set as a matter of fundamental programmatic planning going to define the issues related to the "territory of the inhabitants" (Magnaghi, 2000). The School of the Polytechnic of Bari talks about cross-scaling, as a comparison of the change, the transfer and adaptation of models of ecological analysis to the landscape scale respecting the levels of hierarchical organization (King, 1991), from whose cartographic document scale and survey data were dictated by historical and cultural contingencies. Mariavaleria Mininni shifts the focus on the knowledge construction in landscape theme that is a fundamental cornerstone of the European Landscape Convention (Mininni, 1999).

Knowledge becomes the first step to approach the theme of landscape design, both for the formulation of choices, both for the involvement of the players whose activities affect landscape. This makes it possible to identify the components of the landscape within the territory, analyze their characteristics and modification tensions. The different texts and different practices already in progress reveal a wide variety of approaches to the topic that are a reflection of the many cultural conceptions that are compared, especially in the relationship between the construction of knowledge and action, in which the available tools are often inadequate. Landscape in fact demands answers in different scales ranging from the local scale to that of the particular crossing different time scales.

Landscape knowledge should be developed according to a process of identification, characterization and qualification which includes the description and understanding of the places, the examination of evolutionary processes and the recognition of the value systems. In this regard it may be interesting to draw cards, atlases, manuals and other useful tools primarily to provide a reference and a common language in order to increase the dialogue between the interested parties. The construction of knowledge must be closely linked to the action in order to facilitate the integration of different approaches to the production of knowledge that allow to observe the region through the construction of databases and other tools that are able to draw the traces on the territory. This is the work that follows the know, in other words that of the interpretation, and evaluation of reading that precedes action. In this regard, Bernardo Secchi says, "Planning means the traces of a wide set of tracks, those of the continuous and conscious changing of territory and city status" (Secchi, 2007).

The method

The multi-scalar approach is a method of reading heavily project-oriented and in particular through the analysis must be able to address different scales of the project, therefore, constitute the corpus of surveys which are actually "already project". In this way, through this system of guidelines the project may have a strong element on which to support themselves and with which to generate a system of relations: the *rhizome* (Deleuze and Guattari, 1987). The support of the rhizomatic structure consists of a series of synchronic and diachronic investigations aimed at identifying the invariants that govern the landscape. The analysis assumes that landscape is the object of the search and goes to determine the structural basis. Eugenio Turri talks about *iconemi* about some elements which he defines as basic units of perception (Turri, 1974). The sum of these elements and their combination form the overall image of the country,

rising primary elements such as structuring the historical and cultural memory of the place. The evaluation and selection of invariant and *iconemi* forms the basis of multi-scalar system, in other words the elements on which the multi-scalar approach can be found and that can be explored at different scales and made system with the project. The identification of invariants and *iconemi* is based on a series of overlapping layers: morphology; hydrography; infrastructure; settlement; agrarian plot.

It should be interesting to put together physical readings with other ones that are based more on a historical study and photography, considering a system consisting of historical and current photos with different field of view degrees, from panoramic photos to the detail. Reflecting about diachronic analysis it is necessary to support the research with the cartographic archive aims to assess any items that do not emerge from eminently morphology. The attempt is to build the readings that go beyond the eminent morphological data and beyond the historical, cultural and perceptual one.

The reflection on the scale is aimed at the identification of invariant to the regional scale and then the exploration of these three basic steps type, or the territory scale and the environmental system, the urban scale and urban form, and the scale of the neighborhood or the city block or in some cases until the architecture and construction detail. Such a descent of scale is based on a reading of territorial planning and well targeted on the lens that filters the information coming from the territory in order to define its own character. Reflecting on the concept of landscape emerged from the European Landscape Convention and then the translation from aesthetic landscape and operating landscape on what Eugenio Turri talks about landscape "A landscape is in fact dimensionally defined mostly by its content; is its content, which determines the size, which also depend on our attitude, subjective, interpretive, in which we merge our experience of the world (aesthetic, emotional, cognitive, etc...) that leads spontaneously to recognize the landscape" (Turri, 1974).

The sign reading "makes landscape" and outlines the main characters of the place, the project has the task of interpreting the signs of the area and take a critical and judgment with respect to them. In this way the reading of the territory becomes an opportunity for the emergence of values and important data at different scales that are stakeholders of territorial scale. The interaction between paper and photo contribution is essential at different scales and may highlight the continuity and the reading of the invariants in the steps of landscape scale. So the search proceeds from the territorial scale to the urban scale where the focus shifts on the definition of the relationship between urban form and environmental dominant and how these have changed, modified and mutated the settlement. The choice of the invariant rules and defines this scale and a reading mode that explains how the latter is put in the scheme with the whole system (Figure 1).



Figure 1. Network thickness.

The mutual relationship between the parties will then have its keystone in the project, closing arguments and defines the multi-scalar and complete them at the same time deeply rooted with

them and therefore with the place and with landscape. The further descent of scale can go to the scale of city block where the invariants often are reflected in the elements, lines or points that become references, limits or areas in which the project is to *feed* the relationships of mutual exchange and reciprocal relationship. If the landscape is the language of the land, we need to investigate not so much the “syntactic structure”, which represents the most objectified and uniquely quantifiable (ex: in terms of natural resources and material values) as the recognition process, in other words a process of identification that binds all communities within its territory “producing” valuable landscapes. Starting from the signs and landscape invariants, it is therefore possible to retrace the shared construction process that belongs to landscape, as well as giving new meaning in those contexts that express different resources today than in the past. The project is proposed as a multi-scale design for a landscape that is now sprawling, the concept of which often escapes to the treatise. The multi-scale flow allows to give clarity to the project, the hierarchy between the parties and *getting roughs* into the place. Arjun Apadurai talks about “production places” like the activation of a particular place and the person's ability to change and to transform it (Tosco, 2011).

Applications

The multi-scalar approach is the focus of an internal research project at the University of Cagliari which has as the objective of the recovery of the little villages in Sardinia and in particular the relationship between settlement and border areas. My study takes place in this project, with a deepening on the village of Cabras, a perfect research terrain for the development of the theme of project multi-scalar capacity. Cabras is placed in the most important wetland of Sardinia, characterized by the mouth of Tirso river, and the presence of ponds, drained marshland and the lagoon with the same name (Cabras Lagoon). In the midst of this wide regional water landscape it develops society that lives between agriculture and fisheries, and which derives its resources from two major funds, the lagoon, which until a few decades ago it was still a feud, and the field cultivated with cereals, rice, vines and olives. The territory of Cabras is divided into two parts, *Bennaxi* and *Gregori*, the first one is a fertile alluvial soil and with very good conditions for agriculture, the latter is better for settlement. The geological and hydrographic nature of the place has deeply determined the position of settlements in the whole area of the so-called Campidano Maggiore, so that Cabras is located at the end of a series of villages with the same distance from the river Tirso, in which the area of Bennaxi, the floodplain became both a support source, as the principal place of agricultural production, but also a means of defense against Tirso flooding. The villages are located on an ancient Roman road, the so-called *Via Maxima* leading from the Roman port of Tharros, passed Cabras and came to the Roman outpost of Forum Traiani, the seat of the Roman army in Sardinia.

The mutual relationship between habitat, road and water has always adjusted system and relations of urban and territorial scale. The theme of water then reveals additional complexity in the form as it is enriched with a system of irrigation canals radiating from Tirso as the main system and allows you to structure the surrounding countryside. The result is thus a supporting structure of landscape straight from the water system that has in the river Tirso its generator system and through the system of canals to reach individual plots that generate agricultural plot and through ducts leading intercept the main settlements. The regional scale talks about a very complex system, therefore, where it is sufficient to represent a superposition of the water system and infrastructure related with the distribution of villages in order to understand thickness of the landscape that can have the river and how the project needs to interact with the water factor.

The agricultural plot draws the countryside but also the urban form, as the center of Cabras shows deeply scored by a plant in which the vacuum dominates on full and in which the space between the houses, the heart of the block is actually a large crop of interior farmland that belongs to housing. It is a fabric in which farmlands are contained and in which the relationship between road house and garden is a step often direct and linear. The urban scale introduces us to

the theme of the relationship between settlement and settlement, road and agricultural plot. The growth of the city in the last hundred years shows its continuous attempt of the city to include parties of agrarian plot inside including it inside the shape of the city block and going to clash with the landscape water that crosses and order the agrarian plot.

The project is confronted with this, a system characterized by a wide water landscape, where Tirso hierarchizes a duct system that carry water to the countryside close in large tanks and piezometric towers at the margin with the city center. Water defines an invariant at the territorial scale, canals and water towers represent *iconemi* of urban. While the scale of the block controls the house that defines a filter between urban and rural interior of the block. The multi-scalar system lies in the strength of these invariants to define all scales, from wide scale river at the territory scale, to the water tower at the urban scale until the channels that arrive near the cluster, until the street and the towers that form the skyline of the city and define pathways and crossings, until the house which is the smallest unit, the atom of the settlement, that variously aggregated and compared with the elements that I mentioned above, draws the urban form.

The project can become an opportunity to mend the edge of the city through a system of *passing through public space* which is based on a structure of farmland, namely the canal that enters the city through a system of tanks, watering hole, and drinking troughs of the agricultural plot. The new urban tissue reinterprets the domestic blank isolates reasoning systems with different densities going to define a base tissue with high density but wide space dedicated to public space. The houses are all individual with a spread space dedicated to little vegetable garden, whose size varies in a coordinated and regulated manner. The public space is a very abstract space where the element dominates the wide square yard, the main trading place on the edge of the consolidated center and direct daily practice and calls for characters in this kind of space, in some cases very elongated, while in other an Italian square in a dense system. The project ends with a new definition of the edge, a line defined by the channel that closes the project and ideally it is linked to watering tanks that dot the agricultural plot. The relationship between architecture and multi scalar approach becomes a system of relations between the invariants of the land, the river and the water, the invariants of public space, the continuity of the wall, the landscape of *iconemi*, steeples and towers, and then the water at the scale of the city block with the channel and the trough that becomes the basis of a series of details that go beyond the architectural scale, through a coherence that starts from the analysis of the territory that in this sense becomes study and project in the same time (Figure 2).



Figure 2. Passing through public space.

The second project that I propose has been developed within the international competition European 12 which had the theme of Adaptable City, it was therefore required to teams to engage in interpretation of the theme in different contexts. Our choice fell on the center of Hognas, where it involved the construction of a new settlement and the issue of urban ecorhythms. The interpretation of ecorhythms and the territory of Hognas is one that has resulted in the definition of the project and on which it is inserted multi-scale survey. The city of Hognas is a historic

trading port in the south of Sweden, in the region of Skåne, overlooking Denmark and particularly important maritime crossroads between Helsingor and Copenhagen on the Danish coast and Landskrona, Helsingborg and Malmö on the Swedish coast.

This important port has sanctioned the birth of an industrial coal processing and manufacturing center specializing in quality ceramics. In addition to this all an agricultural hinterland with rape and potatoes fields, which mark the typical rural landscape of Skåne, dotted with farms and a growing mostly in large estates. With the closure of factories and the reduction of port traffic, Høganäs is faced with its current resources, the water and the sea, and the agricultural back end. The scale of the territory tells Skåne system with the network of relationships between Høganäs and infrastructural mesh that acts as a hub between the pole of Helsingborg and Halmstadt north and between Helsingborg and Stockholm on the other side. A landscape invariant is represented by the long field and the park series, often with a territorial importance, the green size becomes a key element in the urban scale which overlaps the mesh infrastructure, another element that defines a multi-scale is the railroad, settlement structure which divided historical coal production centers across Sweden and now abandoned.

The relationship between the green plot and infrastructural plot appears to be the dominant element in the landscape of Høganäs. These have become the axes of the generators of the new system of habitat that is proposed for this area. The choice is to define a unique infrastructure and green mesh percolating through the old railway and port system from large environmental park in the north to the south through green areas of the north-south axes and understanding the historic district of Gruvtorget. The wide green bands become public space and infrastructure, with bike paths and walking trails, overlaying a green and light plot to a heavy infrastructure that once ran through the area. On this system of relations with the existing, the project engages the theme of temporality and multi phase of the project, identifying crossings in green transversal axes generators of new urbanity which then joins in cluster systems with the possibility of increasing saturation in time (Figure 3).

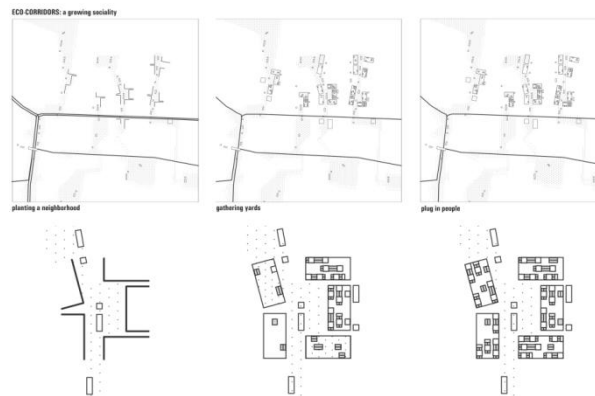


Figure 3. Høganäs, a growing habitat.

The cluster is positioned as a wood fence in public and defines the boundary between the percolating green and agricultural mesh that remains consolidated in the area. The idea is to define wide wood squares that interpret the theme of the public space of the urban centre and in this way try to find a dialogue with the tissue of traditional country houses that characterize Høganäs agrarian plot. Thus the cluster is generated as the sum and dialogue between historical elements, square wood and new elements. In this case the multi-scale project is divided on two fronts, the first is the multi-scalar system of the public space, from territorial arteries, to the space of the relationship among the houses, defined by the fence and inside the card. On the other hand we have the issue of multi-temporal and changeable and evolutionary possibilities of the project over time. The Adaptable city is becoming a place full of relations marked by a

green percolation through the countryside, the historic town and new agricultural plot and gives voice to territorial demands through the micro scale in different time scales(Figure 4).



Figure 4. Wood square with clusters.

Future perspectives

Thinking about the concept of multi-scalar allows us to tie analysis and design in a manner often inseparable and in this sense to tie it to the place deeply and exert the terms in which Carlo Socco speaks about landscape, defining it as the sense of a place as it is revealed to the perception (Socco, 2000). The force is entrusted to the relationship between objects and network, the multi-scale fact relies on a well-defined mesh, a rigid system to lean to the zoom-in and zoom-out using as a yardstick of comparison upon which to vary the certain mesh objects that are part of the signs and fit within a model of perception signs of the landscape which is based on elements that communicate at all scales and that provide the basis for the project at all scales of intervention. The project of Cabras and Hoganas show how deep analysis on the territory becomes the grid on which to perform the progressive zoom, the two elements of multi-scale flow rate, the water and the woods become defining elements of the spaces in 5 dimensions, in Cartesian space of three dimensions, the fourth dimension that refers to multi temporality and a fifth dimension that is the one related to the users and to sociability, since they become the new engine of social relations.

Reading the landscape is not to deny the precarious balance achieved and their continuous changeability or perfectibility, it means dealing with the inertia of the structures of the signs and the depth of the layers that make up the local listings. The multi-scale process has an obligation to balance between change and permanence, and it is the size of the length projecting multi-scale more than three dimensions. The research aims to identify a *transition between the scales* that creeps and lies within the rhizomatic structure of the landscape and identifies possible links and relation systems. The tension between natural and cultural value, between local and universal values, inevitably evokes the relationship between places and networks, long thought of as complementary metaphors, for the interpretation and design of the territories of the contemporary (Gambino, 1994). They may help to recognize the "territoriality of the landscape" in the wide meaning given by the European Convention. It is in landscape, as evidenced by the incessant interaction of the natural and anthropogenic dynamics, that the historical settlement takes its full meaning. In landscape the historic district dialogue not only with the "built cultivated fields" (Cattaneo, 1845), over the centuries by agricultural networks, water systems and systems of roads and infrastructure, but also with the presence of moving nature, often reluctant to any demarcation, pervades and diversifies the spaces surrounding constructed areas in various ways.

The relationship of man with the place, and through the places reside in living spaces. The relation between man and space is living, reflecting on its essence. (Martin Heidegger, 1975)

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Conurbation in the Porto Alegre metropolitan region

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Abstract. *One of the main features of metropolitan regions is the spread of urban fabrics belonging to different municipalities and their tendency to conurbation, which can be uneven, presenting different growth speeds, morphologic peculiarities and different kinds of natural restraints. The parts tend to connect to each other, making up a spatial unit of a different scale and complexity where the whole and not only the parts of its structure follow a new logic. In morphological terms, when the conurbation is strong, its syntactic measures tend to be more robust than those presented by the parts. This can be measured through the Conurbation Index (CI), which compares the global integration of the parts with the global integration measures of the whole – the emergent structure. A theoretical model is presented, from which is analyzed the way the syntactic measures change as the urban fabrics interpenetrate each other. Empirically, nineteen pairs of contiguous municipalities of the Porto Alegre Metropolitan Region are examined, together with five wider systems made up of three or more contiguous municipalities in the same region. In addition, the same methodology used to produce the theoretical model was applied to two groups of municipalities, presenting different morphological features.*

Key Words: *Conurbation, metropolitan regions, urban growth, conurbation index, conurbation modelling.*

Introduction

Metropolitan regions can be understood as a product of the transformations held in the territory by a number of simultaneous phenomena. From the economic point of view, a metropolitan region means the agglomeration of activities over a territory more or less vast, which are distributed and enable to bring together relations of complementarity and interdependence like those that can be found in complex urban systems. This implies, in this sense that the logic of the economic background can be found within different patterns of production and reproduction of social relations. How specialized or diverse the economy is within a metropolitan region depends both on its role regarding a wider economical area, how connected or dependent it is regarding globalization processes, and on the relationships held inside the region itself.

From the social point of view, a metropolitan region represents an agglomeration of people and this is close related to the logic of the reproduction of the social/economic sub-systems. The distribution of the population, the patterns of their income, living standards, jobs, etc., depend on the way social structures relate to the economic system as a whole. Also in this case, diversity or specialization depends on the way the entire system works on space.

From the spatial point of view, metropolitan regions tend to represent a new scale of spatial organization and one of its main features is the tendency to conurbation, that is, the formation of spatial continuities which are produced independently of local spatial dynamics represented by the spatial units that made up the region as a whole.

The Porto Alegre Metropolitan Region

Briefly, in this case study it will be analyzed the main conurbation of the Porto Alegre Metropolitan Region – PAMR, in the State of Rio Grande do Sul, Brazil, made by 14 different municipalities, born in different times and for different purposes. Porto Alegre, Viamão and

Gravatái are the oldest cities and start their evolution from the second half of the 18th century on, in a time when Portuguese and Spanish crowns were fighting for a territory whose limits used to change according to several non-lasting treaties. These are the cases of cities that slowly evolve from small foundation cores. In the beginning of the 19th century the northern part of the region begins to be occupied by German immigrants and São Leopoldo is the first colony and the main centre for the occupation of this part of the State. Later on, Novo Hamburgo, Estancia Velha, Campo Bom, Portão and Sapiranga start their development as expansions of the São Leopoldo colonizing core. Porto Alegre was linked to the colonies (firstly with the German ones and, by the end of the 19th century, with the Italian ones, which occupied the remaining vacant land in the north-east part of the State of Rio Grande do Sul) through a railroad built in 1874. Along this railroad and within the PAMR new urban settlements were built around some of the rail-stations like Canoas, Esteio and Sapucaia do Sul. These are cases of urban areas that grew from rail-stations.

The entire region experiences a remarkable growth during and just after The Second World War, as a result of an industrialization process. The growth of the population that follows this process produces cities like Alvorada and Cachoeirinha which origins are based on consecutive land divisions promoted by urban developments for low-income dwellings and not in the evolution of a pre-existing urban core.

Following this socio-economic process, important national (BR) and regional (RS) roads were built, connecting the cities and the region to the national territory, like the BR-116, which runs from Brazil's South to North-east, crossing Canoas, Esteio, Sapucaia do Sul, São Leopoldo, Novo Hamburgo and Estancia Velha within the PAMR; the RS-030 and the RS-020 cross Cachoeirinha and Gravataí; the RS-118, connects the BR-116 to the BR-290 passing through the territories of Gravataí, Cachoeirinha, Esteio, Sapucaia do Sul and also of Alvorada and Viamão, though far away from their main urbanized areas (Figure 1).

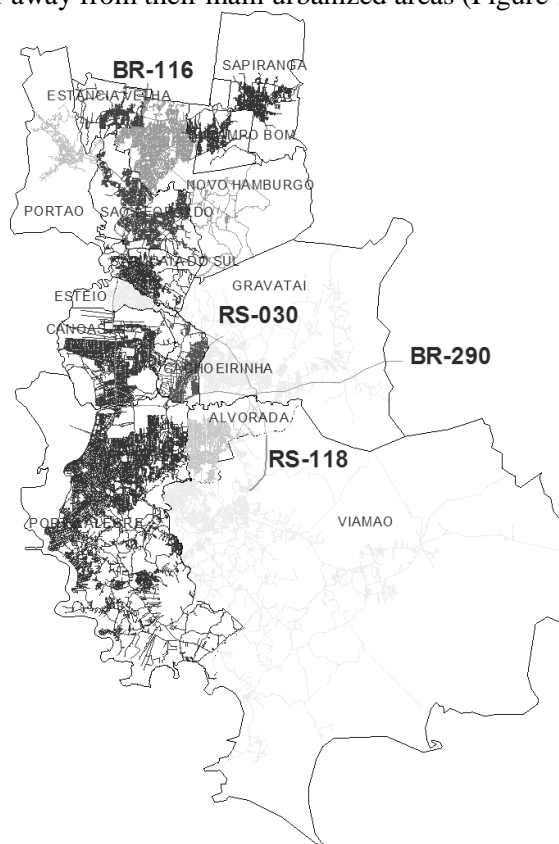


Figure 1. The Porto Alegre Metropolitan Region and the main roads.

From the 70's on, new national and regional roads that cross the region and the increase of regional and interregional connections took an important part in the configuration of the metropolitan space. Important roads built at that time are: the BR-290, connecting Porto Alegre to the coast until the north-east region of the country, running E/W from Porto Alegre Northern city limits and passing through the municipalities of Cachoeirinha and Gravataí; the RS-239, connecting Estancia Velha, Novo Hamburgo, Campo Bom and Sapiranga, close to the Northern limit of the study area; BR-386, connecting the metropolitan area to the North-Western part of the State.

One of the outcomes of this process is that the evolving urban areas begin to carry on roles that are not explained only by their internal logic, but can only be understood by the way they are inserted in an interdependent and expanding metropolitan system where the conurbation is one of its visible outcomes.

Spatial Conurbation and a theoretical model

A theoretical model was produced in order to simulate a growing conurbation process and to observe how this process affects the syntactic measures of the spatial outcomes.

The syntactic measures

In this paper it will be used four syntactic measures (Hillier, B. & Hanson, J., 1984) which help to describe the main morphological properties of the spatial systems to be analysed, as follows: a) Global integration (RN) – Integration is related to the notion of depth: in a spatial system, represented through the axial map, every line is connected to all others, directly or by using a number of intervening spaces. A shallow or integrated space requires a small number of intervening spaces to connect it to all others. On the other hand, deep or segregated spaces need more intervening spaces to connect them to all others. (Hillier, B., 1996); b) Mean depth – In a system, the mean depth informs about how shallow or deep the systems are, regarding the way every space is connected to all others. This measure directly affects the syntactic integration value; c) Synergy – Synergy is the statistical correlation between global and local integration. High correlations mean that a larger number of spaces are simultaneously globally and locally well integrated or segregated, representing systems where the global structure is better superimposed to the local structure; d) Intelligibility – Intelligibility is the statistical correlation between a global measure, (global integration) and a local measure (connectivity). It represents how it is possible to understand the global structure of a spatial system through locally given information.

The theoretical model

The starting point of the model is a regular grid with twice as much vertical than horizontal lines, with its correspondent syntactic measures (Figure 2).

In order to increase the complexity and to build up a conurbation, the same grid is placed contiguously to the previous one, slightly mismatched and with the line that divides one grid to the other belonging to both systems (Figure 3).

The main syntactic measures: mean global integration (RN), mean depth, intelligibility (correlation between global integration and connectivity) and synergy (correlation between global and local integration) are presented below the figures, showing how they change as one system is inserted in the other.

In this way, the resulting grid has the same number of vertical and horizontal lines. Mismatching the position of the grids allows us to observe what happens with the syntactic measures when one grid penetrates the other, step by step, that is, every vertical line of one sub-

system reaching one horizontal line at a time in the other subsystem (figure 4a, 4b, 4c and 4d), until one grid is completely inserted in the other.

This will produce a more compact and shallow system (fig. 5).

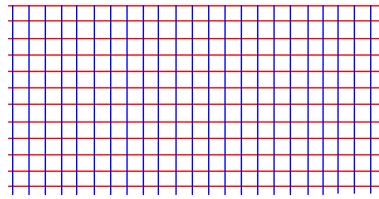


Figure 2. The basic regular grid.

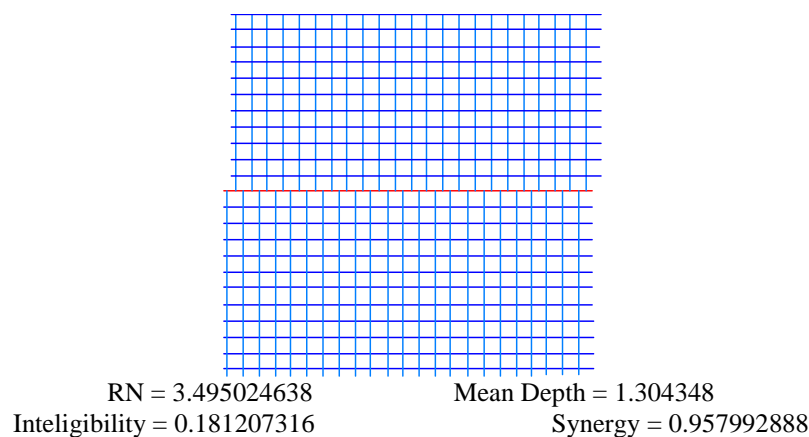


Figure 3. The global integration of two original regular grids slightly mismatched and the syntactic measures of the grouping.

It is possible to observe that as the mean depth is reduced, the more compact is the resulting system in a constant pattern, the same happening with all other measures. These measures are good indicator of conurbation: compactness is responsible for the movement economy and the spatial integration is scattered all over the resulting system.

Another theoretical exercise made on the same grid which is important for the purposes of this paper was made testing the blocking of lines both in the limits between the two subsystems and in their periphery (figures 6a and 6b).

It is possible to compare this exercise with the analysis made by Hillier (1996) on the construction of the spatial integration: obstructions in the centre of the composition tend to reduce integration and push it to the periphery. On the contrary, obstructions in the periphery tend to reinforce the integration in the centre of the composition.

As Hillier says “A centrally located larger space integrates more than one that is peripherally located. (...) The more centrally a block is placed, the greater ‘depth gain’ or loss of integration” (1996:351-352).

For our purposes this is particularly important once we can analyze this process by looking at what happens in the limits of the municipalities we are interested in observing and where we can find some obstructions or interruptions within the urban fabric.

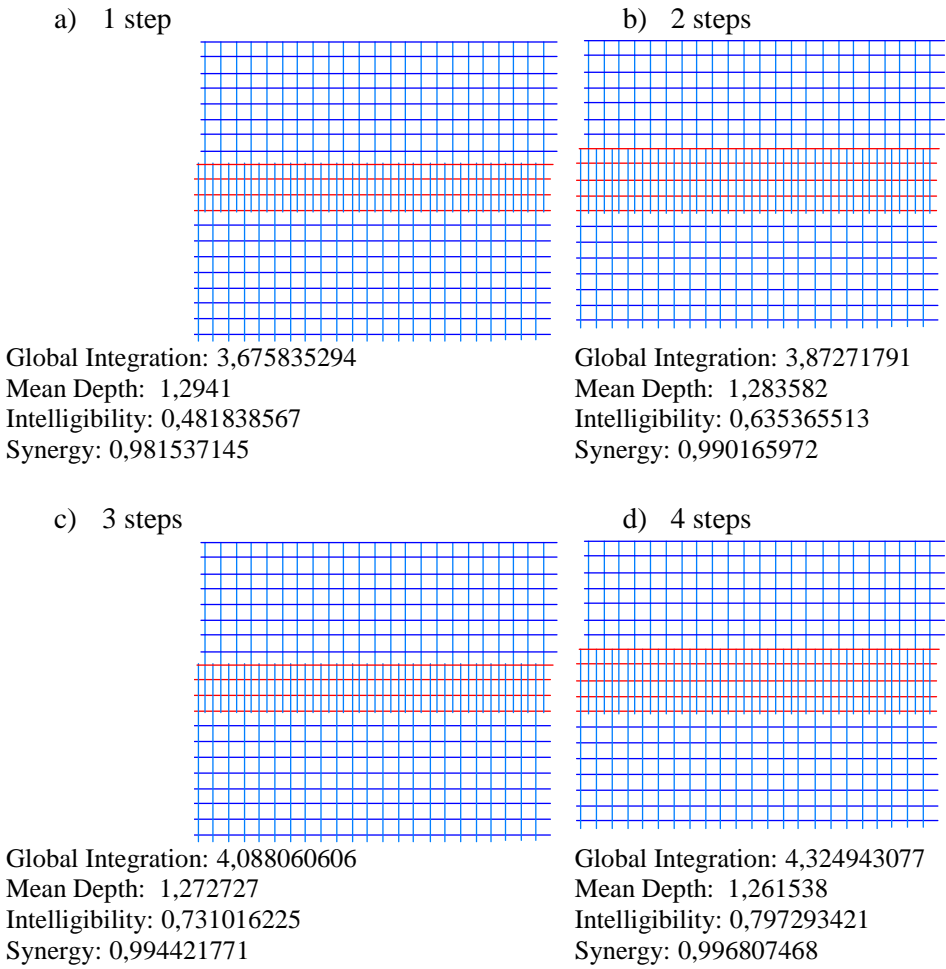


Figure 4 The global integration with the penetration of the grids, step by step (“a” to “d”) and the resulting syntactic measures.

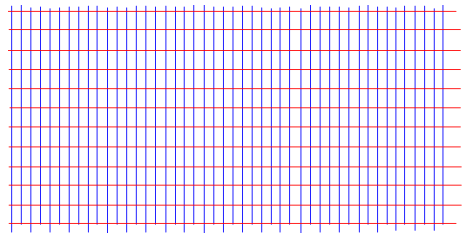


Figure 5 The global integration of one original grid completely inserted in another one and the resulting syntactic measures.

Global Integration: 7.056082759
Mean Depth: 1.172414
Intelligibility: 0.797293421
Synergy: 1.0000000

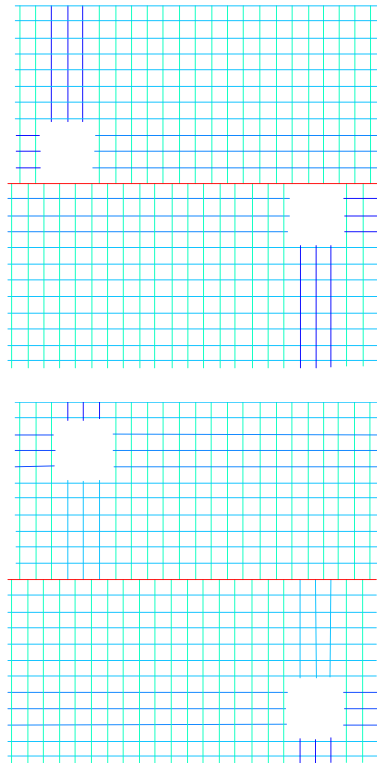


Figure 6. The global integration of blocking of lines in the limits (“a” – top) and in the periphery (“b” – bottom) of the sub-systems and the resulting syntactic measures.

"a" - top:

Global Integration: 2.832373333

Mean Depth: 1.52

Inteligibility: 0.368356272

Synergy: 0.833686231

"b" - bottom:

Global Integration: 2.905639506

Mean Depth: 1.304348

Inteligibility: 0.45514709

Synergy: 0.950454979

The Conurbation Index - Ci

The previous theoretical model shows that the more one subsystem penetrates the other the mean global integration of this system is increasingly higher than the mean integration of the subsystems. Straightforward, we can propose the following conurbation index (CI): $CI = R / (\sum rn/n)$

Where CI is the conurbation index, R is the mean global integration of the grouped subsystems and $\sum rn/n$ is the mean global integration of the isolated subsystems divided by the number of subsystems. The higher than one is the index, the stronger is the conurbation.

It is proposed that in strong conurbations, syntactic measures tend to be more robust for the whole than for the parts. In this way, urban areas with strong conurbation are better explained in the way they work together than when they are considered separately.

In the theoretical model, considering a step by step calculation from the original grid – 0 step - until 4 steps of grid penetration in order to simplify the procedures, and also the results of the outcome of the complete penetration of the grids are presented in table 1, below.

Table 1 Conurbation Index - CI – in the Theoretical Model

	0 step	1 step	2 steps	3 steps	4 steps	complete
CI	0.6167293	0.6485320	0.6832683	0.7212614	0.7630549	1.2449132

What is possible to observe is that the Conurbation Index consistently grows as one sub-system become more and more inserted in the other. Also, the way the index grows in the step by step process is at a same rate from one step to the next one.

The Porto Alegre Metropolitan Region – Pamr - and the Selected Cases

Regarding the PAMR conurbation, considered as a spatial phenomenon, a deeper look into its spatial system reveals that there are different degrees of conurbation and interdependency among the constituent parts. Some spatial complexes - parts of the whole - seem to be better understood when seen together while others, in spite of belonging to the same conurbation, seem to keep their individuality regarding other neighbouring areas, both in terms of the space itself and their socio-economic features.

This paper will deal with the differences in terms of physical relations that can be found in the 14 municipalities considered here as the main PAMR's conurbation. A broader analysis was made, considering nineteen pairs of contiguous municipalities and five wider systems made up of three or more contiguous municipalities and the entire metropolitan area as well (fig.7).

In addition, the same methodology used to produce the theoretical model was applied to two groups of municipalities.

The study cases were analyzed through different syntactic measures, but the Conurbation Index suggested in this paper takes into account basically the global integration measure, once it captures key aspects of the urban layout.

This index may represent both a limit to the conurbation process, cases when CI is high or, on the other side, it may either represent potential possibilities of conurbation or restrictions to its process according to the possibilities of the urban fabrics to be more or less easily connected.

The case studies presented here were selected based on common sense, like: 'we cannot identify where municipality X ends and municipality Y starts', both in terms of the observation of geographical data and also in the way locals describe their city limits.

In this group of municipalities the notion of compactness seems to be a very important feature of neighbouring urban areas.



Figure 7. The PAMR and all Contiguous Municipalities Examined in the Selected Cases.

In the table below, is presented the results for all possible pairs of contiguous municipalities and also for the grouping of more than two contiguous municipalities.

Table 2. Conurbation Indexes for Contiguous Municipalities in the PAMR and for the Region.

Municipalities	Conurbation Index - CI
Alvorada + Viamão	0.727329065
Cachoeirinha + Canoas	0.730430083
Cachoeirinha + Esteio	0.506144471
Cachoeirinha + Porto Alegre	0.690948392
Campo Bom + Novo Hamburgo	0.767137911
Campo Bom + Sapiranga	0.771477628
Esteio + Sapucaia do Sul	1.05085936
Gravataí + Alvorada	0.667362289
Gravataí + Cachoeirinha	0.84343863
Gravataí + Sapucaia do Sul	0.57575311
Novo Hamburgo + Estância Velha	0.879985119
Novo Hamburgo + Gravataí	0.325046497
Novo Hamburgo + São Leopoldo	0.857932704
Novo Hamburgo + Sapucaia do Sul	0.332434153
Porto Alegre + Alvorada	0.731692459
Porto Alegre + Canoas	0.680126249
Porto Alegre + Viamão	0.885701887
São Leopoldo + Portão	0.891893849
São Leopoldo + Sapucaia do Sul	0.863127637
Canoas + Cachoeirinha + Gravataí	0.62463472
Novo Hamburgo + São Leopoldo + Estância Velha + Campo Bom	0.743921475
Novo Hamburgo + Estância Velha + Campo Bom	0.758939133
Novo Hamburgo + São Leopoldo + Sapucaia do Sul	0.866283893
Porto Alegre + Viamão + Alvorada	0.726418989
PORTO ALEGRE METROPOLITAN REGION - PAMR	0.591335660

In red, is marked the case where the CI is higher than one; in yellow, the group of cases with the higher CI's (close to one) and in blue, the group of cases with the smaller CI's. The group of cases with intermediary values of CI remains colourless.

For the purposes of our analysis we will examine only the cases presenting high and low conurbation index once they are more useful for the analysis in the sense that they represent border cases.

The conurbation between Esteio and Sapucaia do Sul is the only one with a CI higher than one, what is interesting for our study, because is an example of two cities with blurred limits, with juxtaposed city centres, sharing the syntactic integration core when examined together.

Some regularities were found among the municipalities presenting higher and smaller conurbation indexes. The main features of the grouping of cities with high CI are (fig.8): (i) They are connected by well integrated lines, which penetrates the sub-systems; (ii) We find two different kinds of distribution of spatial integration: a) one of the sub-systems concentrates most of the integration core, like in the case of Porto Alegre and Viamão; b) the other five cases presenting high CI present the same features, with a strong concentration of integration in important roads (BR's and RS's) that cross and connect the spatial systems. They are connected through their urban fabrics and not only by isolated lines.

As for the grouping of cities presenting low conurbation indexes, the main regularities found are (figure 9): They are connected by a well integrated line, which links both sub-systems but does not penetrate each other; The sub-systems are connected by a small number of lines – mostly by only one; There are no urban fabrics on the city limits but only isolated lines.

In the case of Novo Hamburgo and Gravataí, which have the smaller conurbation index within the cases, the sub-systems present independent integration cores. The distribution of the spatial integration of the joined cities reproduces the distribution of the spatial integration of each of the considered municipalities. In the other three cases, the spatial integration is strongly concentrated in one of the sub-systems. These results can be biased by the way the continuous urban fabric of the metropolitan region is separated for this analysis. For example, in the case of Novo Hamburgo and Sapucaia do Sul (the second smaller CI), when their fabrics are joined with São Leopoldo, whose urban fabric lies between Novo Hamburgo and Sapucaia do Sul, one of the highest CI is produced, as we can see in the table above.

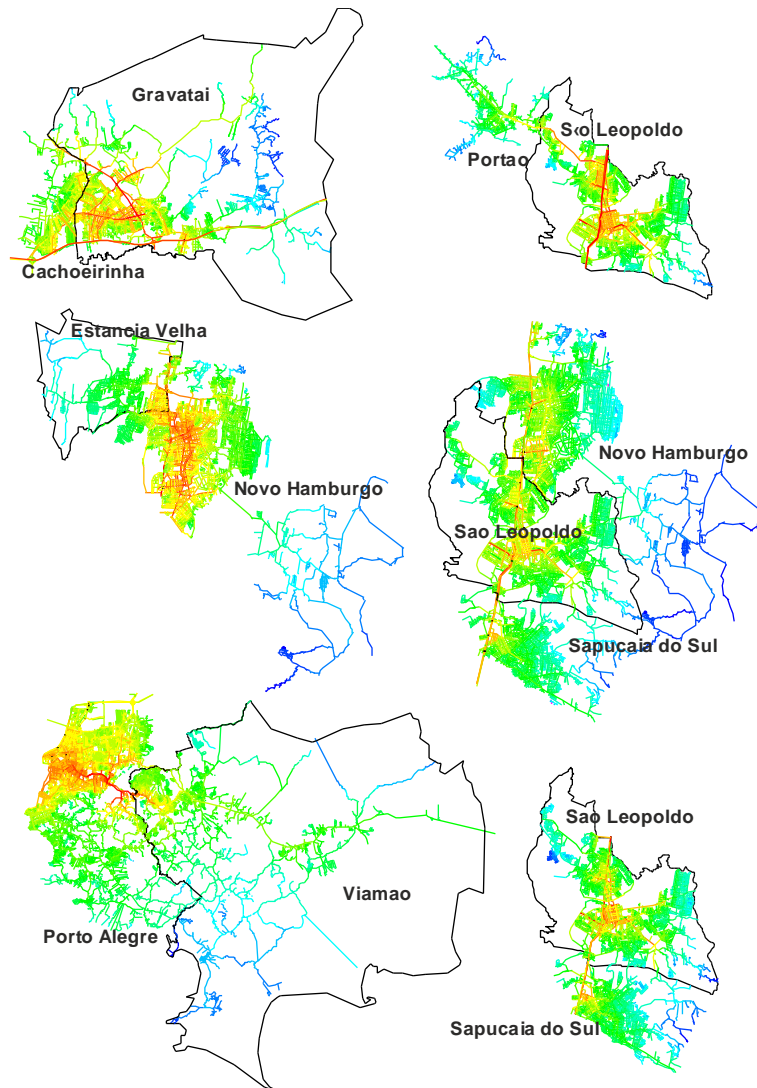


Figure 8. Cases with the Highest Conurbation Index. In black, the limits of one of the municipalities.

In order to observe what happens in actual contiguous spatial sub-systems in terms of their conurbation indexes, when the procedures proposed for the theoretical model are applied (3.2, above), two different sub-systems were analysed: Sapucaia do Sul together with Esteio - the conurbation with the higher CI and with a dense urban fabric in the city limits-; and Gravataí and Cachoeirinha, presenting a high CI but with some vacant areas along the city limits.

The first step was to extend all lines close the limits of each sub-system and one step apart of it until they could reach the lines which belong to the city limits. The second step was, from the

previous stage, extending all lines until the first line inside the sub-systems was touched, and so on.

This exercise was limited to three extensions of lines, although it could be done until every line of every sub-system crossed each other as it was made in the theoretical model. In this way, the lines were extended but no new lines were created, keeping the same the size of the systems in terms of the number of axial lines from the beginning and with the step by step extension of lines. The results for the syntactic measures and for the conurbation index are presented in Table 03 for the grouping of Sapucaia do Sul and Esteio and, in Table 04, for the grouping of Gravataí and Cachoeirinha.

Step 0, in both cases, means the original situation of each sub-system before the extension of lines.

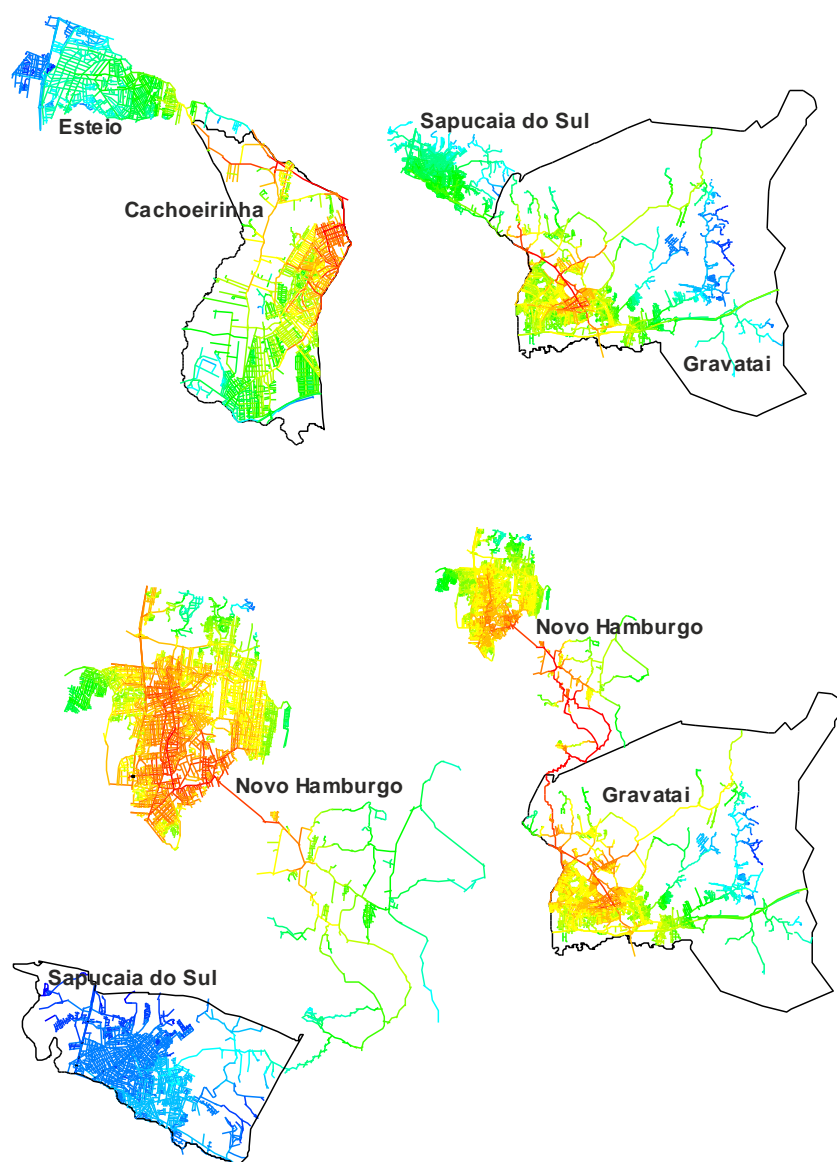


Figure 9. Cases with the Lowest Conurbation Index. In black, the limits of one of the municipalities.

Table 3. Syntactic Measures and Conurbation Indexes for Sapucaia do Sul + Esteio, with Extension of Lines

Extension of lines	SAPUCAIA DO SUL AND ESTEIO				
	Mean Depth	RN	Intelligibility	Synergy	IC
0 steps	5.8708294	1.04971959	0.412122091	0.729756479	1.05085936
1 step	5.844212	1.054441401	0.418072177	0.735514995	1.05558629
2 steps	5.710889	1.07978369	0.442237296	0.753198329	1.08095610
3 steps	5.686107	1.081900806	0.455537553	0.761252168	1.08307551

Table 4. Syntactic Measures and Conurbation Indexes for Gravataí + Cachoeirinha, with Extension of Lines

Extension of lines	GRAVATAÍ AND CACHOEIRINHA				
	Mean Depth	RN	Intelligibility	Synergy	IC
0 steps	10.1811	0.692776914	0.300814959	0.581291802	0.84343863
1 step	10.16005	0.696239306	0.303002426	0.588722765	0.84578566
2 steps	10.13262	0.695886595	0.309784275	0.593726679	0.847225
3 steps	10.09147	0.701809028	0.323290262	0.603776164	0.854435

In both cases, the extension of lines, because they produce a thicker urban fabric in the centre of the systems (Hillier, 1996:352), improves all syntactic measures, while Mean Depth is consistently reduced. Another important observation is the thick urban fabric created by the extension of lines when they penetrate each of the considered sub-systems.

Particularly in the case of the conurbation between Gravataí and Cachoeirinha, it is possible to say that the conurbation can be stronger or weaker depending on the way the existing vacant land in the limits of the municipalities will be occupied along time, creating a new pattern of spatial integration. In this case, the extension of lines in the limits of the municipalities eventually produces the reduction of the vacant land and their substitution by a denser urban fabric, as the number of steps grows.

Final Remarks: What Produces Conurbation?

At this point, from the theoretical modelling and from the actual cases presented in this paper, it is possible to make some preliminary observations about the conurbation process in the Porto Alegre Metropolitan Region. At a more theoretical level, it is possible to understand when we can talk about conurbation as a general process, concerning the relationships among different spatial systems. Furthermore, conurbation is, most of the times, a process resulting from many of the considered scope of variables working together and not only from one or another of them, as described below.

Spatial contiguity

Both in the theoretical examples and in the case studies, it was shown that, although the contiguity of the urban fabrics is an essential aspect of conurbation, it does not suffice to improve conurbation. The spatial contiguity may in some cases to cover-up sub-systems that are divided by a joining line, which may separate discontinuous urban fabrics like in the original situation of the theoretical model showed in figure 3 above.

Compactness

The compactness of the analyzed urban layouts seems to be a necessary condition for the conurbation, but is not always sufficient. Some of the studied cases present a compact urban fabric in the grouped cities, but not a good result in terms of conurbation index, when examined the spatial structure of the joined municipalities and their syntactic measures as seen above. In both cases, the axial lines that lie along the city limits actually unite two different and unconnected urban fabrics that seldom present lines that cross the city limits and penetrate the neighbouring municipalities. What the studied cases show is that compactness is an important feature of conurbation when joined urban areas share spaces that not only touch each urban fabric but, most importantly, interpenetrate each other. Thick urban fabrics in the limits of the sub-systems presenting a significant number of axial lines that are part of both sub-systems, more consistently produce higher conurbation indexes. In these cases, the conurbation tends to be not only a peripheral phenomenon – in the sense that it only touches the sub-systems – but produces another kind of spatial system. In this way, the logic of the grouping of cities prevails over the logic of the parts.

Depth of the spatial system

When the grouping of two different urban layouts is able to reduce the Mean Depth of the resulted spatial system, there is an improvement of the conurbation index once it directly interferes in the results of the Global Integration (R_n) values and the other considered Syntactic Measures of the conurbation.

The Distribution of the Integration

The case study of Esteio and Sapucaia do Sul joint together, which presents the only Conurbation Index bigger than 1, allows us to observe other features that seem to contribute to rise the Conurbation Index, namely, the spatial distribution of the Global Integration (R_n) or, more specifically, the Integration Core of a group of cities. In this case, the Integration Core of the grouped cities tends to produce a centrality that both covers and contains the centralities of the parts. Even if the new centrality does not eliminate the centralities of the parts or the identities of every municipality, we can find proximity and continuity of the city centres within the centrality of the joined cities as an important aspect of the conurbation. On the other hand, in the case of the lowest conurbation index, between the municipalities of Novo Hamburgo and Gravataí, the distribution of the integration core of the joined sub-systems keeps almost intact the integration cores of the parts, almost if the grouping of the spatial sub-systems does not affect the results of the whole. The syntactic independence of the parts affects the results of the grouping sub-systems, producing low conurbation index. We can expect, as in this case, that socio-economic relationships and interdependence tend to be reduced between these two municipalities and, also, that interdependence tend to be established with other municipalities where urban morphology is able to facilitate mutual rapports.

Axial lines or urban fabric?

According to the results of the actual cases examined in this paper, it is possible to say that, if single axial connection is important to produce conurbation, more important is the connection through urban fabrics. The thicker they are in the city limits, the higher the Conurbation Index is.

Is conurbation a spatial quality?

It seems evident that a high Conurbation Index does not implies in qualitative aspects in the functioning of Metropolitan Regions. In fact, strong physical discontinuities that can be found among cities like rivers, vacant land, large natural parks, flooding areas, for instance, can produce low Conurbation Indexes. Nevertheless, low or high conurbation index does not mean that one is better than the other, but it only shows the diversity of spatial roles that can be found in metropolitan regions and some limits to produce spatial conurbation within the region.

Urban growth and the two paradoxes

Emergent processes are able to produce higher conurbation indexes among contiguous urban fabrics through the overcome of the centrality and visibility paradoxes (Hillier, 1996), but only when spatial transformation is required for the functioning of the metropolitan structure as a whole, following both the local goals and the global objectives as well.

The research findings explained in this paper allow us to identify common or different patterns of conurbation, with similar or different outcomes among different groups of contiguous urban areas. It is possible to suggest a conurbation index that is able to explain about the way parts and wholes produce configurational features that can be measured and compared. This Conurbation Index can easily identify the impacts of actual or future urban expansions of neighbouring urban areas, allowing us to understand how this process can lead to public policies that, instead of competing with each other, could promote joint efforts in order to solve urban problems that tend to be shared between the municipalities, specially taking into account that, in Brazil, there is no urban planning at the regional scale, but only at the local scale.

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Configuration of urban grid and the relationship between apartment buildings location: case study in Florianopolis, Brazil.

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Abstract. *The verticalization process is one of the most determining factors of the production and growth of the cities, since it allows the “multiplication” of urban land and its profit maximization. The location is an important factor in this process and, among other things, is related to the configuration of the urban grid, which conforms to a great extent the pedestrian movement on the grid (Hillier et al, 1993) and is able to make certain spaces more or less attractive, thus assigning greater or lesser degree of probability for these areas to be developed or not. The aim of this paper is to investigate the patterns of configuration of the urban grids associated with the location of apartment buildings in the central area in Florianopolis. In order to do this, we used the Space Syntax Theory (Hillier and Hanson, 1984; Hillier et al, 1987). Its two main measures, integration and choice, were applied in global (Rn) and local (R3) scales. Results showed that apartment buildings are mostly located on both globally (Rn) and locally (R3) highly integrated spaces. On the other hand, for the choice measure buildings are situated in medium global choice (Rn), and medium to high local choice (R3). Thus, apartment buildings seem to prefer locations close to the rest of the city, but which, however, prioritize relatively quiet roads detached from the passageways to other spaces outside the center.*

Key Words: *Verticalization process, space syntax, configurational characteristics, high-rise buildings.*

Introduction

In the growth and urban densification process, the profit motivated by the real estate is one of the most decisive driving forces (Krafta, 1994; Krafta, 1999). In this process, the verticalization is a key way by which profit is maximized through the intensification of capital applied in the same location and the highest rate between built-up area and land area that equates to a greater "productivity" of the real estate activity. In this dynamic, the role of location is essential.

The attractivity of certain locations is related to the quantity and quality of existing infrastructure; the accessibility to the city center, to other secondary centers of retail, trades, services and jobs; the natural attributes such as beaches and interesting views; and indication of status and socioeconomic levels associated with certain areas of the city (Gonzales, 1985; Somehk, 1997; Abramo, 2001; Villaga, 2001). Since the price of the construction does not change significantly in different areas (Gonzales, 1985; Krafta, 1999), property prices are the determining factor for maximum profits on urban land.

However, the "best locations" from the point of view of the developers are not necessarily the same from the point of view of those who will use the building. The best locations for the developers, are those that allow them to extract greater profit, which does not mean that they are more accessible to downtown or have greater quantity and quality of infrastructure. Krafta (1994, p. 77) states “*Land is bought in relatively poor locations, as an individual commodity, and sold as part of new buildings, as new, good locations.*” There is therefore a delicate balance between a cheaper land, which reduces the cost of housing production, and a location with enough quality to attract dwellers. Understanding this balance can, therefore, help to better understand the dynamics of urban production and reproduction and the role that location plays on it.

However, the location is traditionally described considering, at the local level, the qualities immediately adjacent to the land (infrastructure, neighborhood socioeconomic status, etc.), and its environment qualities. Globally, it generally operates in terms of the metric distance to the CBD – *Central Business District* (Capozza, 1989). However, since at least the 80's, more refined ways to characterize and differentiate intra-urban locations were developed, such as those introduced by configurational analysis, some of which brought by the theory of Space Syntax (Hillier and Hanson, 1984).

The aim of this paper is to investigate the patterns of configuration of the urban grids associated with the location of apartment buildings in the central area in Florianopolis. We used two different syntactic measures, as we shall see, which capture different properties of the location in order to answer the following questions: considering all streets in which apartment buildings could be located, in which these streets did they actually appear? And what are the characteristics of the chosen streets regarding proximity and centrality to other streets of the urban system and its more immediate surroundings?

In order to answer these questions, we mapped the location of 697 apartment buildings in the center of Florianopolis and compared the configurational characteristics of these locations with the characteristics of the system as a whole, to try to identify significant differences.

Literature review

Dynamics of urban growth

Much of the dynamics of urban growth is driven by the pursuit of profit. This, in turn, is directly derived from the difference between the final selling price and the cost of housing production, including not only construction costs, such as labor and materials, but also taxes, duties and projects, and especially the land. According to Krafta (1998) and Gonzales (1985), the cost of construction tends not to vary greatly with the location within a particular urban area, provided that the buildings being compared have materials of similar quality as well as similar levels of technical and constructive complexity. Thus, the larger price variations properties are due to the price paid for the land.

This, in turn, is strongly influenced by its accessibility to other parts of the city (Capozza, 1989; Villaça, 2001). Therefore, more accessible areas tend to be more expensive, because they: a) minimize the costs of travel; and b) possess greater amount of social labor invested in its environment in the form of public infrastructure.

According to Krafta (1994; Krafta, 1998) areas with potential are "discovered" by developers, who build it and sell its real estate products profitably. By being the first, earn higher profits, since the price paid initially by the land is still low, in a process analogous to that of technological innovation in companies (Harvey, 1985 apud Krafta, 1994), to the point where the initial location advantages become disadvantages, as the value of the land increases. Other developers follow the same way in search of equally large profits, but with one difference: when they arrive, the price of land is no longer the same.

The cycle repeats with dwindling profits and one possibility is that, for the investment to be worthwhile, even at the cost of higher land, there needs to be a greater concentration of capital in that location. This is achieved by increasing the level of construction, changing it from, for example, a residence for middle class to upper class, or by increasing the relationship between the built-up area and the land area, that is, the verticalization (DiPasquale and Wheaton, 1992; Krafta, 1998).

Locational characteristics

Several goods that meet human needs are treated as commodities at one time or another. The same happens with housing, which is directly related to the real estate. Housing as a commodity

depends on a very important factor for their appreciation, its location. As noted above, the housing production, seen as a mechanism for generating profit, largely depends on the prices obtained when buying the land and when selling it as part of a new development, whereas these prices are closely related to the choices of location.

Villaça (2001) states that the quality of the location is the main component of land value “Urban land is only of interest as 'land-location'”, that is, as a means of access to the entire urban system of the entire city (Villaça, 2001, p. 74). Gonzales (1985) also states that the locational characteristics are dominant in the valuation of urban properties.

For residential uses, what are the factors that constitute a good location? The first factor is the presence of urban infrastructure (Gonzales, 1985; Somekh, 1997), represented by the existence of favorable conditions for urbanization and essential services. Another key factor is its accessibility to other parts of the city (Villaça, 2001), especially as perceived proximity to the main center and secondary centers of trade and services (universities, shopping centers, etc.) and others (Lynch, 1984; Batty, 2009).

Besides these factors, the scarcity of urban land, according to Gonzales (1985), combined with the qualities acquired through the status of the different sectors of the city, transform the urban land on a rare commodity. Thus, these areas are capable of producing enterprises with superior value to their production prices, especially in cities with significant growth. Under these conditions, the author states that it is possible to obtain the so called monopoly rent (MR), a determining factor in the extent of urban land prices. The MR varies according to the quality level of the project and location (as is the case, for example, in coastal areas), related to their condition and rarity, and the ability to pay of consumers. This quality is attributed to the lot status created “spontaneously” from the growth of the city or zoning, which allocates and uses special qualifications to residential areas.

The Verticalization in Brazil

The fast and intense process of growth in medium and large cities, both spatially, as population, has attracted the interests of a dominant economic class, especially developers. Thus, among the various forms of capital reproduction on urban land, the process of vertical integration has been a genuine innovation in the capitalist city. Thus it is clear that the building height is part of a strategy of capitalist interests, which ends up changing the urban landscape and the way of living of citizens (Tows and Mendes, 2011; Ferreira, 2012).

Conceptually vertical integration involves the notion of high-rise building or skyscraper. Somekh (1997) defines as the multiplication of urban land, made possible by the use of the elevator and points out that the construction of the first skyscraper in the city of São Paulo in the 1920s initiated an intense process of urban change that extends until today.

At the beginning of the twentieth century the production of vertical integration in Brazil began to expand due to factors such as the use of electricity, the use of elevators (Somekh, 1997), in addition to technological innovations in the area of construction applied to structural systems (Töws and Mendes, 2011).

Although the production of urban space is related to capital, political and cultural factors should also be considered, as the ideological spread of progress, development and modernity, associated with the symbolic dimension of this vertical integration in the urban context (Ferreira, 2012; Ramires, 1997).

From the readings made on the process of verticalization in Brazil some aspects can be listed briefly. (1) The verticalization is a feature of Brazilian urbanization (Mendes, 1992; Souza, 1994; Ferreira, 2012); (2) The verticalization is related to the modernity idea (Ferreira, 2012; Ramires, 1997; Ramires, 2011); (3) Fast increase (Ferreira, 2012); (4) It is characterized by a predominance of residential buildings as opposed to services, contrary to what occurs in other countries of the world (Ferreira, 2012; Souza, 1994); (5) The process of verticalization was made possible by a revolution in the way of building, both with respect both to new techniques and the use of different materials (Somekh, 1997; Ramires, 2011; Töws and Mendes, 2011); (6)

The vertical construction is also responsible for significant impacts on the urban structure, particularly social, and the value and use of urban land (Ramires, 2011); (7) The State assumes the role of urban space producer through the regulation of its growth (Ramires, 2011; Somekh, 1997); (8) The market logic is intrinsic to this process (Ramires, 2011; Somekh, 1997; Villaça 1986; DiPasquale and Wheaton, 1992).

As seen above, the location is able to exert a great influence in land values. Thus, Villaça (1986) points out that the location can be characterized as one of the engines that drives the process of verticalization and acts as a major contributor to urban sprawl.

Space Syntax and intra-urban location

The Theory of Space Syntax (TSS), developed by Bill Hillier, has as one of its main features the emphasis on the importance of the urban layout configuration. It was derived from the observation of the city and the attempts at trying to understand the relationship between physical aspects and social interactions. For Hillier (2009), TSS has always sought, first of all, a descriptive theory of the spatial form of buildings and cities.

To understand the theory of Space Syntax it is important to understand its basic principle, which is the natural movement. According to Hillier et al (1993), a significant portion of all pedestrian movement is determined by the road system configuration, that is, the way the roads and other public spaces are related to each other. This portion of the movement, that depends only on the configuration and, therefore, does not consider the location of the attractors (trade, services, housing, urban infrastructure, etc), is called Natural Movement (NM).

The theory of Space Syntax has two main measures: Integration and Choice. The first is a measure of closeness, while the second is a measure of centrality or betweenness. For both measures, the spatial unit adopted is the axial line, defined as the greatest straight lines capable of covering the entire system of open spaces (Hillier and Hanson, 1984).

Integration measures how close an axial line is from all other lines in the system. This proximity is calculated from the average number of changes of direction required by one line to reach all other lines. Therefore, the measure of integration is based on the depth of each axial line, representing the average topological distance from one line to all others in the system. Thus, Hillier et al. (1993) states that, the greater the number of intermediate spaces between any two points, the greater its depth, and therefore, the lower its integration.

The measurement of the average depth may be calculated according to a determined fixed radius, also topological, called the local Integration. In this case, the integration of an axial line measures how close (configurationally) this line is in relation to its immediate surroundings. This location is normally radius equal to 3 (R3) but it can also be 5, 7, 9, or any other desired number.

Several empirical studies (Hillier and Hanson, 1984; Hillier et al, 1993; Penn et al, 1998; Hillier and Iida, 2005) found evidence that integration is strongly associated with other urban patterns, such as land use and value and especially pedestrian movement patterns. According Hillier et al. (1993) the configuration of the urban grid is what guides new construction and new uses, since according to the authors some areas may have greater or lesser degree of potential of being built or rebuilt, as they are in areas more or less integrated into the system.

The second measure used in the study is Choice, which can also be applied on a global or local level. According to Hillier et al. (1987), the choice measure indicates the probability that a certain space is part of the minimum path between all pairs of system space.

Therefore, while the Integration measures the closeness between a space and all the others, the choice measures its centrality in relation to other pairs of system space. This means that they capture different properties of spaces and therefore may help clarify the different roles that the same space can play. Integration, therefore, captures the movement 'from-to', since it is a measure of closeness between origins and destinations. It assumes that, on average, origins and destinations closer to each other tend to generate greater momentum than origins and destinations that are far apart from each other.

On the other hand, the Choice captures movement through the space, that is, that movement which is not necessarily generated at the same place but passes by it, having been motivated by the interaction between the other two spaces. Although this difference is subtle, it is clear: we can think of spaces that are in shortest paths of other spaces without, however, being very close to all other areas of the system.

Applied to this study, 'Integration' and 'Choice', can help to clarify the preferences location of the apartment buildings with regard to these two aspects.

Methodological procedures

Produced by Grupo Desenho Urbano e Paisagem (GDUP), the axial map of the urban agglomeration of Florianópolis was used which has 22,369 lines, and then extracted the syntactic measures Integration and Choice (Rn and R3) of the central area of the city of Florianópolis.

Were raised by the Municipality of Florianópolis real estate cadastre data, updated in 2012 and, thereafter, selected lots that have apartment buildings with 3 floors. In the central area, these account for 476 apartment buildings lots, while the city has a total of 2064 units, according to the registration database. From these data, all axial lines that have apartment buildings were identified.

Then, the spaces (axial lines) that had apartment buildings were compared with the total axial system of the Center of Florianópolis, to identify how (and if) the first differed from all the lines of the Center. The first comparison was made visually, trying to identify patterns that were best captured by this way, and that would probably be more difficult to capture through descriptive statistics (mean, mode, median, etc.).

These statistical measures were part of a second comparison, to verify more quantitatively, the differences between the verticalized spaces and the system as a whole to assess whether, overall, the apartment buildings were located in areas more or less integrated than the average system, both globally and locally. The same check was made to the measure of choice.

Case Study: Florianópolis

Capital of the State of Santa Catarina, Florianópolis is located between the geographical coordinates 27 ° 23 'and 27 ° 50' south latitude and 48 ° 21 'to 48 ° 21' west longitude from Greenwich, with an area of 443.36 km² which is divided between its continental portion and insular and has 421 240 inhabitants (IBGE, 2010).

Florianópolis is now a tourist hub of the country and recently was named the third best city in Brazil to live, according to human development index published by the UNDP (PNUD, 2014).

The process of urban sprawl in Florianópolis

In the early twentieth century Campos (2009) states that Florianópolis was a provincial town, its structure was seen as summarizing land to what is now the city center and mainland portion. However it was in the early decades of this century that a number of modifications started through construction, responsible for new investments.

From the 1950s, is significant urban expansion of the city, which happens to have one, however chaotic accelerated growth. In this period the city hall ordering the first master plan for the city, since so far there has been little state interference regarding actions planned in the urban area of the city.

For Campos (2009), the installation of various government agencies in 1960, mainly the federal university of Santa Catarina, attracted a significant growth and development for the city, hence urban sprawl of the city and begins the vertical expansion in the city center.

The construction of the BR101, in the 1970s, became the fastest shifts, encouraging, according to Coelho (2012), the process of implementation of state highways, especially the SC401, linking the center to the Casnasvieiras beaches, boosting the city. According to Campos (2009) diverse investments in urban infrastructure were made during this period in order to develop the city. The construction of new bridges, Colombo Sales Machado and Pedro Ivo Campos, along the north and south embankments, enabled the urban expansion, as well as bridges, roads and double track constructed around the island. As well as across the country, in the 1970s, Florianopolis experiences its first real estate boom, this is when there were the first large residential developments, deployed in the city center, Beira-Mar Norte avenue neighborhood and close to Trindade.

With the process of economic recession that hit Brazil in the 1980s, Campos (2009) states that some major construction of the city give way to construction of smaller, thus the building which concentrated in the city center and had in average 12 pavements, this new environment, migrate to the suburbs and spend to produce buildings with 4 pavements, initiating the horizontal expansion of the city.

After the crisis of the 1980s, the revival of industry occurred in the 1990s, when many buildings over 12 pavements began to be built in Florianopolis.

From the 2000s occurs in the metropolitan region of Florianopolis a great "real estate boom", the city becomes a dream of consumption for various national as well as international social classes, mainly attracting people from the states of Rio Grande do Sul, Paraná and São Paulo, as well as neighboring countries in search of quality of life. This scenario turned out to further boost the construction industry, contributing to a major urban expansion that began a widespread vertical city.

Results

Global Measures

To identify the configurational characteristics of the streets which happened the process of apartment building in the central area of the city of Florianopolis, these were analyzed on a global and local scale, using the space syntax measures described above: Integration and Choice. The apartment buildings are located in 154 axial lines within a local environment of 642 lines in the central area. Figure 1 Shows the map of Integration and Choice radius R_n and finds apartment buildings.

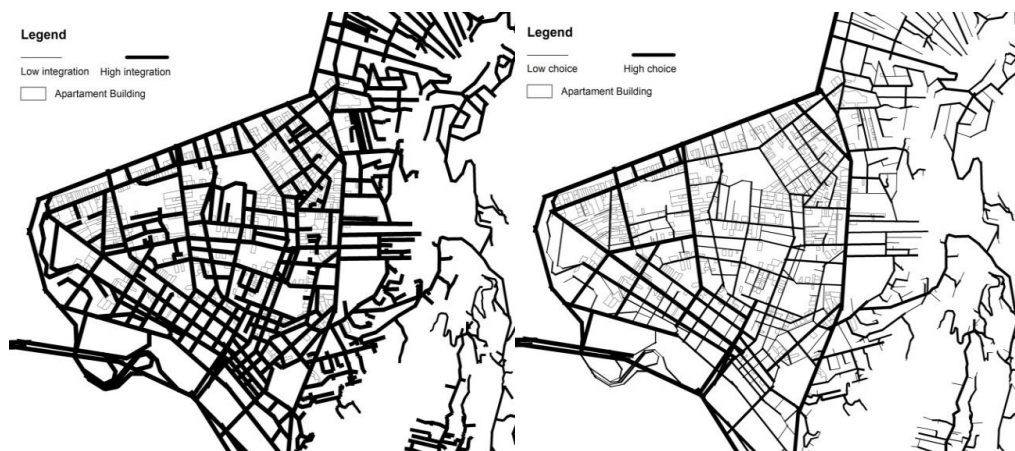


Figure 1. a. Integration R_n of the central area | b. Choice R_n of the central area.
Source: Grupo Desenho Urbano e Paisagem (GDUP) UFSC. Compiled by: Authors.

Looking at the study area in relation to the extent of integration Rn, one realizes that the entire cut has high level of integration with the global system, that is, all the buildings are coming from other areas of the city (a consequence of the fact that the cut represent the central area of the city). Yet, clearly the predominance of apartment buildings on high weight lines in Figure 1a. We can also notice a tendency of these buildings become more concentrated in the center and north of the cut, with low occurrence in the southern portion. This happens probably for historical reasons rather than by configurational reasons, since the southern area corresponds to the Historical Center of the City, where there are lots of historical buildings preserved with low number of floors.

As for the measure of Choice Rn, we see in Figure 1b that few streets of the central, are part of the shortest paths to other areas of the system, that is, there is a small amount of lines that carry these connections, while others remain secondary. In terms of density, this occupation, however, noticed that the streets with greater choice have higher concentration of apartment buildings, while, as the streets are internalized and become less "passing", the concentration decreases.

This relationship between the measure of integration Rn and Choice Rn, can be enhanced in Graphic 01 below. The black dots represent the streets where there are apartment buildings, while the gray dots represent the total streets of the central area.

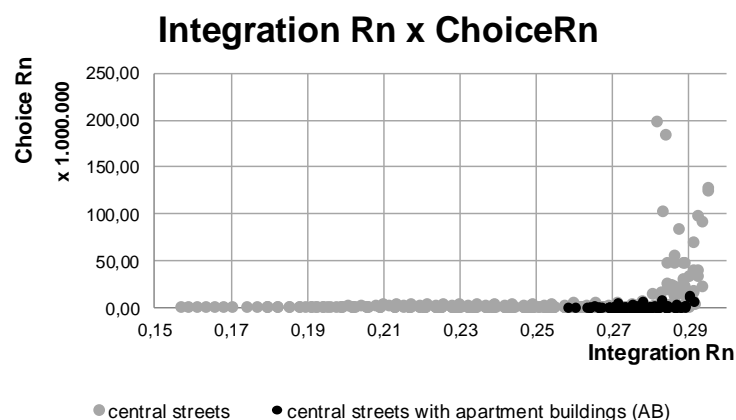


Figure 2. Integration Rn X Choice Rn. Compiled by: Authors.

In this Figure 2 it is possible to identify streets where there are apartment buildings that have high global integration, being located in the far right portion of the set of points, but low choice global.

Local Measures

When analyzed on a local scale, the streets behave differently. Observing figure 3 below, the apartment buildings are located on streets from medium to high integration, while for the measurement of Choice, the location of apartment buildings is mostly on streets with a high level.

Figure 4 below shows the relationship between Integration and Choice R3. In this graph, we can identify that the deployment of apartment buildings focuses on the process of medium to high local integration and a few streets stand out for the high rate of choice R3.

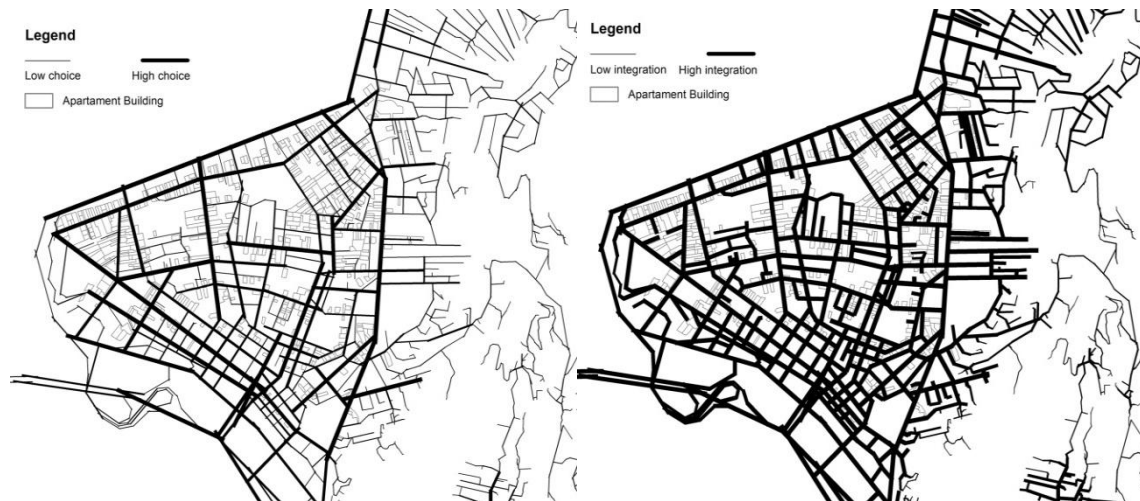


Figure 3. a. Integration R3 of the central area. b. Choice R3 of the central area.
Source: Grupo Desenho Urbano e Paisagem (GDUP) UFSC. Compiled by: Author.

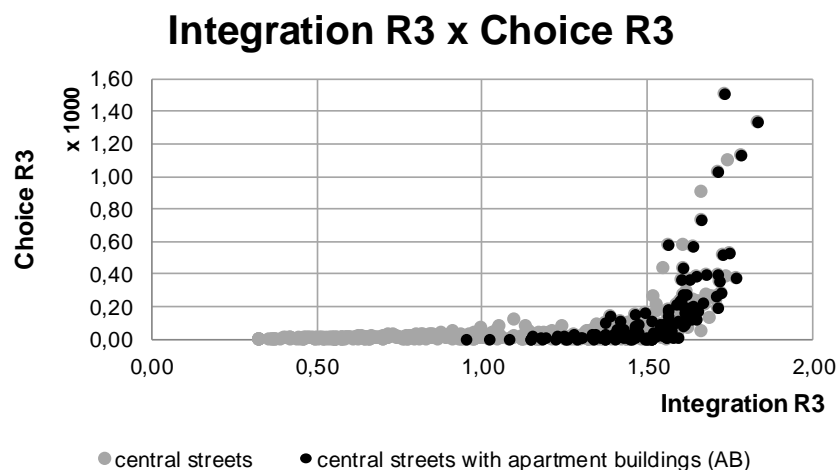


Figure 4. Integration R3 X Choice R3. Compiled by: Authors

Numerical Comparisons

Mean syntactic measures for the center as a whole, and for the streets with apartment buildings, are given in table 1. Comparing the values of two columns, we see that measurements of streets, where there are apartment buildings, is sensibly larger, with emphasis on measures of local radius (R3), especially the choice, in which the streets of the central area where there are apartment buildings is 131.41, against 51.47, the general average of the center (up 255.3%) .

Compared with measurements of choice, variations of Integration compared between all the streets downtown and only those with apartment buildings, listed in the third column can be considered small (107.7% and 133.6%). This may be an indication that the key to understanding the criteria of location, from the point of configurational view, is in the choice and not on Integration, at least for the selected area for this case study, characterized by a central area in which virtually all integration values are high, that is, there is relatively little variation.

This impression is reinforced by the histograms of space syntax measures in its two scales of analysis shown below.

Table 1. Means of syntactic measures of central area streets. Preparation: Authors.

	<i>Centre – All streets (624)</i>	<i>Centre – streets with apartment buildings (154)</i>	<i>Diference (%)</i>	<i>Centre - streets with apartment buildings (154) Weighted Average</i>
Integration Rn	0,26	0,28	107,7%	0,28
Choice Rn	3.447.193,31	5.364. 760,75	155,63%	28.020.368,28
Integration R3	1,10	1,47	133,6%	1,58
Choice R3	51,47	131,41	255,3%	356,43

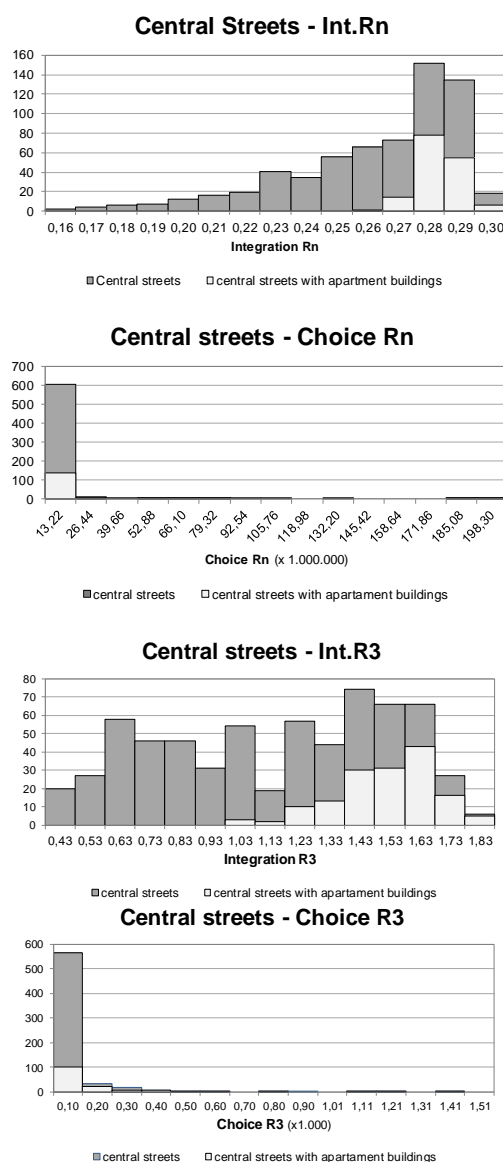


Figure 5. Histograms of syntactic measures of the streets of the central area. In light gray, the histogram of the streets where there are apartment buildings.

Through the histogram is also possible to identify most of the streets of central area have a high rate of integration Rn, and moderate to high level of integration R3. For the measurement of choice, on the global scale, the vast majority is close to 0, however the few streets that have

significant value collaborate to high average which is 3,447,193.31, while on a local scale, few streets have expressive value.

Conclusions

The verticalization process is one of the responsible for the transformation of the urban landscape and is part of a capitalist strategy for profit on urban land.

In turn, the urban land value is highly influenced by its location into the urban space, especially considering the proximity to the center, services, businesses and its urban infrastructure.

In this context, a configurational analysis can help explain the logical of location within the urban space. Thus, the Theory of Space Syntax helped identify the configurational characteristics of streets with buildings in the center of Florianópolis.

Through the analysis it was identified that within the central area of the city of Florianópolis, apartment buildings are located on streets with high global and local integration, that is, the other areas are near the city. As to the measure of choice, implantation occurs preferentially in streets that have medium to high level on a local scale, therefore, these streets are not part of the shortest paths to other parts of the city, but within the center itself.

In other words, the preference deployment occurs in streets that make its central location and easy access to many points of the city location, however, prioritize relatively quiet pathways outside the access roads to other places outside the center.

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Typological atlases of block and block-face

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Abstract. *The classification of blocks and block-faces according to several morphological characteristics is used in this paper as a basis for assessing urban form. Classification aggregates discrete data into categories which can subsequently become associated with specific considerations, requirements or solutions regarding city planning and design (Steadman, Bruhns et al. 2000). The issue, then, is to present similarities, co-variations or contingencies in a meaningful and legible manner so that the resulting typology of urban conditions can support planning or design actions. The intent is to represent and characterize urban units according to numerical profiles and to group them into clusters, using the k-means method (Gil, Beirão et al. 2012). As a second step, clusters are depicted on maps to produce typological atlases. They serve to assess existing urban conditions or test future urban conditions. Two typological atlases are proposed. The first concerns the morphology of blocks based on shape and size; the second concerns block-faces as the interface between street and building, coalescing external and internal loads. Syntactic measures such as metric and directional reach (Peponis, Bafna et al. 2008) characterise the external load exercised by the street system and morphological measures such as setbacks and building frontages (Talen 2005; Oliveira 2013) represent the internal load exerted by buildings. The typological atlases help visualize the prevailing building and street patterns and facilitate the evaluation of urban conditions so as to distinguish between saturated areas and areas with greater potential for future development.*

Key Words: *Block-face; typological atlas; block morphology; metric reach.*

Introduction

The morphology of our cities entails fundamental problems but also, when studied carefully, hints for their solutions. The form of North American cities, particularly as it has accrued since the 60s, has been characterized principally by ‘urban sprawl’. Studies of the configuration of sprawl show the incompatibility between our understanding of irregular forms and the tools proposed to measure it (Scheer, 2001). Furthermore, a study that compared the urban form of Barcelona and Atlanta has shown that measures that are relevant for a regular and dense city cannot be applied to a sprawling city (Bertaud, 2004). Solutions that deal with sprawl should be able to accommodate changes as part of the inward and outward growth of cities, without detriment to the large-scale functioning structure. Of particular interest is the question of whether an area developed as a suburb can get more densely urbanized over time, and, if it can, which particular suburban sites are good candidates for the initial steps towards denser urbanization.

This paper proposes a way to measure and assess existing urban form in the context of North American sprawling cities as a basis to provide more targeted and appropriate solutions, which are a step towards sustainability. For this purpose, a systematic way of assessing urban form has been developed, taking into account selected syntactical and morphological properties used in previous studies of cities. Part of the work has been to adapt some of existing measures for the study of irregular forms. However, the main contribution of this proposed framework is to link these properties to a single morphological unit, the block-face, as the interface between street and building that is expected to provide a more comprehensive account of the existing conditions.

The block-face as unit of analysis

The methodology builds upon a research tradition of analytical and quantitative studies of urban layout developed in the fields of morphology and space syntax. It raises two questions regarding the unit of analysis and the measures of built environment. Studies in urban morphology typically look at the interactions between urban block size and shape, and patterns of buildings. Typically, however, the impact of the larger scale syntax of street network is not taken into account. On the other hand, studies in space syntax have looked at the interaction between street connectivity, land use and development density, but have not specifically addressed the geometry of urban blocks.

Linking buildings to streets and blocks to buildings

Bridging two fields, recent studies have shown correlations between building density and street connectivity. While space syntax is typically concerned with accessibility, Marcus (2010) has proposed the concept of “spatial capital” to relate street accessibility, building density and population diversity. Direct street accessibility is an essential component of building density in relation to street life which lends itself to promote a continuous built environment along streets. To integrate the notion of accessible building density is to look at how the street relates to buildings physically, by measuring frontage and setbacks.

Looking at building configurations, Berghauser Pont and Haupt (2002, 2010) establish a strong relationship between block dimensions and building configurations and building functions. The diversity of building configurations within a block is captured in a matrix called ‘spacemate’ that associates block area, open space area, ground floor area and total floor area with different types of developments. This study highlights the impact of size of urban block to building density, but does not fully integrate the impact of the block boundary, which is made by the streets. The area of the street is considered to be part of the non-built space, and it is not strongly integrated into the space matrix. To complement these existing measures of block size, measures of shape based on block periphery are proposed to link blocks to streets.

The block-face

Recent studies have started to link building configurations and street networks. In a study of New York, Oliveira (2013) uses streets, plots and buildings as morphological units to link syntactic properties of streets to the morphology of buildings (frontage, height), as well as to land-uses. This in-depth and comprehensive study limits itself to relatively few streets. Using a GIS platform, it is possible to develop a more systematic linkage between the syntactic properties of streets and building morphology.

In the context of sprawling city form, the potential of sites to accommodate future development should to be assessed in terms of the balance between local and global access, as determined by the conditions at the perimeter of the block and available land as determined by block size, shape and existing building footprints. The block-face emerges as the morphological element that naturally associates the properties of the street network and the properties of buildings. The block-face is the element that belongs to both the street and the building and, as such, can capture variations along a street or between different faces of a block. By looking for systematic relationships between buildings and streets, there is a clearer understanding on how they associate or dissociate. As such, they can affect the future of cities by constraining the potential forms of future development.

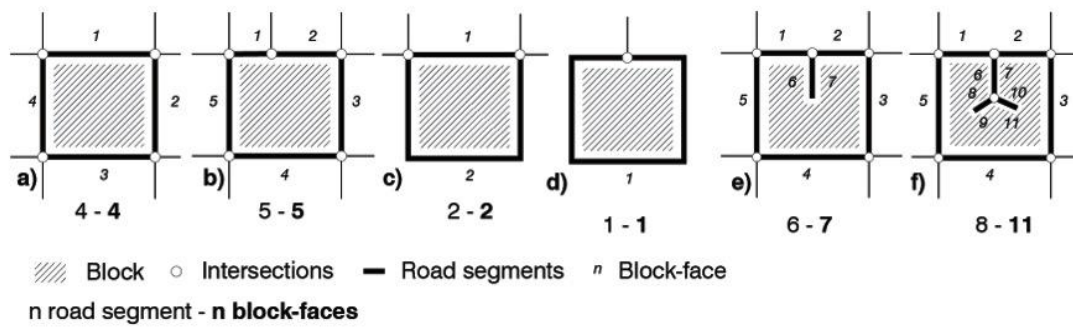


Figure 1. Number of block-faces based on road segment. The distinction between (b) and (e) is the source of the pressure on the boundary: external (b) or internal (e). The variation between number of road segments and number of faces happens when there are internal road segments: dead-ends (e) or internal street (f). Blocks (c) and (d) are cases of block partially or fully contained within another block.

The block-face, as morphological unit, has been used in only few urban morphological studies (Purciel, Neckerman et al., 2009). The distinction between collecting data at the block level or the block-face is that the latter includes the street as a unit of analysis. Figure 1 illustrates the different translations from road segments to block-faces. The number of faces per block corresponds to the number of road segments associated to a block with adjustment for internal road segments.

Measures

The balance between street properties and building properties defines the value of blocks and block-faces. This section presents a set of attributes related first to street layout and second to building footprints. Once defined, the measures of the built environment are transferred as “load” onto the block-face. There are two distinct kinds of loads, the internal load that measures density and continuity of buildings configurations and the external load that includes the connectivity and the accessibility of the street network. Figure 2 summarizes the relationships of each morphological unit to their syntactic and morphological properties and their measures.

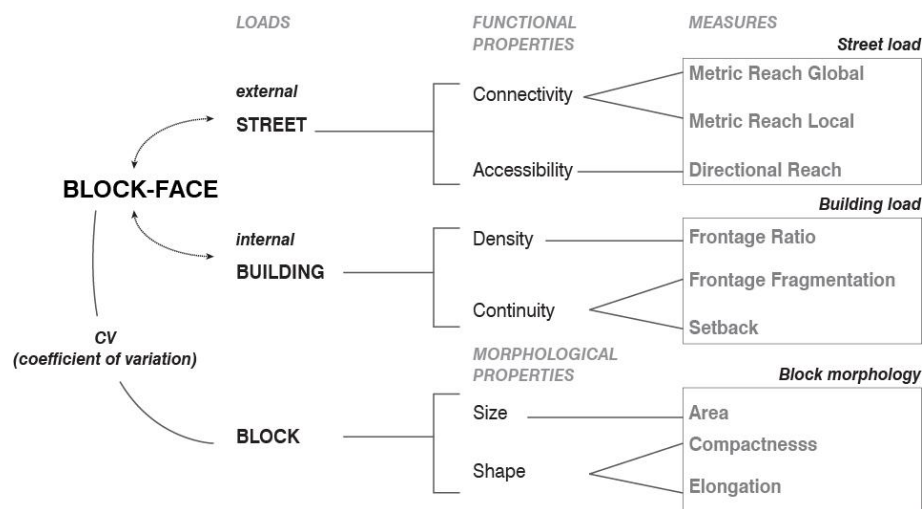


Figure 2. The relationships of morphological units, their syntactic and morphological properties and their measures.

Internal load - Buildings

Because the emphasis is on the density of the built environment along a street, the selected measures of the internal load define the relationship of building to the block boundary. This internal load expresses the density of construction in a given area, therefore, it implicitly relates to the potential for further development or to the saturation of the urban fabric. The location of buildings in the center or on the edge of the block determines the degree of enclosure or openness of the block. For a passer-by, the degree of “enclosure” of the block is characterized by the continuity or the interruption of facades along the streets: in other words, the “built frontage”.

Built frontage is made of the lines of the building footprint that are within a given distance from the block-face. Talen (2005) draws the limit at 9-14 meters in the interior of the block from the street for the sense of enclosure to be effectively present. In the case of Atlanta, the chosen distances are 15 meters from the boundary of the block (figure 3-1). The frontage ratio of a block-face is the percentage of its length that is built. The continuity of the frontage is captured by frontage fragmentation, which is the number of building fronts that makes the frontage and tells how fragmented the experience is for the passer-by.

The third measure is the setback, which is the distance from the limit of the lot and the street to the first line of the building footprint towards the center of the block. In this sample, setbacks are represented by radials. Radial setback indicates the ratio of “in front of the buildings” length and the “behind the building façade” length as one moves from the perimeter to the block center (figure 3-2).

External load - Streets

The second set of measures focuses on the characteristics of street layout, the external load. Street performance is principally linked to accessibility and connectivity. The connectivity of a street layout is defined by the amount of street length available within a set reach. At the urban scale, the metric distance and topological distance are incorporated in the measure of metric reach and directional reach (Peponis, Allen et al., 2007). Parametric thresholds are used to distinguish local from global reach. Each reach measure records a different affordance of the street segment. It is then transferred from the street segment to the two block-faces associated with that road segment.

Metric reach characterizes street density and street connectivity. It measures the total linear distance in miles that is available for someone departing from the middle of a road segment and “walking” a given distance in every direction (Peponis, Bafna et al., 2008)²¹. The given distance is called radius. Variations in the radius length capture either local street density, using, for example, a radius of 0.17 mile (270m), or global street density with radius of 5 miles (8km). Metric reach provides a measure of “potential”, of how much of the urban fabric is available nearby. It quantifies in length the range of nearby opportunities provided by the street network. To some degree, metric reach captures availability of alternative routes, or street connectivity. A metric reach value is assigned to each road segment to characterize block-face. High values demonstrate high density and therefore high local connectivity.

Directional reach records the total length of streets available from a street segment within a set number of changes of direction. What counts as a change of direction is specified using a threshold angle. In this study an angle greater than 10 degrees is considered a turn. Directional reach can be analyzed using different numbers of turns. Directional reach at 0 direction change

²¹ The details of their computation in the ArcView GIS platform is discussed in Peponis, J., D. Allen, et al. (2007). *Measuring the Configuration of Street Networks*. 6th International Space Syntax Symposium, Istanbul Technical University, Cenkler, Istanbul

depicts the “straightness” of the urban fabric locally. It is associated with the legibility of the urban structure. This is the only measure that does not take density into account; it is the simplest configurational measure. Other measures of connectivity and density exist, but these two are selected because they are associated with the street segment. The last set of measures relates to the design of blocks and their geometry.

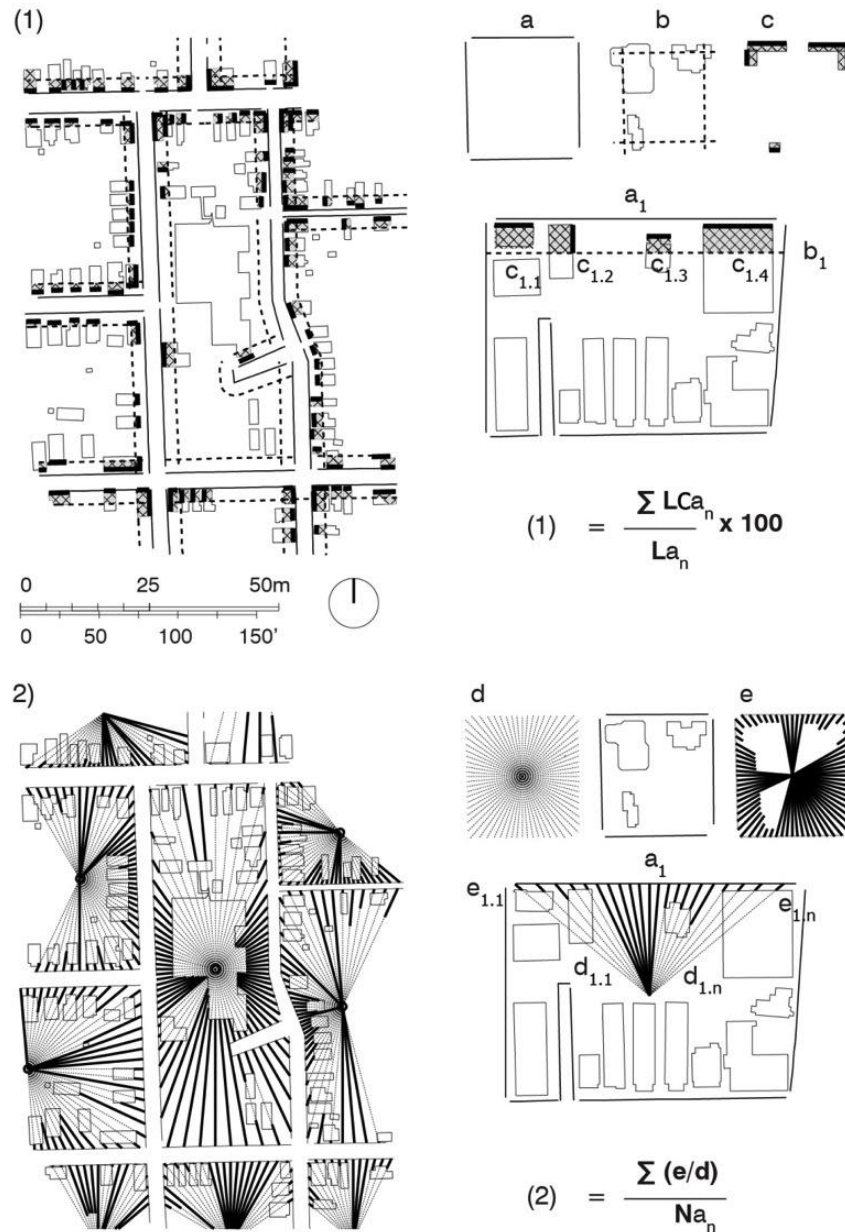


Figure 3. Frontage Ratio (1) is the ratio of the sum of the length of building frontage (c) that are included in the 10 meters buffer zone of that block-face (b) by the length of the block-face length (a). Block-face setback (2) is the average ratio of the length of the radial. Frontage Fragmentation (3) is the number of building frontage included in the 15 meters buffer zone.

Morphology of Blocks: relate linear dimension to properties of street and building configurations

The relationship of block-faces to a block resides in the morphology of the block and its capacity to distinguish its sides depending on which street a side is facing. Geometrical shapes can be measured in several ways, and the selected measures describe two aspects of a block: the periphery, which is in contact with the street, and its internal metric depth, which provides a framework for the location and size of building footprints.

Block size can be described by its area or by linear dimensions. Dimensions describing the overall proportions of block at the periphery are referred to as “width”. Average length, the length of the block perimeter divided by the number of block-faces, and segment length, the length of the street centreline between two intersections, are computed to characterize block width. Dimensions from center to perimeter are referred to as “depth”. They describe internal properties of blocks: the longest axis²² or maximum span is the distance between the furthest points on the perimeter, and the radial depth is the average distance from centroid to perimeter.

Other dimensions of block morphology relative to shape are the deformation of the block boundary and the proportions of the block. Deformation can be measured by the distortion of the perimeter or by variations in depth. To compute the distortions of the boundary, two shape indexes are presented and used to describe the block stock in Atlanta: square compactness and elongation. According to Colaninno, Cladera et al. (2011), the shape indexes based on the ratio perimeter-area (square compactness) and based on the longest axis (elongation) are both indicators of the “complexity” of a shape. Square compactness better describes the boundary and elongation better defines proportions.

Description of Atlanta stock

These measures become the basis for quantifying and building a profile of the blocks in a city. In this particular case, Atlanta is chosen to exemplify sprawling city form. Table 1 summarizes values and ranges of values for measures of street load, building load and block morphology.

Mapping

Figure 4 illustrates two ways of looking at the city of Atlanta based on the most recurrent type of block morphology. The first profile of Atlanta that shows the most recurrent type of block dimensions is established based on the selected dimensions for width and depth. To make up the profile, blocks with a radial depth between 43 and 93 meters and with an average face length between 58 and 122 meters are selected. Only 1071 blocks match the two requirements (figure 4-1). While the ranges selected described half of the sample when considered one at a time, the final selection based on both measures encompasses only a quarter of the blocks. These belong to the small-medium category, with an average size of 1.3 hectares.

²² To measure internal dimensions, except the radial depth, we use the Shape Metrics Tool developed by Jason Parent and available online [http://clear.uconn.edu/tools/Shape_Metrics/index.htm]. It calculates the longest axis, the girth and other measures that will be needed to compute index of compactness. The tool is a Python script that runs out of ArcToolbox in ArcGIS 9.3. It requires a polygon as an input. The measures are explained in detailed in a published article: Angel, S., J. Parent, et al. (2009). "Ten compactness properties of circles: Measuring shape in geography." *Canadian Geographer/Le Géographe canadien* 54(4): 441-461.

Table 1. Summary of values and ranges for all selected measures in the city of Atlanta.

Block-face (n= 29750)		MEAN	MEDIAN	QUARTILES	ALL
Street load					
Metric Reach 0.17	<i>mile</i>	0.91	0.86	0.63-1.15	0-3.1
Metric Reach 5	<i>mile</i>	735	776	602-880	210-980
Directional Reach 0dc	<i>mile</i>	0.5	0.24	0.1-0.56	0-27.5
<i>Building load</i>					
Frontage Ratio (20m)	<i>percentage</i>	26.8	22.8	0-46	0-141
Setback	<i>percentage</i>	46.7	41.8	27-64	0-100
Frontage Fragmentation	<i>n</i>	2.9	2	0-4	0-46
<i>Block (n= 4028)</i>					
<i>Block morphology</i>					
Area	<i>hectares</i>	6.15	2.01	1.1-4.3	0-503
Average Length*	<i>meters</i>	130	109	78-158	11.6-2046
Segment Length	<i>meters</i>	173	131	85-212	7-2585
Maximum Span	<i>meters</i>	339	239	168-386	8-4107
Radial Depth*	<i>meters</i>	91	74	56-103	2.7-657
Square compactness	<i>0-1.3</i>	0.78	0.84	0.65-0.95	0.06-1.24
Elongation	<i>0-1</i>	0.66	0.68	0.59-0.75	0.2-0.94
Number of block-faces		6.4	5	4-6	1-136

**averaged dimensions*

The second profile of Atlanta blocks is based on block shape. It is made of blocks with square compactness between 0.8 and 1.01 and an elongation index between 0.66 and 0.8. Only 1173 blocks match the two requirements (figure 4-2). Although still small, this profile includes a wider range of block sizes, with an average value of 2.1 varying between 0.01 and 52 hectares, compared to the profile based on dimensions alone. The two maps imply two different principles of urban blocks in Atlanta, but they both show that the combination of different measures to describe a typical block creates much smaller better-specified categories.

Clustering and visualization

Atlanta embeds a variety of urban forms that range from traditional urbanism on a gridiron to extreme forms of sprawl. Predictably, the local and global connectivity of the urban form varies widely in Atlanta. Furthermore, Atlanta is comprised of urban forms that have not yet reached their full potential in terms of building density. In these currently sprawling patterns, there is room for future density and street connectivity to increase. Thus, it is useful to determine how to measure their potential for transformation and which physical characteristics are more conducive to changes in block subdivision and street connectivity.

The mathematical classification of urban and built form allows for the precise identification of commonalities and differences between designs. Classification is a way to group elements with similar characteristics so as to reveal their potential in terms of evolution, function and performance. The classification of designs is traditionally based on visual and formal resemblances that are identified to propose types. The designer, who then uses the types, knows that they embed certain properties. The role of quantification and formal analysis is to structure the exploration of possibilities given that geometry and topology impose their own limitations upon urban and built form. It is also important to note that the typology presented is not final.

Different emphases produce different types based on aspects of morphological properties, syntactic properties or a combination of both.

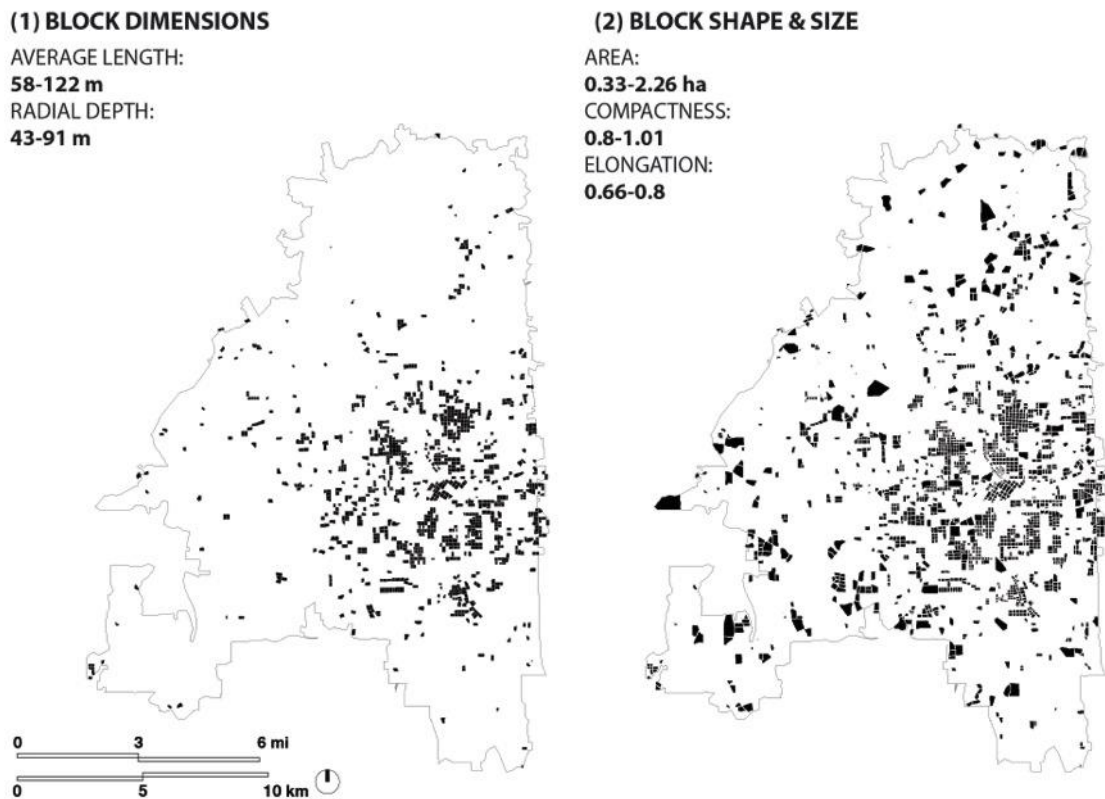


Figure 4. Blocks representative of Atlanta based on their radial depth and average length dimensions. They represent the compact half range (n= 1071) (1). Blocks representative of Atlanta based on their area, square compactness and elongation. They represent the compact half range (n= 1173) (2).

Clusters (k-means)

The classification of neighborhoods has been used to evaluate the efficiency of urban design policies (Song and Knaap 2007). Song and Knaap aggregate a set of measures into eight factors that serve as inputs for k-means clustering. Cluster analysis is used in order to produce classifications of urban form (Gil, Beirão et al. 2012). Other authors characterize urban structure by using data training and discriminant analysis algorithms to produce classifications based on the shape and configuration of buildings (Steiniger, Lange et al. 2008). The most complete and automated computational classification of urban structure taking into account building footprints and block shapes deals with Barcelona (Colaninno, Cladera et al. 2011). The authors train the model by using established historical periodization. They subsequently integrate the structure of the street network into the analysis. A thorough review of pattern classification methods by Duda and Hart (1996), suggests that k-means clustering tends to divide a set of objects into homogeneous groups with no preconceived information about the group structure of the data.

The k-means clustering organizes blocks into clusters that share common properties. The goal is to create clusters that show statistical and numerical evidence of similar patterns. Several parameters can be given as input and the data is partitioned according to the distance of each entry to the different means. With k-means clustering the data are partitioned into a number k of clusters, determined by the user.

Morphology of Block clustering

A first clustering of the Atlanta blocks by their morphological properties is established as follows. Three morphological factors are selected to characterize the size (area) and the shape of blocks (square compactness and elongation). After several tests, the number of clusters was fixed to eight: fewer clusters did not provide enough discrimination and more clusters created too many classes with too few elements, and quite small variations of values between clusters. The different clusters are illustrated in figure 5.

Regarding block area, k-means clustering partitions the blocks into groups ranging from small-medium blocks to mega blocks, the blocks larger than one million square meters. Regarding square compactness, which is sensitive to the shape of the block boundary, clusters highlight the range from regular to convoluted blocks. Finally, regarding elongation, which describes the overall span of the block shape, clusters distinguish between consolidated/compact, elongated and narrow blocks.

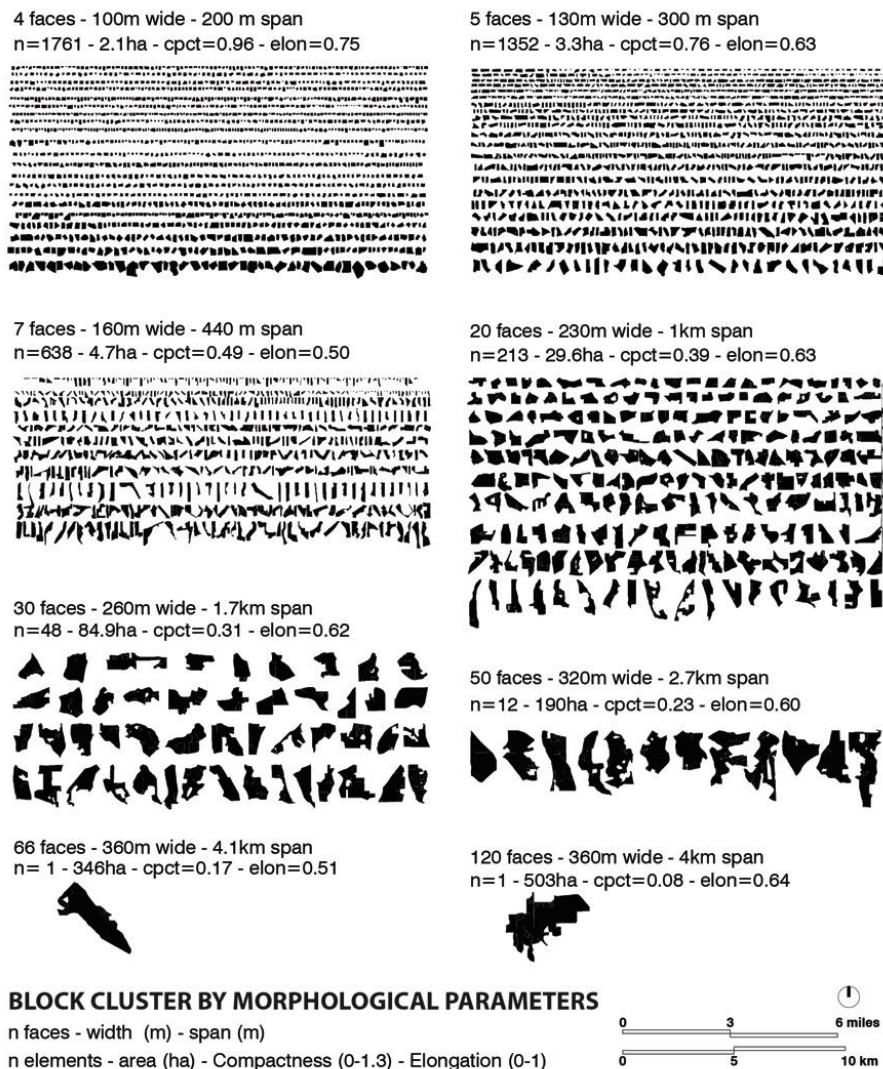


Figure 5. Eight clusters from the k-mean method based on area, square compactness and elongation: table with mean values. For each cluster, the mean number of block-faces, average length (width) and longest axis (span) are reported in meters.

This classification of blocks by morphological characteristics provides a first step towards the assessment of the existing state of the urban fabric. Other design characteristics are associated with each cluster. For example, the average dimensions of span (longest axis), depth and width are given as well as the average number of block-faces.

Mapping Syntactic clusters – characterisation of neighbourhoods

For the purpose of understanding the effect of different types of external loads on the formation of neighborhoods, urban blocks are clustered to depict configurations and associations in their urban contexts according to distance from the center, the density or the linearity of their association, their isolation and the complexity of their boundary. The clustering method by k-means divides the sample into 8 clusters according to the external load measures: local connectivity, measured by metric reach radius 0.17 mile (274m); global connectivity, measured by metric reach radius 5 miles (8km); the regularity of the grid, measured by the directional reach value for 0 direction changes, and the regularity of the grid, measured by the number of block faces, which is sensitive to the number of internally and externally oriented T-junctions along the block periphery.

Figure 6 illustrates the clustering of blocks according to syntactic properties of the adjacent streets and their location on the map. Block clusters tend to form patterns of aggregation that visualize traditional type of neighborhood as well as less recognizable ones. In the grid type, homogeneous and compact neighborhoods are split into three categories: small compact neighborhoods made of regular blocks centrally located, such as in “*Downtown Atlanta*” (figure 6-a); compact neighborhoods with a more organic structure like “*Ansley Park*”, with its curvilinear streets based on Olmsted-type principles (figure 6-b) and fairly compact neighborhoods at the periphery of the sample (figure 6-c). These last two clusters have the most numerous elements; their difference is essentially in their location; within some 4-5 miles (6.4-8km) from the city center (figure 6-b) and others located beyond the 5 miles (8km) boundary (figure 6-c).

The linear distribution of pattern relates to neighborhoods with a high mean directional reach. These clusters represent blocks attached to a major street that is long and straight. These are neighborhoods that developed along a major axis such ‘*North Avenue*’ (figure 6-d) or ‘*Sylvan Road-Joseph Lowery Blvd*’ (figure 6-e). The other clusters depict association of large, complex pattern blocks with a high number of block-faces. The pattern of blocks is interrupted by large gaps that create large discontinuity. Adjacent blocks only share a small proportion of their perimeter. They are very large blocks with normal-medium global and local reach and directional reach. Finally, isolates (figure 6-h) have the highest number of faces and the lowest global mean reach and directional reach.

From a connectivity standpoint, Atlanta presents fairly discrete neighborhoods with very few connections between them. New typologies arise linked to properties of long straight lines or to a very complex system of bounding streets. Reciprocally, morphologies of neighbourhoods are associated with syntactical characteristics.

Block-face clustering and mapping

The urban form of Atlanta can be characterized as diverse. While Atlanta is made of a majority of small and fairly regular blocks, as shown in the first profile, the extremely large blocks participate fully as elements of discontinuity. The discontinuity of the urban fabric is one of the main characteristics of the overall urbanism of Atlanta. The second characteristic is that building configurations in Atlanta are characterized by very deep setbacks that do not participate in defining the continuity of city form. The two main issues are where to implement new development to create a sense of continuity and how to use the existing potential carried by the street network. Density should be increased for block-faces with high connectivity and buildings should be located as to create a continuous frontage.

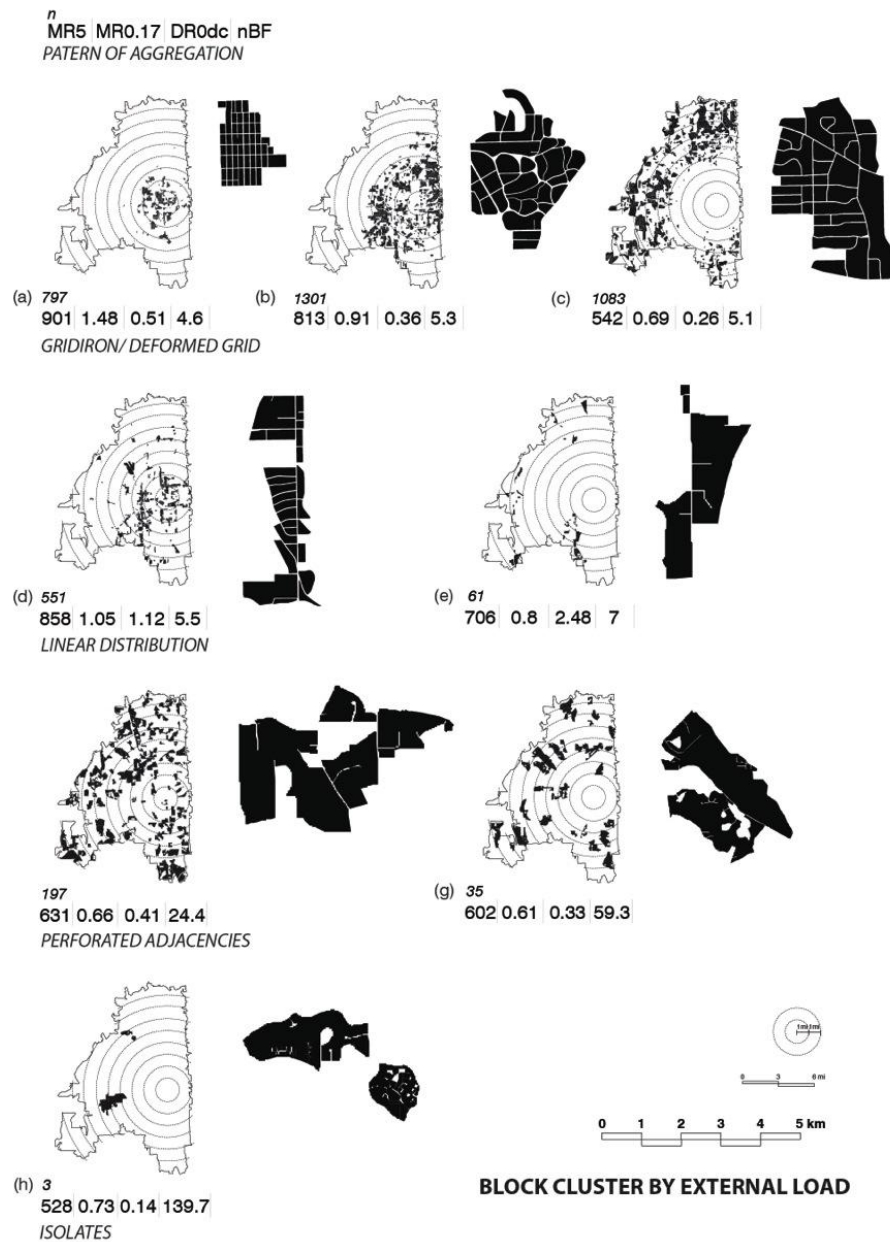


Figure 6. Clusters based on external load. The number of blocks (*n*) is reported for each cluster as well as the metric reach radii 5 miles (MR5) and 0.17 mile (MR0.17), the directional reach without change of direction (DR0dc) and finally the number of block-faces (nBF).

A block-face is the link between the external characteristics of the road structure and the internal pressure of building load. The combination of all these parameters provides a framework for comparing and classifying block-faces. The k-means method previously used is applied once more. Three parameters for the external load and three parameters for the internal load are included in the calculation. The building load is represented with the amount of frontage at 20 meters from the centerline, its fragmentation and the presence of setbacks. The external load encompasses the global metric reach with a 5 miles radius (8km), the local metric reach with a 0.17 mile radius (274m) and, finally, the straightness of the road structure with the directional reach with no change of direction.

Table 2. The mean values for 8 Clusters of block-faces according to three parameters of building load and three parameters of street load. Frontage fragmentation [F20F] and ratio [F20R] at 20 meters and setback ratio [SK] account for the building load. Reaches with metric reach 5 miles [MR5] and 0.17 mile [MR0.17], with directional reach 0 direction change [DR0dc] account for the street load.

Cluster	STREET LOAD			BUIDLING LOAD			
	MR 5 (mi)	MR0.17(mi)	DR0dc (mi)	SK (%)	F20R (%)	F20F (n)	# block-faces
1	479	0.45	26.42	92.9	0.00	0.00	4
3	53	0.50	12.28	77.1	1.70	0.23	22
2	543	0.64	0.29	80.9	15.15	1.72	4373
4	588	0.70	0.24	31.6	41.87	4.10	7127
6	867	1.12	0.46	74.9	20.26	1.45	5269
7	869	1.19	0.48	25.6	70.86	4.26	8473
8	811	0.99	3.11	46.7	34.37	2.49	1296
5	728	0.67	0.28	30.7	67.55	13.56	3006

Several clusters have similar street loads parameters and very different building load and vice versa. Table 2 pairs the clusters with similar characteristics of either building or street loads: clusters 1 and 3, clusters 2 and 4, clusters 6 and 7. Cluster 1 includes empty block-faces near highways. They have very high directional reach but very low connectivity and are empty. Cluster 3 is a slight variation of cluster 1 with low building loads. Block-faces have plenty of available space for new buildings but are not connected well to their surroundings. Cluster 2 includes block faces with almost no building on their edges, but with low setbacks where built. Cluster 4 includes block-faces that are fairly well built on the edge, with building footprints also covering the interior so that no additional building can easily be added.

Cluster 7 represents the best performing block-faces, they are highly connected locally and globally, they are fairly accessible, the setbacks are minimum (quarter), they are highly built on their edge (70 percent) with a reasonable fragmentation (4 to 5 building footprints on average). They are functioning well. Cluster 6 has similar behavior for connectivity and accessibility but their building footprint load is very low: only 20 percent of the frontage is built by 1 or 2 building footprints, setbacks indicate lack of buildings with a 75 percent value on average. In the similar location but more empty of footprints, cluster 6 can be seen as containing blocks which are at an earlier stage of development compared to those in cluster 7.

Cluster 8 is average on every level, but with higher values on connectivity and low values on building load with only 35 percent built and fairly low number of building footprints (2 to 3). These block-faces are located near long straight lines that are not highways. They have a very good potential based on their existing connectivity and accessibility. Cluster 5 seems to represent the suburban type of block-face with lots of building footprints (13.6) and high frontage (68 percent): single-family houses. Block faces in this cluster are fairly well connected globally, but not performing as well locally.

To illustrate the different types of block-faces, an example of streets and blocks is provided in locations with large irregular blocks with diversified conditions on the boundary (figure 7). The example shows the block that accommodates the Atlanta City Water Works Reservoir II with

some surroundings blocks. It shows six distinctive types of block-faces. The north side is made of block-faces type 4. They are characterized by low global or local connectivity and medium straightness associated with a fairly small amount of frontage associated to deep setbacks (half way between the center and the boundary) with few building footprints. There is little to be done to improve the existing conditions. In block-face type 8, located on the east side of the block, similar building configurations exist but in a very high connectivity and straightness context. The east side of the block is bordered by Northside drive, which gives lots of potential for buildings that need connectivity and accessibility, but the existing configuration of buildings needs to be improved. The south boundary is fairly unbuilt with block-faces type 3 and is fairly well connected. More buildings could be added. However in that specific example, half of the southern boundary is bordered by the reservoir. The same condition exists for the block-face type 2 but as a cul-de-sac, it is less accessible and less connected.

In summary, some of the clusters are context dependent: clusters 2 and 6 are concentrated in specific regions, and cluster 8 is linked to specific streets. On the other hand, different building configurations exist for similar street characteristics. The example of the large block (figure 7) showed that a single block can have variations on its edges to accommodate different building configurations. The ability of some blocks to create different conditions along their edge carries an interest for creating diversity.

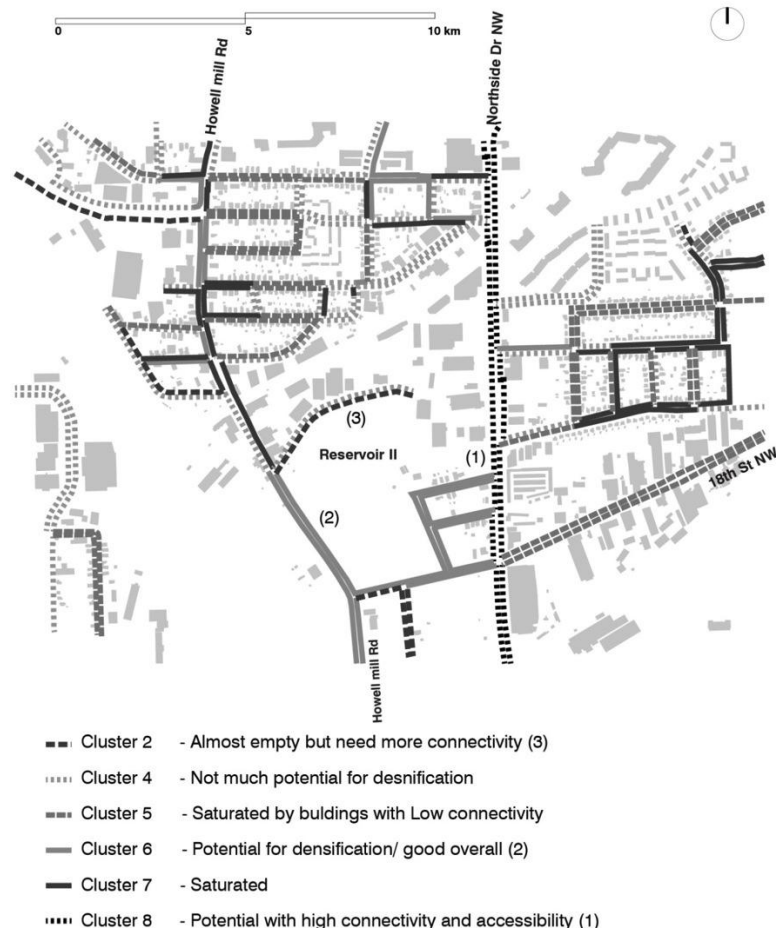


Figure 7. Example of different block-face types around a fairly large block (Atlanta City Water Works Reservoir 2) that illustrates clusters 2, 4, 6 and 8. The immediate surroundings include also clusters 5 and 7.

Conclusion

The proposed framework to understand the behavior of existing block-faces concerning building and street loads has shown that block-faces can have different levels of densification. However, only some block-faces have the flexibility to accommodate changes, particularly for addition of buildings. The analysis of block-faces has facilitated explorations of the significance of streets in relation to buildings. Streets can now be defined as made of two sides; thus, they link two possibly different conditions emerging from the two blocks they are in contact with. Streets also link adjoining blocks along their length. The context is included in the assessment of block-face.

This article has shed light on some purely morphological relationships. It has also proposed to bring block-faces into focus as fundamental to our understanding of city form. In doing so it also proposes ways in which the interface between architectural and urban design can be visualized. Block-faces have emerged as the boundary and interface at which the syntax of street networks and the syntax of built form interact.

This work contributes to the assessment of existing cities, specifically to the identification of locations with greater potential for development based on good connectivity and good availability of development land at the edge and also in the interior of blocks. The work also contributes to the assessment of the potential of individual properties considered for real estate development.

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Analysis and modeling of spatial changes: Identification and quantification of urban growth in Florianópolis-SC

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Abstract. *The urbanization process is one of the most remarkable manifestations of human actions on space, highlighted by the progressive population growth in urban centers. Such growth is what makes cities big and complex structures, representing the peak of the way of life, appropriations, transformations and manifestations that humankind is capable of imposing, be them economic, social, or environmental. Thus, scenarios with a tangled, intrinsic and dynamic physical and territorial structure emerge, reflecting the changes in the morphology and functionality of such places, thus becoming urban spaces rather than rural areas. Among the trends in urban expansion, it can be highlighted urban sprawl, characterized by low density, fragmented, polynuclear, and often uncontrolled urban dispersion. Considering this, and taking as case study the city of Florianópolis-SC-Brazil, marked by the distribution of several urban nucleiconsolidated throughout its insular territory, the present study aims at understanding, identifying and quantifying the dynamics and spatial organizations of the city areas. In order to do so, spatial-temporal analyses of land use through photo interpretation in GIS platforms of representative spatial cutouts representing different existing urban morphologies have been conducted. Besides that, geoprocessing techniques and the use of spatial metrics are employed in the evaluation and classification of variables through numeral indicators. Thus, the mapping and quantification of the alterations represented by Human vs Space interaction throughout the analyzed period allows a better understanding and a higher accuracy of the spatial dynamic processes.*

Key Words: Urban morphology; spatial metrics; GIS, spatial-temporal analysis; urban sprawl.

Introduction

The cities have undergone considerable changes in recent decades due to urban growth. Progressive and intensified form, remains ongoing process of urbanization, leading to changes in land use, causing significant physical-territorial impacts, mainly related to urban morphology (Coelho et al., 2014, Borges et al., 2010). According to Deng et al. (2009) and Kong et al. (2012), urbanization is characterized as the most powerful and visible action of the force of man, which causes sudden changes in use and landscape patterns, to relate mainly the social and economic issues.

In this context, marked by the performance of the real estate market, the interests of society and public policy, is occurring a dispersed process of urbanization (*urban sprawl*) (Inostroza et al., 2013). Characterized by low density, spreading spatial patterns, configured for fragmented and discontinuous urban settlements, forming a polynuclear structure and highly dependent on the automobile, leading to significant environmental shocks (Herold et al., 2005, Costa and Silva, 2007, Bhatta et al., 2010, Aguilera et al., 2011, Thapa and Murayama, 2009, Yu and Ng, 2006, Tv et al., 2012, Aljoufie et al., 2013, Yu and Ng, 2007, Barredo and Demicheli, 2003).

In order to mitigate the impacts of urban sprawl, the monitoring of urban development by means of spatiotemporal information appears to be an important tool in the evaluation of transformations of the territory. Especially, in order to ensure the sustainability of cities in the future. The use of geotechnologies, which combines remote sensing and GIS techniques (Geographic Information System), is a valuable resource in the planning and construction of urban policies, it is possible to identify and understand the dynamics and shape of the urban growth process (Coelho et al., 2014, Borges et al., 2010, Deng et al., 2009).

Among the techniques for assessing the dynamics of urban land occupation, allowing the characterization and diagnosis of problems, has emerged the use of spatial metrics. These are adapted from related Landscape Ecology studies and shown to be an important geospatial tool.

Directed to studies of landscape and different ecosystems, especially the themes of forest and animal species, emerged from the 1980s (Moura, 2010b, Moura, 2010a, Liu et al., 2010, Li et al., 2005). It is configured on a system that studies the landscape from the perspective that it is formed by the heterogeneities of an interactive system, the formation of a mosaic of patches or fragments (Forman (1995), Lima and Rocha, 2011). From a system where there is a relationship between its components, allows the realization of assessments at different spatial and temporal scales, studying the composition and structure (Poletto and Metzger, 2012).

In this scenario, based on the methods of Landscape Ecology, have become the urban spatial metrics to urban studies. It is noted an interesting mechanism in knowledge area for the analysis of spatial and functional patterns. Through the generation of quantitative data and indices featuring urban space as the form, size, number and geographical dispersion of its constituents (Sundell-Turner and Rodewald 2008, Sanches and Ferreira 2008, Aguilera et al., 2011).

Thus, taking as a case study of the city of Florianópolis-SC, which is marked by the distribution of numerous consolidated urban centers along its island territory (Figure 1), this study aimed, from a spatial clipping, the Canasvieiras District to understand, identify and quantify the dynamics and spatial organizations of the areas.

Material and methods

Study Area

The District of Canasvieiras is located on the north coast of Santa Catarina island, 30 Km from the capital center. Its main highway access is SC 401. According to data from the CENSO (2010) has a population of 18,091, approximately 4.3% of the city's population and population density of 280.67. See Figure 1.

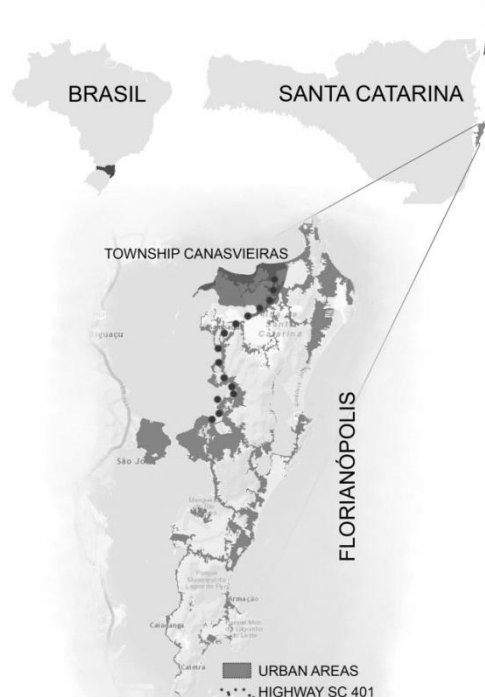


Figure 1. Localization Township Canasvieiras (source: Authors on Basemap Arcgis 10.1).

The local appears as major urban centers in Florianópolis, endowed with significant infrastructure and services. Constituted itself as one of the first centers of the island with bath-house function, thus having its process of urban growth intensified after 1950 when the Municipality begun work on parcels and deployment streets (Reis, 2012, Silva, 2000).

Thus, the choice of the spatial clipping area is due to its history of urban development, which resulted in the diversification of morphological structures. On one hand there they are significant areas with the urban mesh in “fish spine” format resulting from improper installment patches of lands well as the city growth along main roads. Moreover, the development of areas with a regular reticule, a factor that distinguishes them from other bath-houses areas of the city for its concentration and morphological structure.

Construction of the cartographic base

The work was based on the integration of historic images dated 1977, 1994 and 2013. Equipped with high spatial resolution, developed the mapping of urban areas through photointerpretation in GIS (Arcmap) interface, to identify the spatiotemporal dynamics. For Kong et al., (2012) to conduct studies that consider the territorial changes over time, combined with the remote sensing constitute an important basis for research and play a determining role in making diagnoses and planning proposals.

Application of spatial metrics

The ability to quantify the structure of the space is a prerequisite for studying the function and modification of urban dynamic (Forman, 1995; Herold et al. 2005, Li et al., 2011). This study, we used a series of spatial metrics to quantify and measure the urbanization process over 40 years, in order to understand the relationships between the spatial patterns, structures and processes of the urban District of Canasvieiras in relation to its urban fragments.

Thus were applied metrics in class level relative the spots area, shape complexity and distance from urban areas, based on other works by applying the metrics within the city such as Herold et al., 2005, Calegri et al., 2010, Muchailh et al., 2010, Yeh and Huang, 2009, Li, 2008).See

Table 1. Spatial metrics and description (source: Authors, 2014).

Spatial Metrics
NP - Number of patches
Total number of patches
TLA - Landscape area
Sum of areas of all patches class level
CA - Class area
Sum of areas of all patches belonging to a class
MPFD -Mean patch fractal dimension
Shape complexity
NNDist – Nearest neighbourhood distance
Distance to the nearest-neighboring patch of the same

Subsequently obtained the database relating to metrics, developed in an extension of Arcmap called Patch Analyst. Together, the development of graphics and tables to better elucidate the obtained information.

Finally, building mappings concerning measurements and indices identified by metrics with subsequent confrontations, explaining the changes in the respective analyzed periods.

Results

The formatting of the mappings and graphics contemplated 3 metrics in 3 distinct periods of spatiotemporal analysis, as follows: class area, mean patch fractal dimension and nearest neighborhood distance. All categorized 5 intervals.

CA- Class area

The 1970s represented the beginning of large investments in infrastructure in Florianópolis, especially works of implementation and better highways, especially paving the SC 401, as previously mentioned, the main access Canasvieiras District. Encouraged by national development policies, the study area followed the moment and began the process of implementing road and hence urban growth (Trindade, 2009). From the 1970s the District also began to consolidate as one of the main centers of interest to tourists, opportune by improving the SC 401, which enabled access to the beautiful bath-house characteristics (Santiago, 1995).

Thus, we realized the rootedness of 3 significant urban areas, as well as its conformation along the coastline (Figure 2), is characterized as the first function in nucleus with bath-house on the city. Therefore, urbanization spread along the continue pathways of margin.

The settlements, seen by the municipal government as major driver for tourism, have made great investments, as in that case, what distinguishes the area of studies of other urbanized areas of the island, the territorial organization resigned into a regular reticule (Reis, 2012), which will be further treated at work.

Until 1977 there were 8 urban patches, of which 3 have excelled containing from 34 to 163ha, representing 97% of the total urban area by cropping study. See Figure 2 and Table 2.

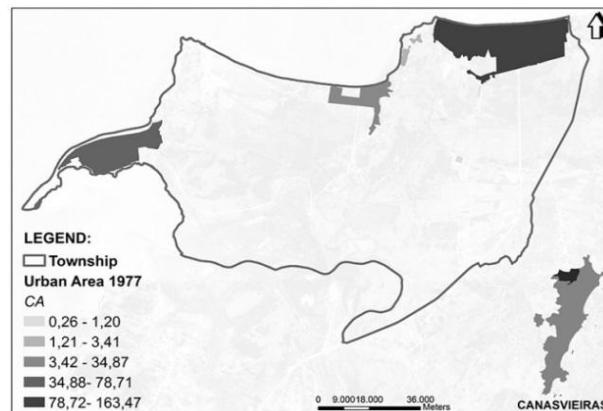


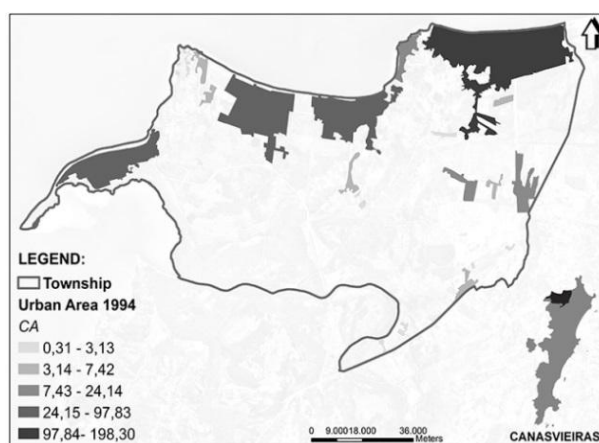
Figure 2. CA Urban area 1977 (source: Authors, 2014).

Regarding urban patches of decade 1994, an increase is found, totaling 23 areas (Figure 3). There was an increase of smaller patches, with until 7.42 ha representing about 69% of urban fragments, but representing less than 10% of urbanized area (Table 3). These conformed by the coast and along the SC 401. Urban development took place in the adjoining main highway, which is perceived similarity with other studies, indicating a global trend.

Major urban areas suffered major additions, by the consolidation of transformation of large farms in land from the real estate speculation and large urban-tourism undertaking arising from the financing of capitals representatives.

Table 2. CA Urban area 1977 (source: Authors, 2014).

Class	Patch	% cumulative	Area (ha)	% area
1,20	3	30,00%	2,10	1%
3,41	2	50,00%	5,34	2%
34,87	1	70,00%	34,87	12,26%
78,71	1	80,00%	78,71	27,67%
163,47	1	100,00%	163,47	57,46%

**Figure 3. CA Urban area 1994 (source: Authors, 2014).****Table 3. CA Urban area 1994 (source: Authors, 2014).**

Class	Patch	% cumulative	Area (ha)	% area
6,98	24	75,00%	34,87	4,63%
18,10	4	87,50%	59,75	7,93%
28,80	1	90,63%	28,80	3,82%
68,47	1	93,75%	68,47	9,09%
319,63	2	100,00%	561,57	74,53%

We emphasize the emergence of a new urban patch bordering the coast, conforming in 4 main areas that held approximately 445ha, or 82% of the city area (Figure 3 and Table 3).

Finishing the spatiotemporal exploration on the area of the patches, stood out conurbation of 2 zones conforming to the most fragmented urban area of the District (Figure 4). Together the 2 existing large areas totaled around 288ha, that is, 83.5% of urbanized area (Table 4). However, there was a noticeable intensification of smaller urban areas throughout the territory in an amount of 28 to 32, appearing with 87.5% of the total. From this, it was noticed the emergence of new and small urban centers distributed and represented 12.5% of the urbanized area (Table 4).

This process is possibly associated with a gradual fragment of properties configured for this process often clandestine and with peculiar characteristics. Other areas appeared and /or suffered increment, tangent SC 401, connected to a doubling from the 1990s. See Figure 4.

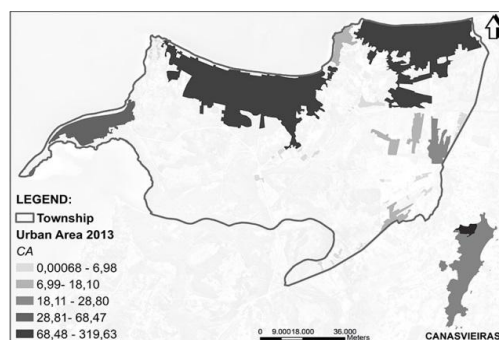


Figure 4. CA Urban area 2013 (source: Authors, 2014).

Table 4. CA Urban area 2013 (source: Authors, 2014).

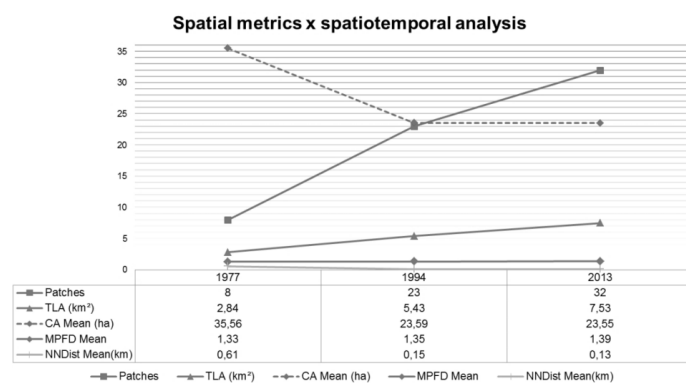
Class	Patch	% cumulative	Area(ha)	% area
6,98	24	75,00%	34,87	4,63%
18,10	4	87,50%	59,75	7,93%
28,80	1	90,63%	28,80	3,82%
68,47	1	93,75%	68,47	9,09%
319,63	2	100,00%	561,57	74,53%

Thus, from Table 5 was possible to see the changes that occurred over 40 years. Initially the clipping study consisted of 8 urban patches, increasing significantly in 1994 and successively in 2013, though to a lesser extent. Concomitantly, there was a progressive increase in total urban area of the District over the analyzed period, showing the trend in Brazil and the world, mainly, indicating a population with urban profile.

From 1977 to 1994 there was a total increase of urban district, which reflected the intense process that happened from then on throughout the city, encouraged by the idea of development and implementation of infrastructure facing the roads. From 1994 to 2013, there were similar increases in area, together with the number of urban patches, but in smaller quantities, therefore the fusion of some urban areas.

Results that were reflected in the average size of the patches, where the first period was 3 representative urban patches of a smaller universe, which implied a higher average. In later years it was noted the decrease in the average due to the increase in the number of fragments, but with smaller standards of areas. This resulted in increased distribution of small urban locations, combined with the expansion process of existing areas. According to Moura (2010a) minor patches tend to have poor stability and was therefore subjected to greater dynamic, that is, modifications of urban growth processes.

Table 5. Spatiotemporal analysis and metrics (source: Authors, 2014).



Urban typologies on Canasvieiras District

Currently, Canasvieiras District is characterized by having two distinct models of parceling and urban grid. Differentiating itself from other bath-house areas of Florianópolis, influenced by tourism growth and together with large investments, land subdivision entered a formal order. The settlements that are tangent to the margin have cross line urban mesh, associated with legal encumbrances. This typology is in 3 principal patches in the mapping of 2013, just offshore, marked from the beginning of its creation from the years 1950/1960 and has suffered successive implementation processes. Figure 5.

However, there are areas with an urban morphology like "fish spine", with a discontinuous and irregular grid (Figure 6).

According to Reis (2002) this urban growth is associated with the conversion of large tracts of land before rural, in fragment urban portions, without any urban strategy set. Process which is set along roads that made up the route of the existing agrarian structure, characterized by both these cool systematization as illegal.



Figure 5. Regular grid (source: Authors, 2014).

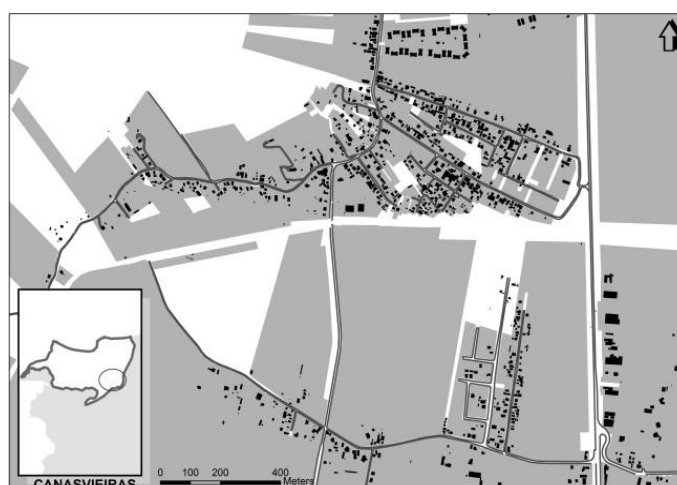


Figure 6. Irregular grid (source: Authors, 2014).

MPFD-Mean patch fractal dimension

Average value of ratio of fractal dimension of the fragments of the class, this metric indicates the complexity of the shape. The index is an indicator of complexity that has a minimum value equal to 1, which represents a fragment to the shape of simple perimeter. Moreover, the index value 2, the greater the complexity of the shape marked by saliencies and re-entrances representing a complex geometry.

The mapping 1977 showed uniformity of content, with a mean of 1.33 (Figure 7 and Table 5). Considering values less than 1.33, was up 37.5% in urban patches with low complexity index, representing an absolute majority of 243 ha (85.55%) of the territory of urban District. Among the characteristics of these areas, had the effect of drawing the regular urban grid, making the relationship form the perimeter and area patches showed up straight.

Above average index, 3 urban areas had higher form complexity, covering only 1% of the total urban area. Are small patches with irregular morphology of the perimeter. See Figure 7 and Table 6.

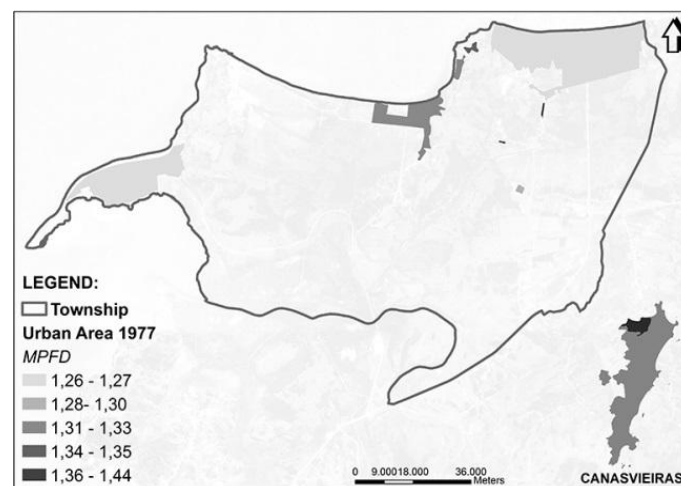


Figure 7. MPFD Urban area 1977 (source: Authors, 2014).

Table 6. MPFD Urban area 1977 (source: Authors, 2014).

Class	Patch	% cumulative	Area (ha)	% area
1,27	2	25,00%	242,18	85,13%
1,30	1	37,50%	1,20	0,42%
1,33	2	62,50%	38,28	13,45%
1,34	1	75,00%	1,93	0,68%
1,44	2	100,00%	0,90	0,32%

With the increased number of patches, as well as the total urban area from 1994, was the overcoming of average complexity index to 1.35 (Table 5 and Figure 8). However 43.48% of the patches had lower average behavior and covering 92% of urbanization. New areas were implemented, along the lines of gridded urban network.

In contrast, patches showed increasing of area and/or joint, getting forms/more jagged areas, reflected in a higher rate of complexity. Although part 13 patches, these total are only 7.7% of

the urban area of the cut (Table 7). Factors related to the growth of subdivisions of agricultural areas, linked to the period of extensive demand for urban land since 1970, which led to heterogeneity of urban mesh, with complex morphology reflected in the composition "fish spine".

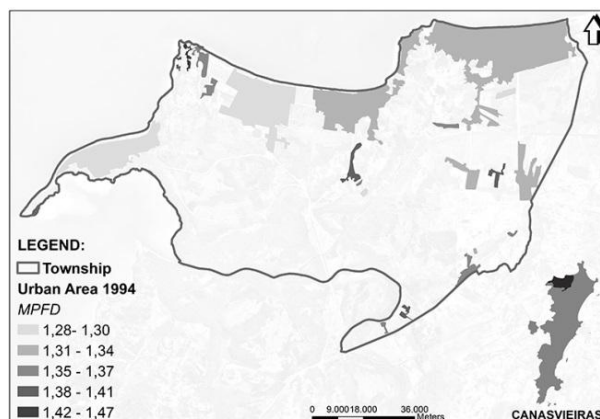


Figure 8. MPFD Urban area 1994 (source: Authors, 2014).

Table 7. MPFD Urban area 1994 (source: Authors, 2014).

Class	Patch	% cumulative	Area (ha)	% area
1,30	4	17,39%	171,83	31,67%
1,34	6	43,48%	328,92	60,62%
1,37	7	73,91%	24,68	4,55%
1,41	4	91,30%	14,22	2,62%
1,47	2	100,00%	2,90	0,53%

Mapping in 2013, there were proportionally to the increase of average complexity index of 1.39, the growing urban fragments, as well as its total area (Table 5 and Figure 9). Over 50% of the fragments were characterized by low complexity of form, related to the increase, as well as the emergence of new urban areas following the regular patterns. Compose accounted for 95.5% of the District (Table 8).

With the conurbation of urban patches, was a reduction of the complexity index thereof, which is clearly noted a urban growth marked by the fill of areas.

Among the areas with increase in complexity index, is one of the larger fragments. Unlike the behavior of other patches where there was the development of urban voids, it went through a urban expansion process of growth coupled with clustered branch. Aspects which contributed to a jagged fractal.

In general, the spatiotemporal analysis diagnosed increased areas accompanied by the appearance of smaller fragments. Thus, in the course of 40 years had as feature the largest display of these fragments relative to the context of its insertion, resulting in contact with other urban areas subsequently, through its fill or merger. It, resulted more symmetrical, coming of a regular pattern of urban mesh. Other fragments with higher rates reflected the development, often, the appearance of new and isolated areas, or with patterns of expansion inform of "branches", kind of arms, the morphology characteristic "fish spine".

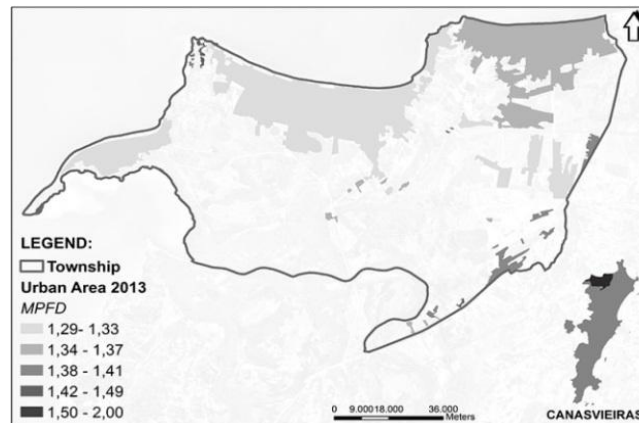


Figure 9. MPFD Urban area 2013 (source: Authors, 2014).

Table 8. MPFD Urban area 2013 (source: Authors, 2014).

Class	Patch	% cumulative	Area	% area
1,33	8	25,00%	470,33	62,42%
1,37	9	53,13%	249,74	33,15%
1,41	10	84,38%	29,58	3,92%
1,49	4	96,88%	3,80	0,50%
2,00	1	100,00%	0,00	0,01%

NNDist- Nearest neighbourhood distance

Average value of the nearest neighbor of the fragments of the class, it was realized that in 1977 had 3 significant urban nuclei distributed in the territory. The urban patch with 164.10 ha, about 57.6% of the total, as well as 34.87 ha and 12.26% of the total urban area is characterized by having in his small fragments adjacent urban areas (Figure 10 and Table 9).

The third representative area, with 27.67% of the total (78.71 ha), proved to be the most isolated, with a distance of almost 3km.

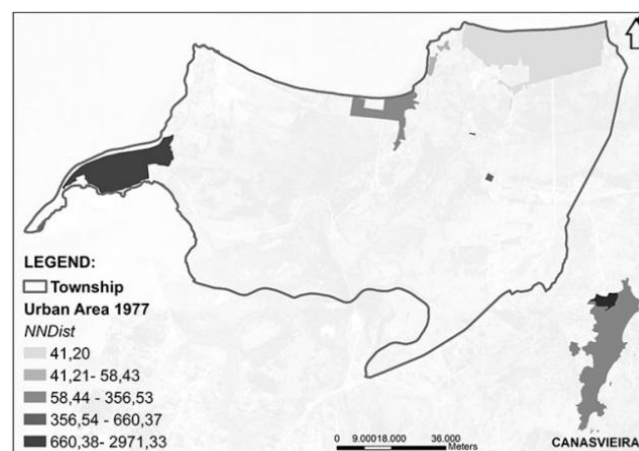


Figure 10. NNDist Urban area 1977 (source: Authors, 2014).

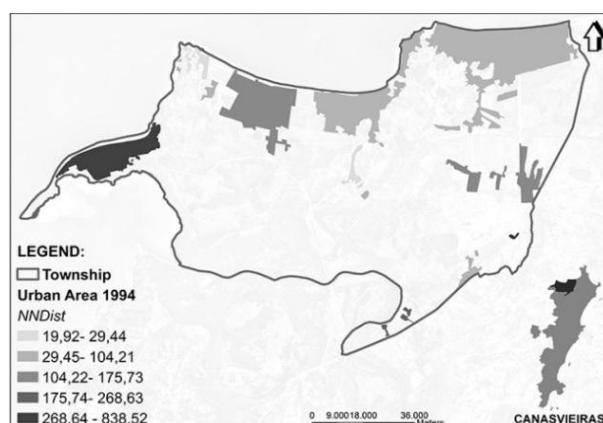
Table 9. NNDist Urban area 1977 (source: Authors, 2014).

Class	Patch	% cumulative	Area(ha)	% area
41,20	2	25,00%	164,10	57,68%
58,43	2	50,00%	5,34	1,88%
356,53	1	62,50%	34,87	12,26%
660,37	2	87,50%	1,47	0,52%
2971,33	1	100,00%	78,71	27,67%

Arising from urban growth, the period of 1994 was marked by a substantial reduction of the distance between urban areas (Figure 11). More than 60%, both in relation to the number of urban nuclei as the total urbanized area were virtually interconnected, since the distances were between 19 and just over 100m (Chart 10).

With the development of a significant new area of representative fragments, there was a substantial proximity, where the greatest distance was under 1 km.

In addition, sets of small areas incorporated, contributing to the reduction of distances.

**Figure 11. NNDist Urban area 1994 (source: Authors, 2014).****Table 10. NNDist Urban area 1994 (source: Authors, 2014).**

Class	Patch	% cumulative	Area(ha)	% area
29,44	4	17,39%	17,37	3,20%
104,21	11	65,22%	314,47	57,96%
175,73	4	82,61%	137,52	25,35%
268,63	2	91,30%	3,69	0,68%
838,52	2	100,00%	69,51	12,81%

Regarding the analysis of 2013, it is predicted that changes have occurred in relation to the differential in categories (Figure 11: NNDist Urban area 1994 and Figure 12).

In the first 4 classes there was an increase of distances, which reflected the processes of joining several fragments and deployment of new more distant urban nuclei throughout the territory (Figure 12).

Already the distance of fifth category remained stable (838.52 km), showing virtually no growth or emergence of new nuclei, demanding a territorial dynamic reduction on west sense of District (Table 11).

From this, analyzing the Table 5, it was realized that the process of urbanization, where there was substantial proximity to urban areas, occurred between 1977 and 1994. Compared to 2013 was maintained almost constant distance, and increased urban areas happened towards a consolidation of existing urban nuclei.

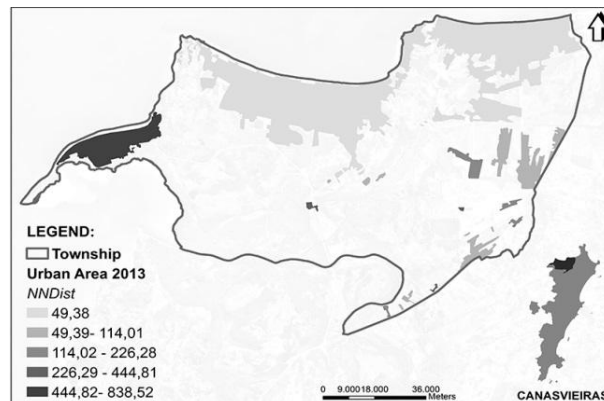


Figure 12. NNDist urban area 2013 (source: Authors, 2014).

Table 11. NNDist urban area 2013(source: Authors, 2014).

Class	Table	% cumulative	Area	% area
49,38	13	40,63%	592,42	78,63%
114,01	11	75,00%	71,85	9,54%
226,28	4	87,50%	17,60	2,34%
444,81	3	96,87%	3,12	0,41%
838,52	1	100,00%	68,47	9,09%

Final discussion

Metrics, when treating about the size, shape, geographical position and typology provided the recognition and realization patterns changes caused by urban growth, allowing to measure the structures, better comprehension and greater accurate of the processes and interactions of city areas over 40 years in Canasvieiras District.

An urban dynamic characterized by rapid expansion, accompanied by the interests and pressures of the real estate and tourism market, which led to the construction of buildings along the land situated on the boardwalk, in order to attract more tourists and people seeking to possess a property on the waterfront. Especially where private capital was responsible for the parceling paper of smallholdings, which were fishermen and farmers, without any organ or policies of inspection.

Thus, the application of metrics in spatiotemporal analysis allowed us to identify and measure how much these processes in economic order, tourist, social and political reflected in the urban morphology of study area.

The elaboration of thematic cartography from the generated database of spatial metrics enabled confront the various stages of urban evolution, identifying the interactions between urban patches and the ways in which patterns and interactions have changed over time.

Thus, the use of spatial metrics in urban studies shows an instrument of evaluation and planning of space, indicating favorable and unfavorable situations, contributing to make strategic decision.

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The urban form of the Inner Port Area in Kesennuma, Miyagi Prefecture, as source of resilience

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Abstract. *Kesennuma City, which is in northern part of the Miyagi Prefecture in Japan, was struck by the Tsunami in March 11th, 2011. The city has an area of 46 square kilometers, and that of 9.6 square kilometers, 20.5% of the area, were flooded. Reconstruction of city center, “Kesennuma Naiwan” area, which is the inner port area in Kesennuma Bay, was making little headway, since stakeholders have focused their arguments on the seawall construction. In fact, they should have more discussion about comprehensive reconstruction, including land-use plan, scenery and townscape, which would give the vibrancy around the waterfront. After two years after the earthquake, they established Community Conference organization comprising city planners and architects, and the recovery program has made by citizens, and progressing towards revival. There are two sources of the power of the resilience is in the urban form of Naiwan area. One is the dynamic urban form structured by townscape updated again and again taking in an advanced architectural design from overseas at every tsunami and conflagration. The other is static urban form, consisting of landscape, the sea and a mountain weave, climate, and scenery. The object of this research is to clarify the urban form that contributes to develop the resilient city, through the study on the contents and the process of making the recovery program of Naiwan area.*

Key Words: Tsunami; Resilience; Seawall; Scenery; Hazardous area

Introduction

The Naiwan, or Inner Port area is the old center of Kesennuma City. The area was marked by a beautiful fishing port, but most of the buildings have been swept away by the tsunami of 11th March, 2011, or their ruins were cleared away afterwards. (see the figure 1²³)

Since the Naiwan area, which encircles an inner bay, is itself closely surrounded by a mountain range that served as a near-by escape from the approaching tsunami, only few lives were lost during the tragedy²⁴. (see the figure 2 and 3)

In the aftermath of the disaster, the reconstruction authorities of Miyagi Prefecture designated a 4 meter-high seawall that would henceforth protect the formerly unprotected Naiwan area from future tsunamis²⁵. Realizing that a close relationship with the sea is the basis of their livelihoods and for community recovery, local residents launched a protest movement.

The local government of Kesennuma City supported the citizens in their effort to establish a Reconstruction Planning Council (hereafter ‘community council’) and to promote a joint, collaborative reconstruction process. However, most of the local residents were against the construction of any seawall. For the first two years after the tsunami, the council wasn’t able to

²³ Created by the author based on the materials ‘Regarding Tsunami Devastation of Major Areas,’ presented at the second Kesennuma City Disaster Reconstruction Conference, on 28th March 2012.

²⁴ Based on the materials ‘Damage Situation of our City after the Great Earthquake,’ presented at the first Kesennuma City Disaster Reconstruction Conference, on 28th March 2012.

²⁵ Based on the document ‘About setting the Heights of Seawalls along the Coast of Miyagi Prefecture’ that was presented in the Miyagi Coastal Local Coordination Meeting on 9th September 2011.

discuss about concrete reconstruction plans, such as revitalizing the local shopping streets or the reconstruction of residences.

In the Reconstruction Promoting Conference, set-up by Kesennuma City, the perception developed that the reconstruction planning had become delayed because of the lingering seawall problem²⁶. At this stage, the residents, who had been opposing the seawall plans of far began to give up and came to think that if the seawall is something that is absolutely necessary for the reconstruction to move on, they must accept it for good or worse.

The citizen leaders of the Reconstruction Planning Council, however, decided to propose a new plan in order to mitigate the impact of the next tsunami without being required to build the proposed, high seawall. They sought to reorganize the planning system, which would now closer reflect the opinions of the citizens²⁷. Institute of Urban and Regional Studies, Waseda University appointed as a specialized agency for the urban design.

As an adviser I have been supporting the Community Council in order to promote citizen-based planning. In this paper I want to discuss the process of reconstruction planning, which I relate to the specific urban form of the Naiwan area as well as to the process of making the recovery program, and I will show how that contributed to the development of a more resilient city.

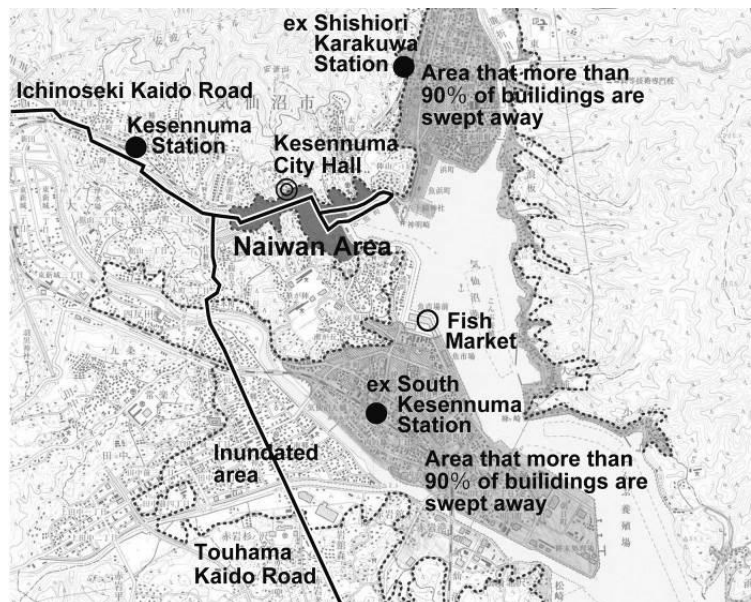


Figure 1. Devastation around Naiwan area by the tsunami of 3.11: Compared to the area around South Kesennuma and Shishiori-Karakuwa station that developed from wide wetlands and paddy fields in the Meiji Era, the tsunami damage was relatively light in the protected Inner Port area, that formed a safe city center and good natural harbor.

²⁶ Based on the materials 'Situation and Issues of the Restoration and Reconstruction Projects, p.10' of the fifth Kesennuma City Disaster Reconstruction Promotion Conference, on 28th March 2013.

²⁷ Based on Abe Toshihiko 'Seawall Problems and Citizen-led Community Development Issue in the Kesennuma Naiwan Area,' in: 'Town Planning Strong Resilience and Large Disaster Mitigation Task Force Report, Architectural Institute of Japan, p. 213-221, 2014.3.30.



Figure 2. Picture of Naiwan area after the tsunami 3.11, maintains the beautiful scenery: The Naiwan area surrounds a small bay and is itself wrapped by hills that rise between 20 to 40 meter above sea level. The mountains in the background are located at the opposite shore of Kesennuma Bay; 1.5km from the mouth of the Inner Port bay. The compact size of the bay with its 350 meter width in east-west direction and 250m width in north-south direction, has contributed to the formation of a coherent, human-scale cityscape that in turn facilitated lively commercial activities.



Figure 3. Harmonious streetscape of the sea and the mountains: Harmonious streetscape along the waterfront road with Mount Anba (left) and Jin'yama (right) in the background. The proximity to these two mountains allowed a quick evacuation of the residents before the tsunami arrived at the Inner Port area on 11th March 2011.

Beginning of the Seawall Issue

Along with other coastal areas in Kesennuma, Miyagi Prefecture decided to build a seawall that would withstand a so-called Level 1 tsunami – a tsunami that is likely to occur in intervals of a decade to 100 years. The municipality of Kesennuma City, on the other hand, has the responsibility for mitigating the impact of a more rare, so-called Level 2 tsunami – one that is comparable to the tsunami of 11th March 2011 and that is likely to happen every several hundred to 1000 years. The City is doing this by preparing evacuation plans and by designating the land that is likely to be flooded as Tsunami Hazard Area. Here residential functions are generally not to be permitted²⁸.

In autumn 2011, in the first recovery plans, a seawall with a height of 6.2 meters above sea level was designated by Miyagi prefecture. A tsunami defense with a height of 6.2 meters would only appear with a visible height of 4.4 meters, since the ground level of the Inner Port area would be raised by 1.8 meters. Since there was no seawall before the tsunami disaster, most people in the Naiwan area objected to these plans.

²⁸ Based on the Tsunami Regional Development Act, enacted 2011.12.14

Tsunami simulations that were carried out for recovery plans in other parts of Kesennuma Bay later led to a changed location of seawalls in the Naiwan area and a height reduction by 1 meter. Although the seawall would be now only 5.2 meters high, the feelings of locals did not change, because the sea was no longer visible from the port area.

For this reason, the deliberations between the Community Council and Miyagi Prefecture were making little headway. However, unless the location and the height of the seawall were not decided, the Tsunami Hazard Area could not be designated either. Furthermore, the placement of roads and parks could also not be decided if the inhabitable areas were not clearly outlined. Furthermore, if Land Readjustment procedures were not to be initiated soon central government subsidies for the reconstruction of residences and shops would expire. Based on the plans of Miyagi Prefecture, the sea and the town would be separated by a high seawall and thus it seemed uncertain if the fishery industry and the tourism sector could be revived in the Naiwan. Worse, neither residences nor stores could be rebuilt in this situation.

Turning point of the Seawall Issue

Two and a half years had passed since the tsunami, when the beginning of deliberations between the Community Council and the governor of Miyagi Prefecture marked a turning point. The governor suggested two possibilities: First, if a breakwater would be placed in the entrance of the bay, the height of the seawalls along the basin of the Inner Port could be lowered. The second option would be a setback of the seawall from the quay, and not to construct any seawalls between the bay and areas without residential functions, such as fishery or tourism facilities. Before these deliberations with the council, the governor had categorically ruled out any changes regarding the location and the height of the seawalls.²⁹

After the governor had shown his readiness to amend plans, the situation changed significantly. So far the people had been opposing the seawall plans, but now they began to change their minds: They realized that if they were to continue their opposition, the revival of the city would not progress and more and more people would turn their backs to the Naiwan area. The council decided therefore to resolve the seawall issue as soon as possible and it offered an own, comprehensive seawall plan to the Miyagi governor.

The core members of the Community Council formed a study group and examined how the prefectural planners had calculated the height of the seawall. They then demanded from the prefecture to re-simulate several alternative plans in which placement and heights of the seawall varied, in order to arrive at a design with the lowest possible visual impact. At first, they developed a proposal in which the seawall was further set back than in the original prefectural plan, and designed the waterfront area in a way that people could enjoy good views of the sea. They also proposed to construct a breakwater at the entrance of the bay, which would allow to lower the seawall height by 1 meter, because of the tsunami-obstructing effect³⁰. As a result of the simulations, they found that the height of the seawall could be reasonably lowered to 3.8 meters, which is 1.4 meters lower than the original height. (see the figure 4)

²⁹ Press conference on 24th December 2013, where the governor of Miyagi announced the possibility of changing the position and height of the seawall in the Inner Port area.

³⁰ See Miyagi Prefecture 'Development Guidelines for Tsunami Evacuation Facilities', p.73-6, March 2012.



Figure 4. Model of off-shore breakwater planned by the Community Council: Model of the Naiwan area with an off-shore breakwater at the mouth of the bay. Apart from studying possible obstructions to shipping, the Council also explored ways of utilising the breakwater as tourist attraction: Its visual appearance could be improved by greenery and an observatory at its tip would allow to spot incoming ships and ferries. The model has been build by the Urban and Regional Research Institute of Waseda University.

The Problem of the Tsunami Hazard Area

Another problem arose from the designation of the Tsunami Hazard Area: Based on a local ordinance of Kesennuma City, even if a place would be inundated by only 1 centimeter in the simulation of a Level 2 tsunami, it would need to be designated as hazardous area,³¹. In the case of rebuilding residences in an area with such designation, this meant that the foundation or the ground level of the house would need to be raised above the simulated inundation level. Also, the provision of welfare facilities in the first floors would not be allowed and the city would not provide any subsidies to people willing to rebuild their houses here. Thus, if the Tsunami Hazard Area expanded there it could mean that the number of people living in the Naiwan area could be greatly reduced.

The seawall height of 3.8 meters that the Community Council proposed achieved both, preserving the view of the sea and protecting the area from a Level 1 tsunami - likely to occur every few decades. However, with this height, the area that was only lightly damaged by the 2011 tsunami would have to be designated as a Tsunami Hazard Area, due to extensive, simulated flooding in the event of a Level 2 tsunami, with all the negative implications. (see the figure 5)

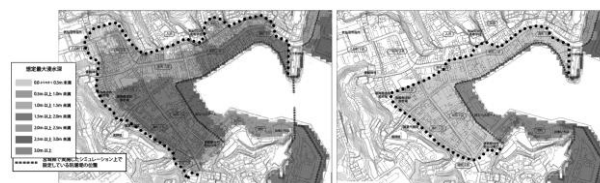


Figure 5. Level1 tsunami simulations for Naiwa area: Tsunami simulations for Naiwan area based on two alternative coastal protections, discussed in the Reconstruction Town Planning Council. A December 2013 simulation (left) showed that in the case of a 3.8 meter high seawall along the port basin, combined with an off-shore breakwater at the bay mouth, wide areas of the adjacent city center would be flooded. Another simulation of February 2014 (right) showed that without an off-shore breakwater and an assumed 5.1 meter high seawall, the level1 tsunami inundation would be significantly less. The inundated, yellow area of the right diagram corresponds to the Tsuanmi Hazard Area that the City designated.

³¹ The area designation has been proclaimed on 9th July 2013, based on the Kesennuma Municipal Ordinance for Disaster Risk Areas.

Settlement of the Seawall Issue

The mayor of Kesennuma City was concerned about the question whether the offshore breakwater could cause harm to the water quality of the inner bay and therefore opposed the idea. Without the breakwater, however, a seawall height of 5.1m would be required. To solve this problem, the Community Council requested to construct a 3.8 meter-high concrete base structure, with an additional 1 meter steel structure at the top that could move up automatically in the event of a tsunami approaching. Even though the costs for such a movable seawall would be comparatively high, the governor of Miyagi Prefecture accepted the proposal by the Community Council, since the Inner Port is the central area of Kesennuma City, and since it plays an important economical and symbolical role; worth to be protected from tsunamis.³²

If the ground level of the area, protected by the seawall would be raised by 1.8 meters, as originally planned, the 4.1 meter-high seawall structure would still appear 2.3 meters high and blocking views from the town to the sea. Thus, the Council proposed to raise the ground level of the protected area to 2.8 meters instead, so that the seawall would only appear 1.3 meters low. More than 3 years after the tsunami disaster, finally, the seawall issue in the Naiwan areas was settled. (see the figure 6)

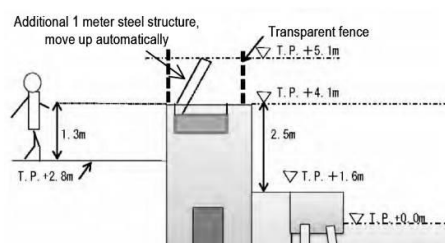


Figure 6. Section of the seawall proposal in March 2013: Section of the seawall proposal that the Reconstruction Town Planning Council submitted to the municipal government of Kesennuma in March 2013. In order to ensure unobstructed views of the sea and still provide for a coastal protection with an overall height of 5.1 meters, the ground level of the urban area behind the seawall could be raised to 2.8 meters while a movable structure at the top of the dike would move up in the event of an approaching tsunami.

Dynamic Urban Form = Resilience

There are many towns and villages where the people are opposing plans of constructing excessively high seawalls, yet in most of these cases, the heights couldn't be reduced. Thus, the construction of seawalls is proceeding without agreement between the citizens and their local governments. Why was it possible to conclude an agreement in the case of the Naiwan area?³³

The most important factor is that although the seawall dispute had started with the debate of pros and cons and with an initial, fundamental opposition, at a later stage the discussion moved forward, beyond mere opposition; towards the issue of exploring what could be an ideal urban form, best able to cater to the lives of future generations in the Naiwan area.

³² Press conference on 14th January 2014, where the governor of Miyagi announced to consider the adoption of a movable seawall around the Inner Port area.

³³ On 14th May 2014 at the commemoration symposium for the 45th Anniversary of the Japan Federation of Bar Association Pollution Control and Environmental Protection Committee, with the title 'Disaster Reconstruction and Sustainability – Beginning to think from the Seawall Problem', a report was presented about the problem of consensus building from the perspective of local residents and experts.

Miyagi Prefecture's stance was originally that "in order to live in Naiwan, we need to construct a seawall to protect the life and property of all residents". Naiwan locals, however, opposed this view: "In order to live in Naiwan, we don't need to construct the seawall. We need to recover our relationship with the sea and preserve the beautiful scenery, in order to foster tourism and regenerate the fishing industry." Thus, before centering a reconstruction discussion on the pros and cons of a seawall, it would have been more helpful to discuss which new urban form would better serve a holistic recovery from the tsunami disaster.

While maintaining its close relationship to the sea and to the surrounding mountains, and while responding to the varied and profound environmental and social changes since the foundation of the city, the Naiwan area has been changing its urban form dynamically and thus it retained its role as the central area of Kesennuma. The members of the Community Council recognized this fact. (see the figure 7)

As an urban designer of Naiwan area, I promoted the design method making consideration of dynamic urban form. The members of the council have discussed about alternative recovery plans during numerous workshops, aided by the use of a 1:200 scale model that we proposed. (see the figure 8) They developed plans for a new urban form along the waterfront that perfectly blended the future townscape with the seawall with our support. (see the figure 9)

In the reconstruction planning process in central Kesennuma the following urban form-related characteristics must be pointed out:

First, it was feared that the citizen's valuation of the waterfront would be lost, if the the seawall were to block the views of the sea from the city. In other words, the concrete form of the embankment would significantly affect the nature of urban form in the Inner Port area. Since the citizens were keenly aware of this, the relationship between the port district and the sea played a central role in the discussions. At first, the mayor of Kesennuma City said that he cannot change the height and placement of the seawalls by changing the national standards. But the citizens' movement changed the mayor's mind. From now on, he will change them based on local peoples' opinion.³⁴

Second, since the land reclamation in Kesennuma port in the early Meiji Period until the 1950s, transformations of the urban form sought to strengthen the relationship between town and sea. However, between the 1960s and the 2011 disaster the new commercial center of gravity has moved away from the sea. In the current earthquake reconstruction plan, thus, great emphasis is put on recreating closer links between town and sea.

The most important point is the main facilities for the locals and tourists will be relocated to the waterfront area where the fish market has been located about sixty years ago.

Third, over time the roads in the Inner Port area have been repeatedly widened in order to adapt them to the needs of the age of motorisation. In order to tap into national reconstruction funds that are only available for a limited menu of narrowly defined reconstruction projects, the local government decided to carry out a land readjustment project in the Naiwan area. This would result in a further, unnecessary widening of roads. The council hotly debated the issue of how to improve these initial plans that could further impair the connections between city and sea. Without reference to the historical urban formation of the area, a central axis was proposed along which tourist attractions and commercial facilities would line up.

The above suggests that the urban form produces a close relationship between town and the sea in the Inner Port district, and it is manifest of a strong resilience.

³⁴ On 14th May 2014 at the commemoration symposium, there was a comment about the seawall by the mayor of Kesennuma City.

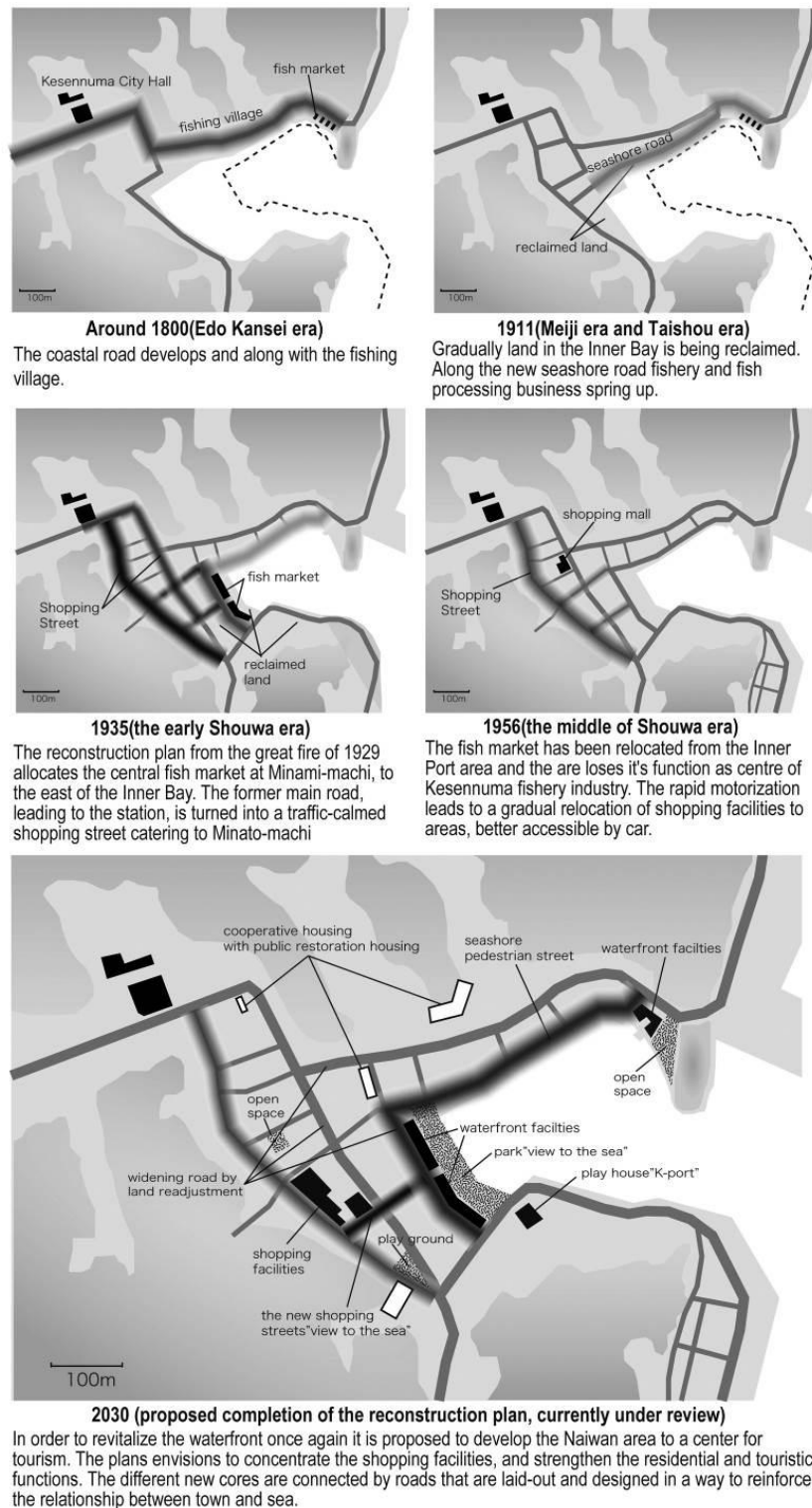


Figure 7. Dynamic Changes of the urban form by the historical development: Historical development of the Naiwan area and central Kesennuma, from the feudal Edo Era (1800), through the late Meiji Era (1911) and early Showa Era (1935) until 1956. These diagrams are based on the analysis of historical maps and photographs by the author. The 2030 diagram is based on the 'Inner Port Area Reconstruction Planning Statement'.

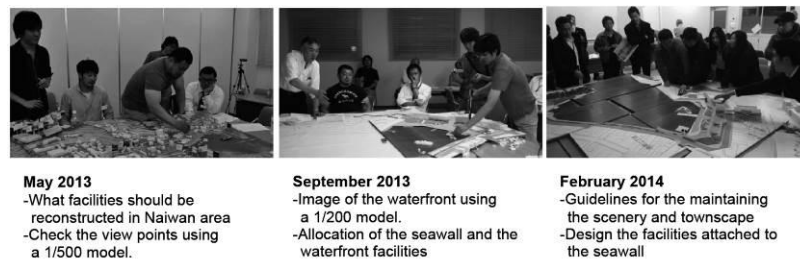


Figure 8. Design workshop process held in the Community Council: Between May 2013 and February 2014 the Naiwan Reconstruction Town Planning Council examined alternative seawall designs in a series of workshops. A 1/200 model helped to visualise the spatial implications of the different plans.

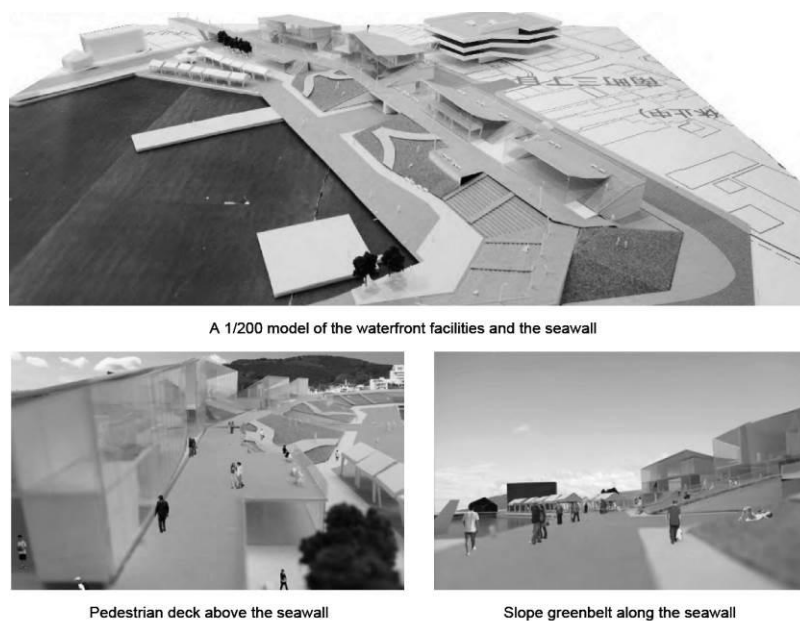


Figure 9. Future image of the waterfront in the Naiwan: Future image of the waterfront area and the seawall as shown in the 'Naiwan Area Reconstruction Planning Statement'. The model has been build by the Urban and Regional Research Institute of Waseda University.

Future Perspectives

We all recognized that we cannot build back the Naiwan area better than before the tsunami disaster; regenerate the fishing industry, tourism, town- and landscape design, as well as improving disaster preparedness by solely relying on the governments strictly earmarked reconstruction projects and funds.

But we also realized that it will be very difficult to implement such a proposal that seeks to harmoniously fuse the seawall with the townscape, and to regenerate a new urban form, only by utilizing public funds.

Now starting from a comprehensive future vision, we are currently examining which parts of the overall recovery project are most urgent, such as the underground drainage system; which parts are eligible to what kind of central government funding sources, and which parts can be

tackled later, after further careful discussion. Through such a strategic approach, they hope to implement the plan incrementally, with every element being part of a holistic strategy.

Many towns of the Tohoku area were already in economic decline before the disaster happened on 11th March 2011 and it is clear that the affected areas cannot recover without reconstruction funds from the national government. Usually, it is the central and local governments that take the initiative in reconstruction planning in a top-down manner, but the case of the Naiwan area in Kesennuma is different. We will surely find the regeneration of a new urban form here soon, which is fostered by the unique, dynamic urban structure that has proven its resilience over history, supported by the strengths of its citizens in the present. (see the figure 10)

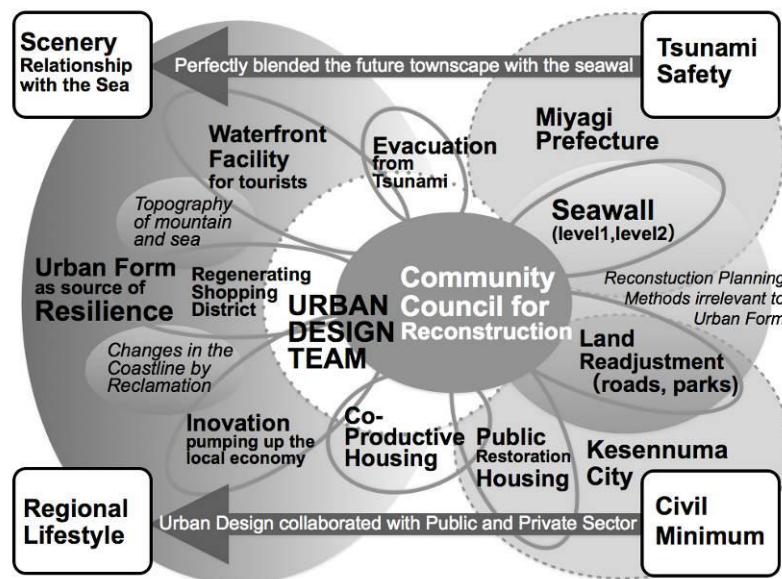


Figure10. Relationship between the urban form and resilience: The public sectors were promoting planning of the seawall and land adjustment for the tsunami safety and the civil minimum. But from April 2013, our urban design team is planning the reconstruction plan with the community council by discussing about the urban form considering the scenery and the regional life styles.

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Air oriented urban form: to develop an Eco-City in the tropical urban area

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Abstract. *The quality of city's living environment spaces has an impact on all aspects of life. It is essential that the spaces we create and improve through the principles of sustainable urban planning will influence how we feel. For the fast expansion of globalization with the unplanned organization of an urban area has affected to develop a city's sustainability within the means of the environments, social and economic foundations. However, those inappropriate approaches of development strategies such as, city's geometric force of density, undefined land-use pattern, different transformation systems and build forms could tremendous change to our urban climatology. Air circulation as one of the most prominent urban principles of urban climate is an effective question for our local and global area where air circulation flows are discontinuing by different level of building form, its height, wrong orientation and building to building buffering spaces. Due to no contact with sunlight, some buildings are obtained cold temperature and during seasonal change it absorbs more cold temperature and increase running expenditure with discomfort living situation. On the other hand, sun orientated surfaces of the build forms are also absorb heat and urban area's temperature extensively space heater than its surrounding rural areas. In this paper we focus on urban build-form orientations, analysis those, its performance and how to reduce solar heat grain through the sustainable indicators of proper air flow circulations to develop an eco-city in the tropical area.*

Key Words: Air circulation, orientation, urban form, eco-city, built environment.

Introduction

Cities are extremely responsive to urban climate unsteadiness and inconstancy and capable to change their own climates (Srivani and Kazunori, 2011). Urban climate is a fundamental issue which not only affects regional and worldwide climates but also have an effect on urban liveability (Grimmond, *et al*, 2010; Huang, *et al*, 2008; Srivani and Kazunori, 2011). It can be modified and enhanced to fulfil the necessity of resident by urban planning ways. The quality of city's living environment spaces are depend on the principles of sustainable urban planning within the means of the environments, social and economic foundations (UDC-1, 2007; Brundtland, 1987; UNCED, 1992). For the fast expansion of globalization with the unplanned urban growth has affected to develop those kinds of city's sustainability.

It is estimated that over 50% (CIA, 2010) of the world's population now lives in cities and urban area. However, these inappropriate approaches of development strategies such as, city's geometric force of density, undefined land-use pattern, different transformation systems and build forms could tremendous change to our urban climatology (Oke, 1988). Furthermore, temperatures are extensively warmer than its neighbouring rural areas. This statement called an urban heat island (UHI) effect where have unprivileged outdoor air quality with weaken ventilation and, which promotes multiple sensitivity to upcoming global changes (Grimmond, *et al*, 2010). From the book of Koenigsberger, *et al*, (1973), where we have found that air temperature in an urban area can be 8 degC higher than in the surrounding rural area and a variation of 11 degC has been reported.

The paper has seven sections, including this introduction. Section 2 discusses on the relationship between urban form and urban climatology with relates eco-city development and

defines. Section 3 highlights few considerations of orientation on build-from pattern. Section 4 discusses the impacts of urban formation throughout air flow. Section 5 offers few conceptual urban formation patterns through sustainable indicators of proper air flow circulation. Section 6 offers a conceptual framework for assessing the air-oriented urban formation of the eco-city. Section 7 presents the paper's conclusions

Eco-city: urban form and urban climatology

Form is difficult to define. Generally, urban form is a combination of characteristics which related to land use patterns, transportation system, and urban design (Handy, 1996). Lynch (1981), defines urban form as "the spatial pattern of the large, inert, permanent physical objects in a city".

In urban design compendium (UDC-2), (2007), shows that urban buildings forms might be modelled for solar access or shade for shelter, exposure to winds depending. Urban form has a key influence on climate change, almost 30 per cent of carbon emissions come from building structures and a further 25 per cent from transport. To succeed in integrating renewable energies in established urban structure, the actual behaviour and the microclimate performance of the urban forms have to be precisely identified. Geometry is a changeable that may be controlled for the preservation of bioclimatic conditions, besides others functional, socioeconomic and symbolic parts of the urban form (Al-Qeeq, 2010).

The manifestation of "sustainable development" as a popular concept (Jabareen, 2004) has revived discussion about the form of cities. To achieve sustainability, this challenge has motivated and encouraged scholars, architects, planners, local and international NGOs, civil societies, and governments to search for new frameworks of urban form by the study of various parameters of urban climate modelling and integrate them into planning and design efforts (Nyuk, *et al*, 2011). Moreover, there is no universal concept that allows us to evaluate these approaches, planning schemes, and common policies (Jabareen, 2006). Therefore the incorporation of basic knowledge of urban climatology in the urban planning procedure has become more vital. From Jabareen, (2006), The Eco-city concept has a new definition for sustainable development in urbanization.

The Eco-city

An eco-city is an ecologically healthy city, designed with consideration of ecological impact, inhabited by people dedicated to minimization of required inputs of energy, water and food, and waste output of heat, air pollution - CO₂, methane, and water pollution (Register, 1987; Novotny, *et al*, 2010). Greening and passive solar designs are the unique concepts of the eco-city. There are others that highlight the perceptions of greening and passive energy design, among them the Environmental City, Green City, Sustainable City (Girardet, 1999; Nijkamp and Perrels, 1994; Gibbs, Longhurst and Braithwaite, 1998), Eco-City (Roseland, 1997; Engwicht, 1992), Ecological City (OECD, 1995), Sustainable Urban Living (Girardet, 1992).

Basis of orientation on urban form

The unique concepts of building form orientation are might be respect its context and climate with few different point of views, like as, (1) optimize sun orientation reduce solar heat gain (Givoni, 1969; Koenigsberger, *et al*, 1973; Prasad, 2014), (2) air flow direction (Givoni, 1994; Koenigsberger, *et al*, 1973; UDC-1, 2007; Prasad, 2014) (3) site geometry (Simonds, 1961; UDC-1, 2007) (4) street layout (Shishegar, 2013; UDC-1, 2007; Bentley, *et al*, 1985; CABE, 2000) (5) Scenic view/vistas (Simonds, 1961; UDC-1, 2007) (6) Legibility layout (UDC-1, 2007; Bentley *et al*, 1985).

In the tropical climate, Building orientation is a major design consideration, mainly with consider to solar radiation and wind (Al-Tamimi, *et al*, 2011, Prasad, 2014). Whereas every morning and evening, sun directly radiate on east and west facade of build form, while north façade faces sun radiation throughout May, June July and August, and south façade faces it throughout November, December, January and February. Therefore in tropical area, building orientation mainly should be seriously considered not only with solar radiation but wind direction also (Al-Tamimi *et al*, 2011; Bentley *et al*, 1985). Givoni, (1994), also reported that the building orientation may be affected by the provision of efficient cross ventilation under the local wind direction which is key factor in tropical areas.

Impacts of urban forming on air flow circulation

Air flow circulation as one of the most important urban principles of urban climate is a valuable issue for our local and global region. For the different level of building form, its height, wrong orientation and building to building buffering spaces, air circulation does not flows frequently and uninterruptedly (Al-Qeeq, 2010).

It has been proved that the urban layout, the geometry and orientation of the street canyon affect the climate of the outdoor and indoor environments, solar access inside and outside the buildings, the permeability to airflow for urban ventilation, as well as the potential for cooling of the whole urban system (Ali-Toudert and Mayer, 2006). The urban layout influences the climate of the neighbourhood and that can even adjust it to improve the thermal comfort situations both outside and inside build form (Al-Qeeq, 2010; Al-Sallal and Al-Rais, 2012). It seems noticeable that street geometry as an urban design tool is more important in improving urban climate which allow to welcoming air flow than other factors of urban environments (Johansson, 2006; Shishegar, 2013).

Usually in towns, when winds face the number and range of obstacles they are flowed moderately (Al-Qeeq, 2010; Jabareen, 2006; Shishegar, 2013). However, some forms of urban structures such as long straight avenues or multi-storey buildings can source for significant air movement. As the air is brought down from high levels, high buildings increasing above low-rise building can generate strong turbulent wind conditions on the ground (Priyadarsini and Wong, 2005; Chan, *et al*, 2001; Al-Qeeq, 2010; Koenigsberger, *et al*, 1973).

Compactness is the method of minimising the amount of building facade exposed to the direct radiation of the sun. Therefore, the compact city consumes a small amount of air circulation for cooling building inner wall or outer façade (Jabareen, 2006; Al-Qeeq, 2010). Improperly selected and sited vegetation can change wind flow direction and provide discomfort living environment for both buildings and people (Al-Qeeq, 2010; UDG, 2006; Al-Tamimi, *et al*, 2011; Bentley, *et al*, 1985; UDC-1 & 2, 2007).

Sustainable indicators and applications for air oriented urban form

Climate responsive arrangement of buildings is important for the comfort and energy saving implications for its users; furthermore, it helps to preserve valuable resources in our planet (Roche and Liggett, 2001). Givoni, (1994), reported that Air movements inside a building depend not only on external wind velocity, but also largely on the architectural parameters. There are generally three techniques that are the use of shadow and air breeze, water elements, and the minimization of the impact of solar radiation which promoting the liability and comfort of human settlements (Al-Qeeq, 2010).

The sustainable indicators would not only be implemented all at once, but also faced difficult to uniformly implement throughout the city. New development areas should be designed to follow the guidelines, but old, built-up areas should be considered to improvement when opportunities arise from urban revitalization (UDG, 2006). Maximising the amount of space to

be naturally ventilated is one of the fundamental strategies towards reducing energy. The first step in minimising solar heat gains is to optimise the orientation and massing of a project specific to its location. Therefore, Establishing and understanding prevailing wind directions and how they work on specific urban area throughout the year will affect massing and orientation decisions.

Key indicators

To good natural ventilation of an urban area depends on the macro-environment. From Urban Design Compendium 1 & 2, (2007); Jabareen, (2006); Givoni, (1969, 1994); Koenigsberger, *et al.*, (1973); Prasad, (2014); Simonds, (1961); UDG, (2006) and Al-Qeeq, (2010), we have discovered various sustainable indicators and review again to implement those in tropical urban area with How to develop the Eco-city.

- site geometry for urban formation: to avoid elongated and linear site geometry which could possible outcome in single-aspect and wall effect, urban site should be separated for conducive to wind movements (Figure 1);

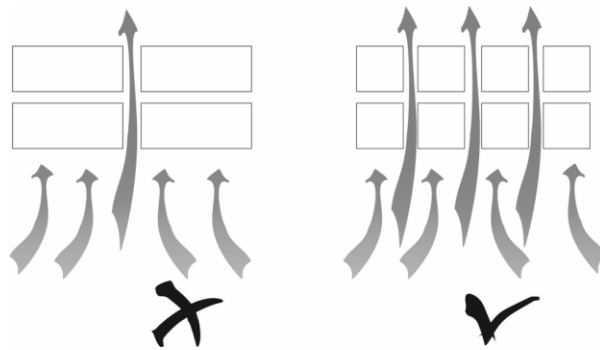


Figure 1. Site Geometry to allow more air flow.

- breezeways/air paths: to enhanced urban air ventilation in tropical dense area, breezeways should be created in forms of major open ways interconnected with major roads, inter-linked open spaces, amenity areas, building setbacks space and low-rise building corridors, through the high-density and tall urban form. They should be connected with mainly the prevailing wind direction routes, and as far as possible, to also preserve and funnel other natural air flows;

- street orientation, pattern and widening: an arrangement of main streets should be allied in parallel, or up to 30 degrees to the prevailing wind path, in order to take advantage of the penetration of prevailing wind through an urban area (Figure 2);

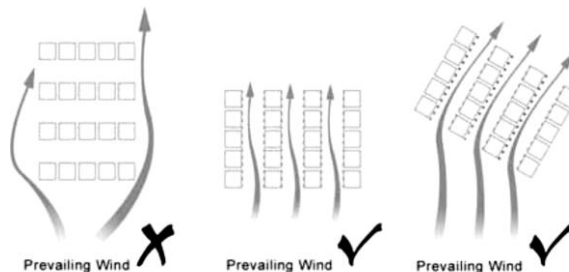


Figure 2. Orientation of street grids.

- the length of street gridiron at right angles to the prevailing wind direction should be as shorter as possible with a view to minimizing sluggish zones while maximizing breezeways across the urban area (Figure 3);

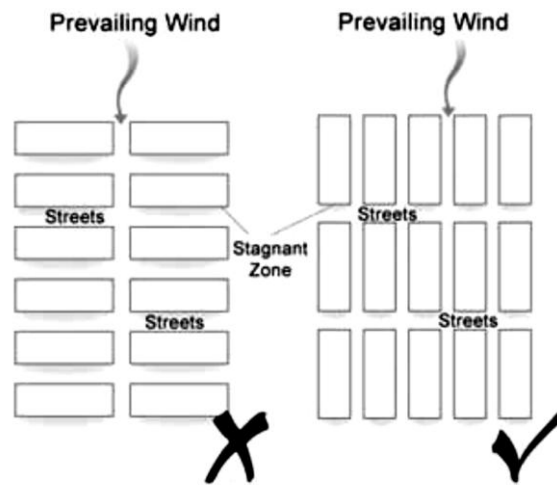


Figure 3. Pattern of street grids.

- to progress the air ventilation in the urban areas, the extending of streets along the prevailing wind direction is considered of high efficiency. (Figure 4);



Figure 4. Street widening/building setback.

- waterfront sites: waterfront sites are the gateways of sea breezes and land breezes due to the sea cooling and sun warming effects. To avoid blockage of sea breezes and prevailing winds, particular concerns should be given beside the waterfront like as appropriate scale, height and decentralised within high-density neighbourhoods (Figure 5);

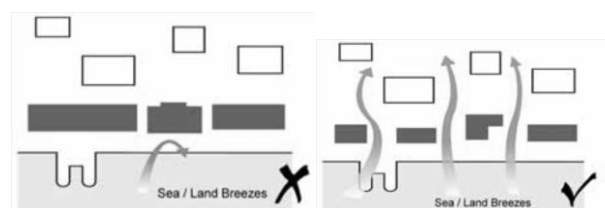


Figure 5. Waterfront buildings should avoid wind blockage.

- height profile and form: a changing height profile with strategic nature of low-rise and tall build forms in the dense urban environment can help to prompt wind flow throughout the city; In generally, gradation of building heights an urban area would help wind deflection and avoid air stagnation to promote air movements. (Figure 6);

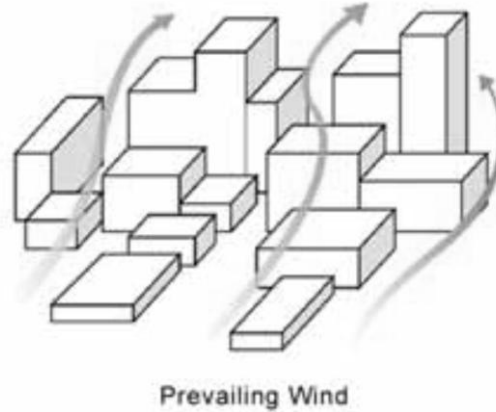


Figure 6. Varying height profile to promote air movements.

- congestion of high buildings forming a lofty wall-like arrangement should be avoided to the front of the prevailing wind or along the waterfront;
- tall buildings in a neighbourhood should be arranged in such a way as favourably block the wind;
- Stepping building height conception can assist optimise the wind capturing potential of development itself (Figure 7);

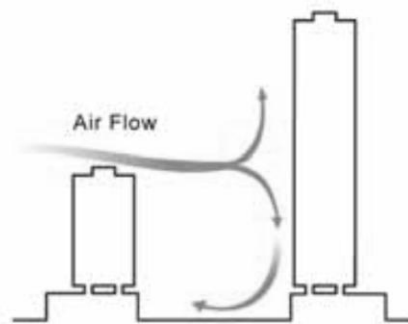


Figure 7. Stepping height profile to divert winds to lower levels.

- built forms that would generate a small eddy area to allow a highest of cooling air to flow around and throughout the build forms should be considered in tropical area (Figure 8);



Figure 8. Creating eddies that also result in building heat loss.

- stagger buildings;
- the arrangement of the building blocks should be staggered such that the build forms behind are able to receive the wind penetrating throughout the gaps between the build forms in the front line (Figure 9);

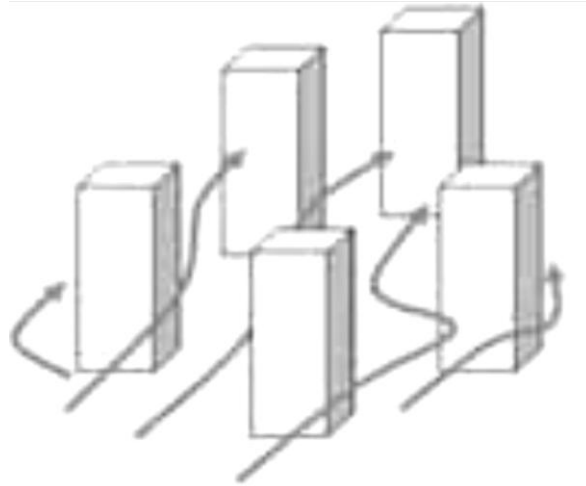


Figure 9. Staggered arrangement of build forms with sufficient spacing between forms.

- the adequately wide gaps should be provided between building blocks for enhancing air permeability and that should be at a face perpendicular to the prevailing wind (Figure 10);

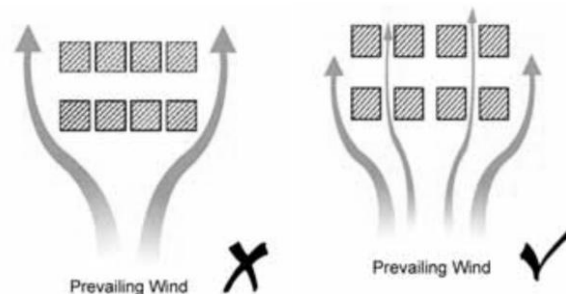


Figure 10. Gaps between building blocks to enhance air permeability.

- podium structure;
- to enhance air quality of the pedestrian environment and improving comfort on street levels and impeding air movement, compact integrated development and podium structures with full or huge ground covered area on wide sites should be avoided where practicable. The following measures should be applied at the street level in the existing urban areas: providing setback parallel toward the prevailing wind; selecting non-building areas for part of large land parcels; creating voids in building facades facing wind path; reducing site coverage area of the podium to allow more open space at grade (Figure 11);

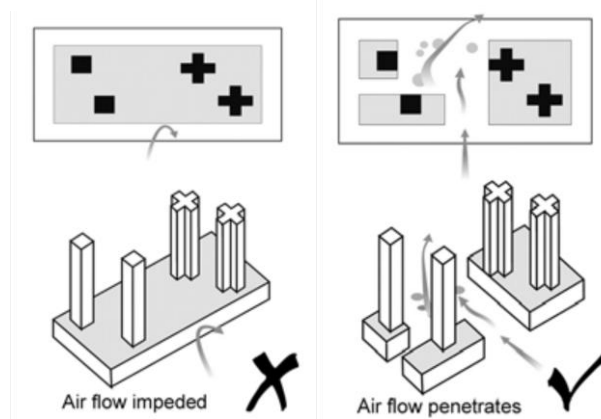


Figure 11. Reducing site coverage area of the podium to allow more open space at grade.

- where suitable, a terraced podium design should be adopted to direct downward airflow to the pedestrian level (Figure 12);

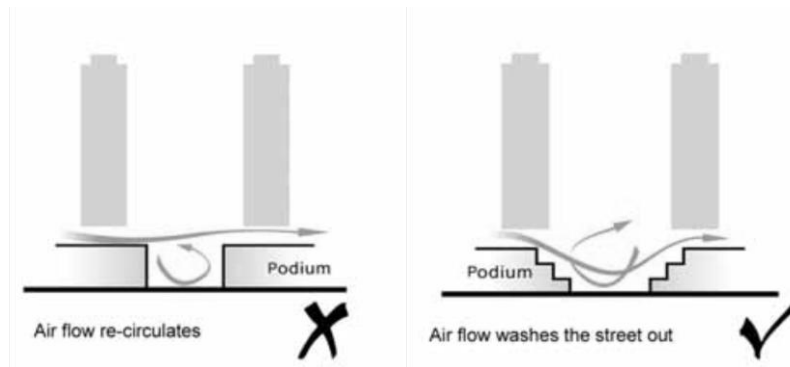


Figure 12. Terraced podium design.

- downwash wind;
- to reach the street level and to ventilate streets and allow air movement into buildings, Building design should consider capturing the downwash wind (figure 13);



Figure 13. Building geometry and layout to allow downwash wind.

- where appropriate, towers should adjoin the podium edge that faces the main pedestrian area or street perpendicular to the wind direction so as to enable most of the downwash wind to reach the street level (Figure 14);

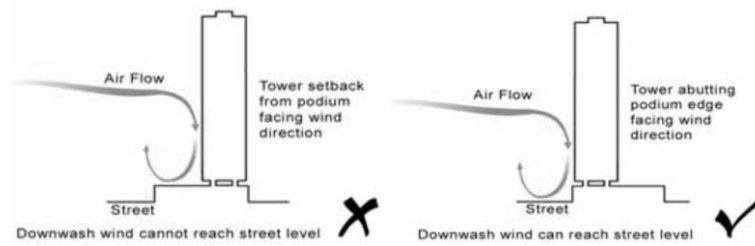


Figure 14. Towers placed to enable downwash wind to reach street level.

- building permeability;
- the provision for higher permeability of building masses can be achieved by creating gaps between building blocks, between the podium and the building blocks built atop (i.e. a void podium deck) and within building blocks at various levels (Figure 15);

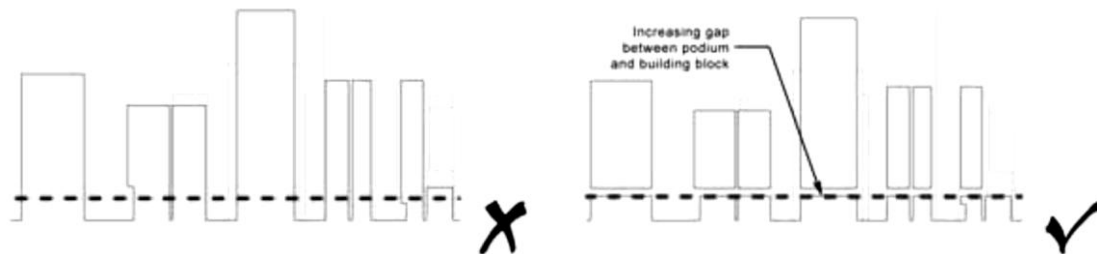


Figure 15. Gaps between the podium and building blocks to enhance air permeability.

- buildings should be as permeable as possible to channel airflow to the blocks in the back row (Figure 16). Sky gardens and double volume void decks can increase the permeability of blocks;

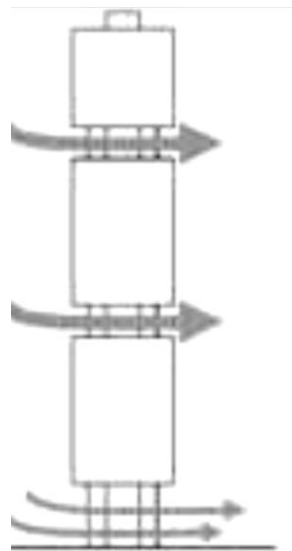


Figure 16. Sky gardens and void decks increase permeability of block.

Assessment of air-oriented urban formation to the Eco-city

Jabareen (2006) provided a thematic typology of literature from the sustainable development and environmental planning fields and recommended that urban sustainable development has conventionally been addressed at different spatial stages. He suggested the possibility of comparing the performance of typical sustainable forms on the basis of design concept criteria related with urban sustainability (see below Table 1).

Table 1. Sustainable urban form matrix: assessing the sustainability of urban form

<i>Design Concepts (Criteria)</i>	<i>Neotraditional Development</i>	<i>Compact City</i>	<i>Urban Containment</i>	<i>Eco-City</i>
Density	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Diversity	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Mixed land use	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Compactness	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Sustainable transportation	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Passive solar design	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Greening— Ecological design	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Total score	15 points	17 points	12 points	16 points

Note: Scores of the urban forms are highlighted in bold.

Source: Jabareen (2006).

The sustainable urban form matrix in Table 1 provides an assessment of the sustainability of the different urban forms. Significantly, this is a tentative consideration that is based on the literature review of the forms and not on experiential findings or field work (Jabareen, 2006). As shown in Table 1, the scores of the urban forms are highlighted in bold in each cell of the matrix (1, 2 or 3), and the final score for each form is the sum of these scores that is presented at the bottom. The results of the assessment, in Table 1, show that the compact city received the highest score followed by the eco-city and then by the neotraditional development, after that the urban containment received the lowest score (Jabareen, 2006).

It is clear from Jabareen's table, for example, that possible conflicts exist between compactness and passive solar design, because the higher densities linked with compactness would increase shading, in that way reducing solar access and no presence of air flow design. There would also be exchanges between compactness and ecological design, with higher densities impinging on green space aspects.

For the purposes of summary and analysis, we could well add a new row with same columns where indicate by previous three points (see below table 2).

From New matrix of Urban Form, the Grand Total scores for each form is the sum of with those previous scores that is presented at the bottom. The results of the assessment, in Table 2, show that the eco-city has received the highest score than both of the compact city and the neotraditional development. The urban containment received the lowest score here also.

Table 2. Sustainable urban form matrix: assessing the sustainability of urban form with additional criteria

<i>Design Concepts (Criteria)</i>	<i>Neotraditional Development</i>	<i>Compact City</i>	<i>Urban Containment</i>	<i>Eco-City</i>
Air oriented form design	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Grand Total score (Summation with previous total points of Table 1)	18 points	18 points	14 points	19 points

Note: Scores of the urban forms are highlighted in bold.

Conclusion

In practical situation of, many local authorities, governments, architects, planning consultants, landscape architects, and so on are grappling much further specifically with aspects of sustainable urban form through a variety of planning and design approaches and policies. The question is which urban form is the most sustainable and environmentally sound for the tropical urban area?

This study identifies the ideal indication of urban formation in the tropical area. To create an Eco-city with sustainable built environment in the tropical urban area, due considerations should be given to urban design concepts and ideologies in the planning and development procedure. Our tropical urban area therefore basically needs more breezy air flows for thermal relief and comfort in the built environment. To improved and long-term development of the wind environment in our city, it is so important to optimise urban design for more wind penetration, particularly to the public realm that urban form would be faced to air oriented.

According to the sustainable urban form matrix and key indicators of sustainable air flow circulation, this study concludes that air oriented urban form contributes to develop an Eco-city in the tropical urban area, where the Eco-city has accumulated urban greening, sustainable transportation system and passive solar design with highly concern of build form orientation to allow maximum air flow.

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Territorial and urban form regulation: from Garden-City to Low Carbon City

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Abstract. *The control of atmospheric emissions is a question of urban planning at least since the end of the XIX century, when the industrial revolution started to disturb the urban environment (Tarr, 2002). "Our Common Future" (WCED, 1987) challenges brought this environmental concern back to urban research demanding for ecological urban form regulation methods, in particular to control the increase of energy demand and Greenhouse Gases emissions (Nijkamp, 1999). Analysing the concepts of Smokeless Cities and of Low Carbon Cities this article investigates the ecological purposes of territorial and urban form regulation methods, in two different moments: First, it analyses Smokeless Garden-City, proposed by Ebenezer Howard in the aim of social economy (Howard, 1949); secondly, it analyses Low Carbon City following "Our Common Future" (WCED, 1987) and "Prosperity without growth" (Jackson, 2009) using academic research in the aim of market economy (Cuchí, 2009; Mourão, 2012). The comparison of these two concepts shows that Smokeless Garden Cities and Low Carbon Cities depend not only on urban form but also on territorial form. Furthermore, it shows that, while territorial and urban form was possible to regulate by social economy zoning; on the globalized market economy such regulation requires accounting and integrating environmental costs on urbanism.*

Key Words: *Territorial Form, Urban Form; Garden City, Low Carbon Cities, Ecological Economics.*

Introduction

Several authors wrote about Ebenezer Howard's *Garden-City* (1898) and ecological urbanization, looking back more than one hundred years ago, on a perspective either of valuating this urban project or of criticizing it. If some found on this proposal a powerful territorial project to control urban growth (Hall, 1998; Peña, 1998), other saw (in particular due to the asylums segregated from urban areas) an eugenic utopia, even comparable to the Third Reich (Voigt, 1989). However, references to *Garden-City* as a model to which is worth to return are more common than the opposite ones.

Furthermore, *Garden-City* contents relating ecological purposes of planning, raised later on by authors as Ian McHarg (1971), are of particular interest for the discussion on methods for controlling environmental impacts of urban growth, as for challenges of "Our Common Future" ideology (WCED, 1987) and Climate Change (Stern, 2007). On another hand, this proposal contributed for the generalization of zoning procedures in urban planning, widely questioned by more recent planners (Mancuso, 1980).

Among urbanization environmental impacts, consumption of non renewable energy and resulting Greenhouse Gases emissions (e.g. Carbon Dioxide), are impacts which regulation is of particular relevance, since it can mitigate a global ecological risk (the rupture of the carbon cycle and global warming, among other crossed effects) and it can contribute to achieve prosperity *decoupled* from fossil fuels consumption (Jackson, 2009). However, to reduce this impact through urbanism practice, in particular in Southern Europe, has still not produced visible effects, probably due to the complexity of the globalized market economy and the weakness of local power. Looking backwards on time can bring us some inspiration for the research on this problem.

Smokeless city, an ecological purpose of urban form regulation at social economy

Ebenezer Howard's *Garden-City* proposal appears at the context of the agriculture crisis which affected England at the end of the XIX century (Hall, 1998). In face of this crisis Howard wanted to organize spatially the new industrial life, while countering the declining rural life. *Garden-City* proposal aimed, in first place, to return people to the country and rural life, and secondly, to conciliate social, industrial and rural development, at short and long term. Thus, it aimed not only to solve the urban problem of then, but also the agrarian problem, responding to the intents of several agrarian reformers of the time, which were concerned with the intense rural exodus in Europe (Peña, 1998).

"To-morrow, a peaceful path for social reform", first published on 1898 by the author, stands on a model of redistribution of population, employment and wealth, all trough the territory: *"there is a broad path open, through a creation of new forms, to a new industrial system in which (...) the distribution of the wealth will take place on a more equitable basis"* (Howard, 1949: 130). Thus, the will of integrating urban and rural life through territorial and urban form regulation, stands at the basis of *Garden-City*, together with the idea that the country could be so attractive as the city, and that these two realities could work as one: *"neither the town magnet nor the country magnet represents the full plan and purpose of nature. (...) town and country must be married, and out of this joyous union will spring a new hope, a new life, a new civilization"* (Idem: 48).

However, the urban revolution was showing the opposite tendency, and all over Europe people were leaving the country life in search of a better life and opportunities, flowing into the cities, congesting and contaminating the urban environment and rising the price of land, confirming Howards' assumption: *"perhaps no difference between town and country is more noticeable than the difference in the rent charges for the use of the soil (...) this enormous difference of rental value is of course almost entirely due to the presence in the one case and the absence in the other of a large population"* (Howard, 1949: 58-59). Population pressure over cities was causing several social and environmental problems and unqualified urban form development, specially visible on suburbanization, that Howard considered a way to the elimination of citizenship and solidarity (Peña, 1998).

Howard proposal of social reform was also directed to two main environmental problems of the industrial city: spatial congestion (urban form densification and degradation, i.e. *slums*) and environmental contamination (concentration of atmospheric pollution, i.e. *smoke*). To eliminate such problems rooted on the industrial city, he proposes a polycentric conurbation served by railways and water channels, where the non-built space is dedicated to agriculture and forest, while the built space remains contained in each urban settlement, ruled by rather high urban densities for that times: the central city has 58000 inhabitants on 12000 acres and satellite cities have 32000 inhabitants in 9000 acres (Figure 1). In average, *Garden-City* globally would have a density of around 900 inhabitants/km², a near value from the density of the metropolitan area of Lisbon in 2001 (850 inhabitants/km²).

Howard envisioned a dense urban form with few open spaces in its interior areas, compensated by the green belt of open spaces surrounding and filling the interior of the polycentric urban system: *"this principle of always preserving a belt of country around our cities would be ever kept on mind till, in course of time, we should have a cluster of cities"* (Howard, 1949: 142).

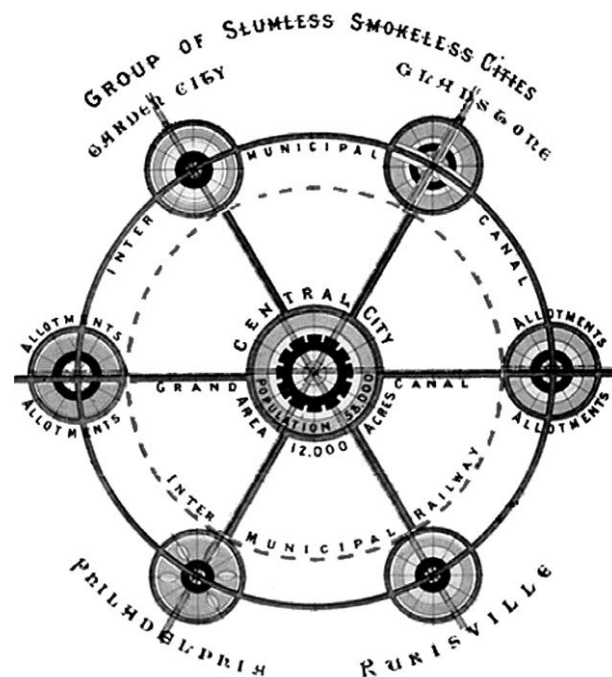


Figure 1. *Garden-City* represented as a *Group of Slumless and Smokeless Cities* (Source: Author, 2014, adapted from Howard, 1998).

The symbiosis between country and city is based on a spatial distribution of population, and on general principles about urban and territorial form: densities were ruling urban form (although the options of the built form were not defined) while the spatial balance between built space and open space was regulating territorial form (Figure 1).

This model would be only feasible with cooperative land ownership, being this cooperative responsible by the process of territorial and urban form regulation, while assuring that the *Garden-City* surplus would be used to the benefit of the cities infrastructures. Land cooperative ownership concept beneath such spatial model is discussed on the literature about social cities (Peña, 1998; F. J. Osborn in Howard, 1949; Hall, 1998), however territorial and urban form regulation method beneath *Garden-City* and its several ecological purposes are not so frequently approached. Indeed, the balance between built and open space, favourable to the built space at the urban scale (of the city) and favourable to the open space at the territorial scale (of the group of cities), was the base of *Garden-City* urban and territorial form regulation.

Howard proposal would, in theory, mitigate urban congestion and slums degradation through population distribution and regulation of settlement density, together with the safeguard of the structure of open and green spaces. These measures would also reduce environmental contamination problems, as smoke or waste, since that the right distribution of the urban form and its economical functions would minimize the conflict among different activities. Such environmental problems would be also mitigated by green space and by the location of industries, near the channels and railways, as also by the efficient non-polluting transport of people: “on the outer ring of the town are factories, warehouses, markets, coal yards, timber yards, etc., all fronting on the circle railway, which encompass the whole town, and which has sidings connecting it with a main line of railway which passes through the estate. This arrangement enables goods to be loaded direct into trucks (...) and so sent by railway to distant markets” (Howard, 1949: 55).

Territorial and urban form would follow the functions purposed, and therefore “urban form” expression does not appear on Howard text, while it is seen as a consequence of the town-country model. *Garden Cities* urban form, at the city scale, could be variable in each settlement

of the model, ever since accomplishing the rules of density and open space. Such variations are visible in figure 1, where each satellite city presents different urban forms.

Thus, the territorial and urban form regulation method of *Garden-City* derived from land use planning, managing territory and land as a “collective resource” and expecting that decisions on urban form, taken by the cooperative administration, would give priority to public interests, safeguarding the collective resources as non polluted soil, air and water.

Garden-City included ecological purposes addressing air pollution, but also addressing waste. Waste would be returned to the productive soil, near urban land, in order to fertilize it, to recover nutrients and to assure urban health: “*the combination of town and country in not only healthful, but economic (...) the waste products of the town could, and this without heavy charges for railway transport or other expensive agencies, be readily brought back to the soil, thus increasingly fertility.*” (Howard, 1949: 61-62)

Garden-City addressed also the energy problem: it would be supplied by electricity produced outside from the urban settlements and smoke, as waste, would be removed - or delocalized - from the urban environment: “*the smoke fiend is kept well within bounds in Garden City; for all machinery is driven by electric energy, with the result that the cost of electricity for lighting and other purposes is greatly reduced. (...) the refuse of the town is utilized on the agricultural portions of the estate*” (Idem: 55). Thus, in theory, smoke and waste would dissipate while bringing the country into the city.

In *Garden-City* the role of the free interstitial spaces between the satellite cities and the central city was larger than the one of a classic “*green belt*” around the city centre with hygienic purposes. These spaces were agricultural and ecological production units, crossed by railways and water channels, that would supply urban centres and would safeguard self-sufficiency by providing food, materials, fuels and ecological services (clean air, clean water). Therefore, urban growth would occur in proportion to the load capacity of the *hinterland* which was part of *Garden-City*. And, thus, urban *ecological footprint* would be compensated by land and ecosystem services performed at the multifunctional green belt of open spaces.

The reality of *slum and smoke full* industrial cities of then was even seen as reversible by Howard (Howard, 1949: 117). While Paris, Berlin, Glasgow or Vienna suffered radical interventions to clean the city with the opening of boulevards, green rings and the demolition of unhealthy slums, Howard argued that to develop *Garden Cities* would solve the problem of congestion and unhealthy environments, not only within the new cities, but also in London, while delocalizing inhabitants and relieving its pressure over the capital. However, the experiences of implementation of the model showed that, instead of relieving London it from social and environmental pressures, *Garden Cities* became green suburbs (Peña, 1998; Hall, 1998) with high mobility costs, hidden by the success of the new fascinating automobiles at the emergent *Fordist* times.

The role of ecological ideology on urban planning then and now

Howard achieved in the early XX century to propose a new ideology about land owning and land use planning with ecological purposes, in particular on what concerns to atmospheric emissions (smoke). However, today, more than one century after *Garden-City* proposal being first published, non polluted air in cities got much scarcer, and *Ecological Cities* are, on the globalized condition of nowadays, harder to idealize and concretize.

The role of ecological balance, renewal of air and water, which Howard attributed to the belt of agricultural and ecological open spaces today is not assured. To promote such open spaces ecological functions demands a high social control against illegal urbanization and environmental contamination, with high costs at a global scale.

On another hand, the ecological performance of such open spaces, in particular on what concerns to agriculture, is not always beneficial in several parts of the Globe, while economical

activity develops with very few ecological constraints, disrespecting the load capacity of the regions.

Howard's work shows that ecological purposes of land use planning are an ideological question, since the territorial and urban form regulation method of *Garden-City* was only feasible in the context of cooperative land management.

In the XX century ideology on ecology and sustainability was widely spread by "*Our Common Future*" report (WCED, 1987) and its inherent concept of sustainable development. Through this report, some of Howard aims became recognized at global scale in the end of the XX century, and on its sequence others, as climate change, were added (Stern, 2007). However, ecological ideology is still rarely transferred to land use planning and urbanism theory, on the contrary of what occurred with *Garden Cities* during the *Pre-Fordism* times.

Indeed, a planning method relating territorial form to ecological performance of cities facing automobiles, only appeared more than 50 years after, on the work of Ian McHarg (1971). Such research is still in course, leading us to a recent proposal on ecological urbanism, with variable meanings all over the world, known as *Low Carbon Cities* or also as *Low Carbon Urban Metabolism*.

Low Carbon Cities, a path to restrict urban energy demand at market economy

Recent research on urbanism identifies the study of the energy-carbon flow (among other flows of the social metabolism) as a relevant field of research to achieve a more ecological territorial and urban form, mitigating climate change since Carbon Dioxide is the principal Greenhouse Gas (Stern, 2007; Camagni, 2002; Newmann, 2006). *Low Carbon Cities* are understood as urban systems which demand few fossil fuels and produce few carbon emissions. However, *Low Carbon Cities*, as all contemporary cities, depend on globalized markets and, therefore, require an integration in a *Low Carbon World*.

The same has happened with *Garden Cities*: its reproduction and generalization would also had demand a *Garden-World*, where densities and open belts would be respected on the long term, all over the world. Thus, the real challenge of *Low Carbon Cities* is the one of a *Low Carbon Economy*, and such challenge requires a strong global ideological endorsement. "*Our Common Future*" report could had been the motor of such ideological endorsement, as *Ecological Economics*, which arose during the 70's of the XX century and inspired planners and an ecological planning method called "*Design with nature*" (McHarg, 1971).

Under *Ecological Economics* the limitation of entropy, and the consideration of environmental costs on the evaluation of urban development scenarios, became key purposes for a more ecological economy. *Low Carbon Cities* give shape to such purposes, conceiving spatial scenarios of low fossil fuels consumption, envisioning an expected future either of scarcity or of full internalization of environmental and climate change costs. But while such future is not recognized as reality, few *Low Carbon Cities* turn reality.

Also only two *Garden Cities* were created in reality, while its model inspired land use planning and urban form theory and practice all over the Occident. The same seems to occur with the concept of *Low Carbon Cities*: It caused a considerable amount of academic studies and innovative proposals, conflicting with urban and land use planning dominant practices and worldwide urbanization trends, so far inspiring several students and academics.

Furthermore, although few *Low Carbon Cities* still exist in reality, territorial and urban administrations all over Europe are committed with the low carbon goal (*Covenant of Mayors* - JRC, 2009) and low carbon urban form appears as an issue of their major interest.

Additionally, academic research shows that the characterization of carbon emissions from an urban system, although complex and demanding specific information (Cuchí, 2009), permits to portrait and then restrict, the carbon emissions of urban origin on a certain municipality, including buildings, mobility and sanitation emissions, and considering delocalized emissions (Figure 2 and 3).

This new quantitative knowledge allows to take informed options on territorial and urban form transformations, and to develop a balance between *high carbon* and *low carbon* urbanization. As research has shown, such balance does not depend only of urban form by itself, but also from micro factors as buildings envelope, or from macro factors as transportation infrastructure and open spaces structure and functions (Mourão, 2012).

Urban Carbon Balance is relevant for ecological territorial and urban form regulation but it is still not incorporated in an operative territorial and urban form regulation method. Indeed, traditional instruments of territorial and urban municipal planning cannot address energy urban demand neither urban carbon emissions. There are two main reasons for this limitation (Mourão, 2012): i) the regulation of carbon emissions at the municipality or city level demands methodologies and domains of information that not always are available or workable for urban planning (for example from IPCC reports, at the aim of Kyoto Protocol); ii) traditional planning relying on zoning fails to address key drivers of urban emissivity, such as mobility, sprawl or degradation and emptying of urban centres.

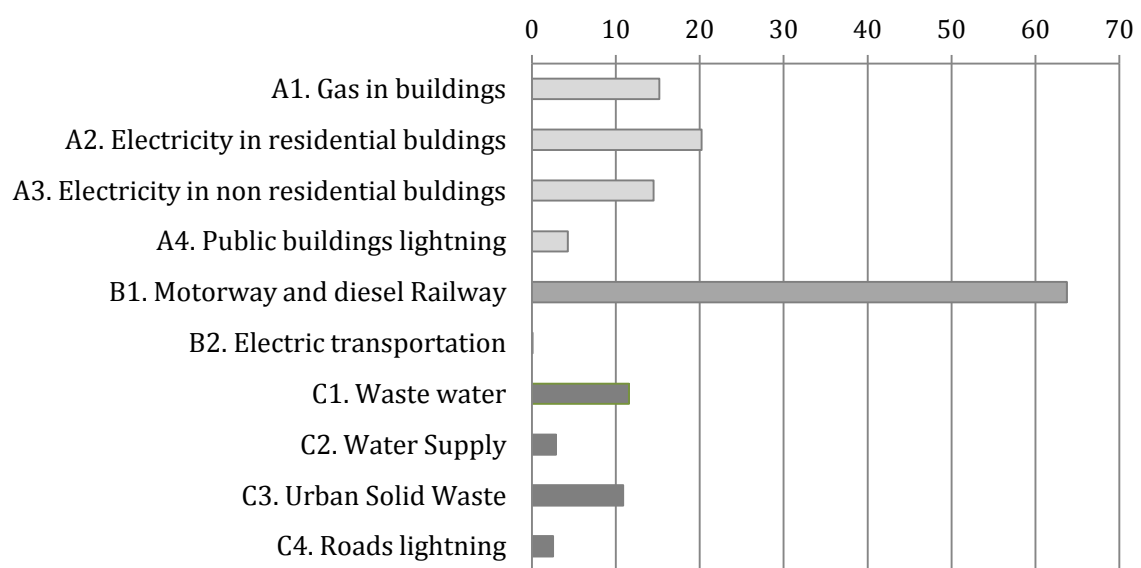


Figure 2. Urban carbon indicators for a Portuguese municipality (Source: Author, 2014 (data from 2007), Unities: Gig gram CO₂e 1.000 ton).

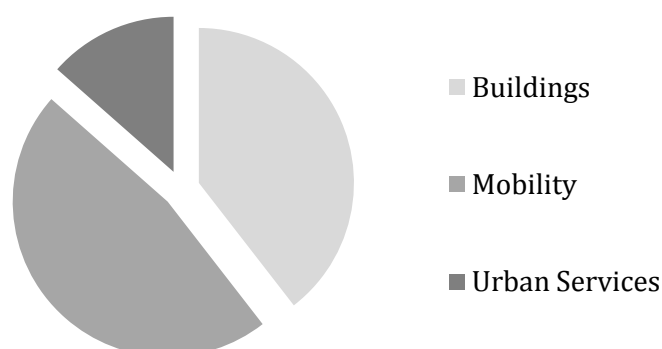


Figure 3. Urban carbon emissions distribution in a Portuguese municipality (Source: Author, 2013 (data from 2007)).

As shown before in this article, while defining areas for certain activities, *Garden-City* proposes a zoning segregating activities and groups, on a paradigm of full control of land uses, a trend that remained in the urbanism of the XX century (Mancuso, 1980; Voigt, 1989). *Low Carbon Cities*, instead, cannot be achieved through the segregation of activities, since they are inserted on a global logic and since they require performance planning, based on principles and goals for a certain territory, and not on the delocalization of emission sources.

An academic proposal for low carbon territorial and urban form regulation, applied to a Portuguese municipality (Torres Novas, 35.0000 inhabitants, figure 2 and 3), showed that territorial planning to reduce carbon emissions should follow principles countering high carbon actions inherent to unregulated urban growth (Mourão, 2012). These principles are: (1) polycentric concentration of settlements, refurbishing existing infrastructure and buildings, defining preconditions to allow urban transformations; (2) structuring low-emission mobility channels, integrating alternative forms of mobility and public transport, and anchoring this structure to the settlements; (3) safeguarding open spaces for water and waste ecological management, biodiversity and food provision, there controlling soil permeability.

At the academic research quoted, simple rules for urban built form planning were also proposed and tested at the scale of a 5.000 inhabitants settlement (figure 4): (a) use of winter solar gains and protection of summer solar gains in all buildings; (b) integration of pedestrian and bicycle paths connecting to the existing equipment; (c) definition of soil permeability rates and integration of reservoirs and pipelines for storm water.

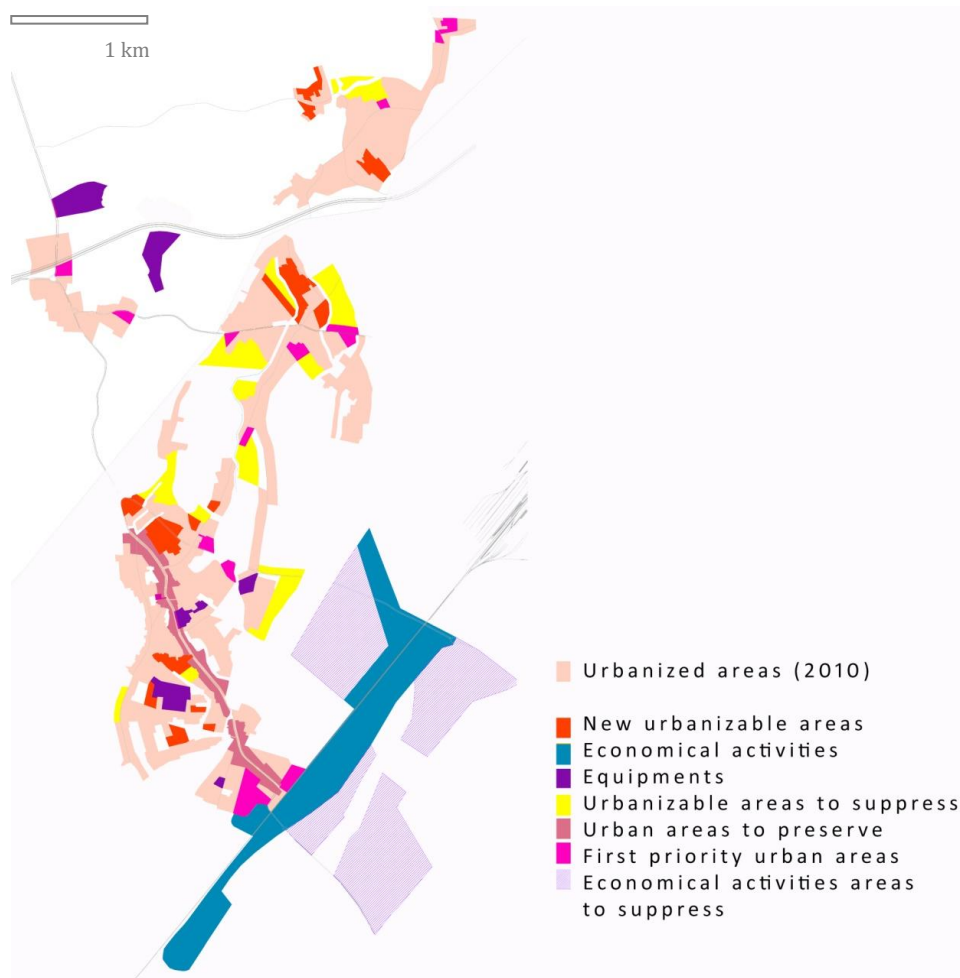


Figure 4. Ecological scenario for a low carbon settlement in 2020 (Source: Author, 2012).

This research has shown that with the framework of an ecological Master Plan, and a *Carbon Balance* quantifying and adjusting it in terms of emissions, it would be possible to require from the urbanization agents, in market economy, the compensation for the generated urban energy and carbon emissions demand. Thus, instead of a pre-established zoning, low carbon territorial and urban form follows pre-establish conditions and goals, which are converted in a ecological scenario of land uses and infra-structure adjustment (figure 4).

Discussion and Conclusions

“*Garden Cities of Tomorrow*” is a work with the ideological background of the local cooperative movement while the concept of *Low Carbon City* follows the ideology of “*Our Common Future*”, and the Earth Summit spirit of *acting local and thinking global*. Nevertheless, *Garden Cities* and *Low Carbon Cities* are comparable as *grassroots* territorial visions since both aim a superior ecological performance, urban pollution control and atmospheric emissions dispersion or reduction.

It is possible to identify several differences between these two urban visions, due to the *urban revolution* occurred during the time elapsed between the two moments when they were produced, as also due its inherent ideological and economical paradigms: while *Garden Cities* were linked to an social economy based on collective land and cooperative management, in times of urban and industrial expansion, being executed trough density and zoning regulation; *Low Carbon Cities* arise at the globalized market economy and industry delocalization. Its execution requires, instead, the definition of principles and rules for urban transformation, controllable by territorial local administration while facing global urbanization agents and major environmental changes. Such principles need to be legitimated by the recognition of environmental costs of urbanization (as carbon emissions) and its economic integration.

Garden Cities, as *Low Carbon Cities*, faced an economic and urban crisis, in different moments of History. Both visions intend to control urban growth trough territorial and urban form regulation, following the classical purpose of urbanism. *Garden Cities* were efficient on its environmental purposes because its spatial model, endorsed by the cooperative ideology, was able to structure urban development in times of strong urban dynamics.

Low Carbon Cities endorsed by “*Our Common Future*” face the harder challenge of structuring the territory in times of lower urban dynamics. As it was for *Garden Cities*, the balance between built and open space is a key for low carbon urban and territorial form regulation. However, in a globalized urban world, *Low Carbon Cities* will only succeed if the ruling of durable spatial structures is efficient to create a spatial context with low energy and carbon operation costs, at the long term and at a global scale.

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Analysis of tools and ‘patterns’ for assessment of urban sustainability to promote design quality

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Abstract. *This research on methods and requirements to forward urban environmental regeneration aims to investigate the requirements and patterns of assessment of urban sustainability in the process of urban design. In the environmental certification of urban development, there is a wide range of evaluation methods developed and disseminated by various countries and organizations. In Brazil, the main evaluation methods used are classificatory, and, although with different criteria the quantitative system is the norm to achieve the certificate. None of them deals directly with the spatial shape or patterns as qualitative parameters of architectural and urban design. This methodology aims at urban environmental regeneration, it integrates studies of ecological urbanism principles for resilient cities (Spirn, 2011) and the principles of urban environmental sustainability (Andrade, 2008), connecting them to the “patterns” developed by (Alexander et al., 1977) and identified by (Moehlecke, 2010). The patterns illustrate strategies for the design process, offering alternatives that lead to the design of more sustainable human settlements. For an in-depth examination, the research analyzed the BREEAM Communities method (UK). This method was juxtaposed to the 108 patterns selected by (Moehlecke, 2010) leading to satisfactory results matching the criteria in sustainability categories within social, economic and environmental dimensions.*

Key Words: Urban regeneration, sustainability principles, urban patterns, environmental certification

Introduction

The evaluation of urban sustainability is a complex theme that has different approaches in different countries. Diverse economic contexts and environmental laws lead to a range of methods for environmental assessment, each adapted to its local conditions. In Brazil, international methods are often imported and it is important to question their applicability to local circumstances.

In Brazil, certifications are being used increasingly to incorporate marketing value and are becoming a powerful tool for real estate development. This has the benefit of attracting the attention of society to the issue of sustainability. However, in most cases, the issue of social justice is not taken into consideration.

Models of sustainability certification in urban areas have evolved significantly in the last few years. The main evaluation methods in Brazil are classificatory, such as the LEED-ND certification - Leadership in Energy and Environmental Design for Neighborhood Development, developed by USGBC - United States Green Building Council and the High Environmental Quality standard (AQUA) to Neighborhoods Allotments and adapted from the French HQE technical reference - Haute Qualité Environnementale.

The sustainability principles used in LEED-ND were extracted from policies for sustainable urban development (Smart Growth and New Urbanism) to neighborhoods, development of urban communities and sustainable construction (Green Buildings) integrating principles of smart growth and planning for sustainable construction designing neighborhoods. The criteria adopted by LEED-ND are divided into three categories: a) smart location and linkage, b) neighborhood pattern and design and c) green infrastructure and buildings.

The High Environmental Quality (AQUA) for Neighborhoods, method was adapted from the French HQE technical reference - Haute Qualité Environnementale to Brazil by Vanzolini, from the University of São Paulo. The Technical Reference presents criteria grouped into three categories: a) neighborhood integration and coherence; b) neighborhood natural resources, environmental quality and health, and c) social life and economic dynamics.

The first national sustainability classification system developed in Brazil, the *Selo Casa Azul da Caixa*³⁵, was created in 2009 and sought to associate the budget restrictions and social practices across six categories: urban quality, design and comfort, energy efficiency, resource conservation, materials, water management and social practices. However, the method does not comprehend urban design, being limited to the evaluation of urban sustainability.

Despite establishing requirements for achieving urban sustainability from the earliest stages of project planning, these certifications do not directly address the urban form and spatial patterns that serve as parameters of quality in architectural design and urban planning. All these methods are quantitative approaches to classification systems, used exclusively for certification. Considering the social inequalities in Brazil, it is necessary to analyze the tools and assessment patterns of urban sustainability that can promote both urban environmental regeneration and quality of urban design, as well as the applicability of the foreign methods of environmental certification within the local context.

The certification of BRE BREEAM Communities (UK), not yet translated into Portuguese, was emphasized in this research for further studies due to its application process that serves as a framework for urban planning and design. This guide encompasses design parameters that guarantee models/patterns that promote social and economic benefits, mitigating the impacts of the built environment in eight categories of sustainability: energy and climate, site modeling, community, ecology and biodiversity, transport and mobility resources, businesses and buildings.

This research hypothesizes that if these models of certifications are combined with spatial patterns of sustainability they can be a guideline to quality in urban design.

As a methodological procedure, initially, in order to understand urban environmental regeneration, we studied the principles of ecological urbanism for resilient cities (Spin, 2011). Within the principle "cities are habitats", patterns were identified (Alexander et al., 1977) as parameters of quality in architectural and urban projects, and recognized by (Salingaros et al., 2010), as a way to generate codes for design tools. Then, sustainability principles (Andrade, 2005 and Moehlecke, 2010) were juxtaposed with "patterns" of quality in design. Although not aiming specifically at sustainability principles "A Pattern Language" offers strategies in the form of tools applicable at different levels of the physical environment, leading to the development of more sustainable human settlements. Lastly, after understanding these patterns, we assessed the tools in the Evaluation of Urban Sustainability (ASU) and its requirements and criteria of sustainability, seeking to compare and combine them to the sustainability patterns in BRE - BREEAM Communities, matching its criteria to patterns and sustainability principles.

Theoretical and methodological aspects

Society and the current economic model, powered by exhaustible natural resources, increase reveal themselves to be increasingly unsustainable. This model is being pushed towards a sustainable evolutionary trajectory, which raises the need for new propositions and future adaptations.

(Spin, 2011) presents ecological urbanism as a solution to degradation caused by urban settlements. Ecological urbanism integrates theory and practice of designing cities with urban planning and ecology and other disciplines, studying the relationship between living organisms

³⁵ The Guide *Selo Azul da Caixa* was developed by a CAIXA technical team, with support from a team of specialists from the universities USP, UNICAMP, and UFSC.

and their environment. It defines some principles that allow the coexistence of all relationships between management systems of city and nature. (Spirn, 2011) describes six principles for resilient cities, defining them as: (1) part of the natural world, (2) habitats (3) ecosystems (connected and dynamic), (4) a deep structure or (5) examples of support, and lastly, (6) urban design as an adaptation tool.

A Pattern Language (Alexander et al., 1977) falls within the principle "Cities are habitats" that should provide its residents the social and biological needs, in which the survival of the species is related to the equilibrium and control that resultant from the design of their habitat. Therefore, urban design meets "habitat quality", promoting and enhancing the development of processes supporters of life and satisfactory to the needs of living beings.

(Alexander, 1979) in "The timeless way of building" identified a precise and objective quality within the built environment, "a quality without a name", that once achieved, injects hope of life in what we build. This quality gives life to things, freeing them of internal contradictions and consists of a complex system that demands fealty to its own nature. It can be partially expressed by some limited words such as: lively, whole, comfortable and accurate.

(Alexander, 1979) describes a process that, if allowed, reveals the spontaneous order in each of us, resulting in the possibility of designing good and agreeable places, and building lively structures. On the other hand, when fear prevents us from finding that order we follow rules that result in dead places.

In defining this quality in buildings and cities, it is important to understand that a space gets its character by patterns of events that happened within it. It is connected to these events and, although not limited by it, an event is also the space where it happened. Patterns of events always relate to certain geometric patterns of space, allowing an analysis of what he calls spatial patterns.

This analysis shows that in buildings or in urban areas there are recurring elements, and recurring relationships among them. These elements combine in different results and variations with different patterns of relationships. The element is, in fact, the pattern of relationship established between the element itself and the elements of the surrounding world.

Therefore, a space would not be formed by elements initially identified, but by patterns of relationship indicative of its character. Patterns are concrete elements, solid substance and starting points to create a building or a city. In adopting living patterns, the outcome is the spatial quality. Hence, it is recommended the use of "patterns with the quality without a name" in order to design a good project.

From this premise, Alexander and his team proposed a language made of a set of patterns. It identifies qualitative guidelines, resulting in patterns that compose a language for urban and architectural design, promoting an environmental quality and "a timeless way" to build. The result is a universal process that preserves quality throughout time, a way to build and design that can help designers to determine the structure of urban spaces with a whole and integrated outlook (Alexander, 1977).

The patterns are presented and distributed according to their different scales, ranging from more global aspects to the construction details. All of them were observed over a long period of time in spatial characteristics of successful places totaling 253, capable of forming an infinite variety of combinations. As the nature of the construction process is understood, a language made of patterns becomes possible. Each pattern relates to the other in order to complete major and minor patterns, many interconnected, suggesting a fundamental order to the working of the language.

The result is a linear sequence from the larger to the smaller scale, revealing a fundamental worldview, which does not build one thing alone, but acts in the world around it and within, allowing for a broader and holistic coherent vision of the world.

The language is more than a manual. It consists of a core archetype of all possible pattern languages, capable of making individuals feel alive and human. By adopting these patterns as the basis of analysis, we focused on understanding its system so that we could connect them to urban sustainability assessment tools.

Patterns and Principles of Environmental Sustainability

Despite the existence of guidelines for more sustainable urban settlements, the recommendations are usually quite general, lacking studies on urban patterns, a tool that could greatly contribute for sustainable development. (Moehlecke, 2010) saw in the book "A Pattern Language" by Alexander et al., an opportunity to study patterns connected to sustainability, although not formulated specifically for this area. The patterns can be seen as strategies potentially able to contribute to the sustainability of urban settlements.

To the urban patterns identified in the work of (Alexander et al., 1977), were juxtaposed sustainability principles based on several authors, among them (Andrade, 2005).

These principles are of common interest to different societies and can be applied in different contexts, as well as guide the development of desirable characteristics.

The results of theoretical connections and analyzes was a set of 108 urban patterns distributed within nine principles of sustainability in social, economic and environmental dimensions present in human settlements. The scales chosen go from the smaller scale of the place, then the neighborhood, to the largest scale of the settlement.

The principles organized by (Moehlecke, 2010) are a result of the translation of "key ideas" (themes) taken from the matrix composed by the dimensions of sustainability (environmental, social and economic) and the three urban scales (place, neighborhood and settlement). Each urban scale, according to the author, must be represented by three principles, each being representative of a dimension. The result is a set of nine principles: social interaction, urban diversity, mixed land use, biodiversity, habitability, compactness, energy efficiency, sustainable mobility and local economy. This identification is only introductory, as other principles can be incorporated later.

Thus, the set of patterns that establishes a connection with the issue of sustainability takes the form of intervention strategies and tools that could be applied in different levels of the physical environment, allowing human settlements to develop more sustainably. The criteria used to establish these connections are: the dimensions of sustainability, the urban scales, and the principles of sustainability.

Both the criteria and the patterns selected provide a base for the analysis of environmental certifications and indicate, respectively, if the certification is truly sustainable and if this is reflected in the quality of the urban design. Each pattern was analyzed considering its relationship with a certain principle and its contribution and potential contributions to other principles and dimension of sustainability, as a pattern can contribute in more than one of them. Therefore, it was possible to connect the patterns of sustainability identified by (Moehlecke, 2010) to the criteria of environmental certifications, in this case the criteria of BREEAM Communities.

Breeam communities

The BREEAM Communities is an independent organization within the family BREEAM, which uses third party assessment and certification standard based on BREEAM methodology. This method consists of a framework for analysis of issues and opportunities that affect sustainability in the early stage of the design process and development.

Developed by BRE Global UK organization, the BREEAM accreditation system for city planning presented its first pilot version in 2008 (almost 20 years after the first versions BREEAM for buildings). Previously, the organization developed a manual for planning and design at the urban scale that was the basis for the requirements of the certification system. Between the 2008 version and the final document, the certification system has undergone public revisions to allow for public participation in the context of urban planning.

According to BRE organization, this certification has four specific objectives: reduce overall impacts of urbanization; recognize projects and communities according to their environmental, social and economic benefits; provide an accredited label for urbanism focused on sustainability; and stimulate demand and ensure the effective development of sustainable communities. The aim is to build a vehicle to support the development of projects ensuring that the models/patterns promote social and economic benefits, mitigating the impacts of the built environment.

Therefore, it uses measures of quantification/evaluation for sustainable determinations with flexible approaches, avoiding specific requirements and solution of composition. It uses the best available science and practice as the basis of qualification and calibration, cost-effective models/patterns for the definition of sustainability, and aims simultaneously for economic, social and environmental gains.

The environmental assessment methodology is extended to the holistic view of sustainability, considering the social and economic impacts of development. It is expressed in a system of negotiable credits divided into three steps. The steps and the organization of the guide help project managers in integrating master planning with evaluative processes and ensure the addressing of issues at appropriate times in the planning process, absorbing strategies of regional sustainability and encompassing environmental, social and economic planning issues.

The issues addressed in the manual are grouped into five impact categories as mentioned above. The criteria relevant to each step of these categories were developed in the following discussion.

Results of the correlation of breeam issues with sustainability patterns

These categories indicate a direction for sustainability, but do not provide an indication of how to actually achieve it. They outline a goal, without showing the way. The issues assessed are generic and can be accomplished without guaranteeing the quality of design and even urban sustainability in full, functioning only as a checklist.

However, by correlating the BREEAM criteria to the contributions of sustainability patterns, we obtain a design methodology, as the patterns direct how to reach the final goal. The sustainability pattern groups contribute to the issue selected by (Moehlecke, 2010) within the dimensions of sustainability. Through these contributions, a way to correlate BREEAM issues to sustainability patterns was developed, as shown in the following table:

Table 1. Issues, contributions, patterns of sustainability

ISSUES ASSESSED	ISSUES / CONTRIBUTIONS	PATTERNS OF SUSTAINABILITY
GO 01 - Public consultation plan	Not addressed in the patterns selected by Moehlecke (2010)	p.45 Necklace of community projects (Not among sustainability patterns selected)
GO 02 - Consultation and engagement		
GO 03 - Project Analysis		
GO 04 - Community management of facilities		
SE 01 - Economic impact	Support for local farmers Support for local products	p.19 Web of shopping, p.32 Shopping street, p.87 Individually owned shops, p.89 Corner grocery, p.93 Food stands,

		p.177 Vegetable garden
	Strengthen local commerce	p.6 Country towns, p.46 Market of many shops, p.165 Opening to the street
	Passive heating	p.107 Wings of light, p.128 Indoor sunlight, p.175 Greenhouse, p.221 Natural doors and windows, p.230 Radiation heat p.234 Lapped outside walls
	Lower energy content materials	p.207 Good materials, p.248 Soft tile and brick
SE 02 - Demographic needs and priorities	Strengthening group identity	p.8 Mosaic of subcultures, p.13 Subculture boundary, p.15 Neighborhood boundaries
	Group diversity	p.35 Household mix
	Age diversity	p.26 Life cycle, p.40 Old people everywhere p.57 Children in the city
	Gender diversity	p.27 Men and women
SE 03 – Flood risk assessment	Water protection	p.25 Access to water, p.64 Pools and streams
	Natural rainwater drainage	p.51 Green streets, p.247 Paving with cracks between the stones
	Respect and preservation of natural areas	p.104 Site repair
	Adaptation to local conditions	p.169 Terraced slope
	Occupancy control	p.4 Agricultural valleys, p.21 Four-story limit
	Occupancy balance	p.3 City country fingers, p.28 Eccentric nucleus, p.29 Density rings, p.38 Row houses, p.39 Housing hill, p.96 Number of stories
SE 04 - Noise pollution	Urban noise reduction	p.173 Garden wall
SE 05 - Housing supply	Development of a sense of responsibility and identity with the place	p.37 House cluster, p.79 Your own home
	Indoor-outdoor contact	p.140 Private terrace on the street, p.164 Street windows, p.222 Low sill, p.243 Sitting wall
	Balanced occupancy	p.3 City country fingers, p. 28 Eccentric nucleus, p.29 Density rings, p.38 Row houses, p.39 Housing hill, p.96 Number of stories
SE 06 - Delivery of services, amenities and commodities	Scattered activities	p.9 Scattered work, p.10 Magic of the city, p.41 Work community, p.42 Industrial ribbon, p.48 Housing in between
	Support for local farmers	p.19 Web of shopping, p.32 Shopping street, p.87 Individually owned shops, p.89 Corner grocery, p.93 Food stands, p.177 Vegetable garden
	Support for local products	
	Strengthen local commerce	p.6 Country towns, p.46 Market of many shops, p.165 Opening to the street
SE 07 - Public	Streets as places of social	p.31 Promenade, p.106 Positive outdoor

sphere	interaction	space, p.121 Path shape, p.122 Building fronts, p.123 Pedestrian density
	More community interaction	p.63 Dancing in the street, p.79 Your own home, p.88 Street cafe, p.90 Beer hall, p.108 Connected buildings, p.124 Activity pockets
	Develop places that encourage permanence and social interaction	p.69 Public outdoor room, p.105 North facing outdoors, p.114 Hierarchy of open space*, p.125 Stair seats, p.160 Building edge, p.163 Outdoor room, p.170 Fruit trees, p.171 Tree places, p.241 Seat spots
	Development of a sense of responsibility and identity with the place	p.37 House cluster, p.67 Common land, p.79 Your own home, p.119 Arcades, p.170 Fruit trees
	Indoor-outdoor contact	p.140 Private terrace on the street, p.164 Street windows, p.166 Gallery surround, p.222 Low sill, p.243 Sitting walls
SE 08 - Microclimate	Microclimate control	p.25 access to water, p.51 Green streets, p.60 Accessible green, p.64 Pools and streams, p.118 Roof garden, p.162 North face, p.247 Paving with cracks between the stones
SE 09 - Amenities	Alternative transportation methods	p.11 Local transport areas, p.52 Network of paths and cars, p.56 Bike paths and racks, p.100 Pedestrian street, p.120 Paths and goals, p.174 Trellised walk
	Safe paths for pedestrians	p.49 Looped local roads, p.50 T junctions, p.54 Road crossing p.55 Raised walk
	Reduction of expressway interference in communities	p.17 Ring roads, p.23 Parallel roads
	Scattered activities	p.9 Scattered work, p.10 Magic of the city, p.41 Work community, p.42 Industrial ribbon, p.48 Housing in between
	Activity pockets	p.47 Health center, p.61 Small public squares, p.97 Shielded parking
SE 10 – Adaptation to climate change	Microclimate control	p.25 access to water, p.51 Green streets, p.60 Accessible green, p.64 Pools and streams, p.118 Roof garden, p.162 North face, p.247 Paving with cracks between the stones
SE 11 – Green infrastructure	Respect and preservation of natural areas	p.104 Site repair
	Reduction of human interference in species development	p.74 Animals, p.172 Garden growing wild p.245 Raised flowers
SE 12 - Local parking	Decrease in car prevalence	p.22 Nine per cent parking, p.103 Small parking lots
	Alternative transportation methods	p.56 Bike paths and racks
SE 13 – Flood risk management	Water protection	p.25 Access to water, p.64 Pools and streams

	Natural rainwater drainage	p.51 Green streets, p.247 Paving with cracks between stones
	Respect and preservation of natural areas	p.104 Site repair
	Adaptation to local conditions	p.169 Terraced slopes
	Occupancy control	p.4 Agricultural valleys, p.21 Four-story limit
	Occupancy balance	p.3 City country fingers, p.28 Eccentric nucleus, p.29 Density rings, p.38 Row houses, p.39 Housing hill, p.96 Number of stories
SE 14 – Local vernacular	Development of a sense of responsibility and identity with the place	p.37 House cluster, p.67 Common land, p.79 Your own home, p.119 Arcades, p.170 Fruit trees
SE 15 – Inclusive design	Reclaiming streets as places of social interaction	p.31 Promenade, p.106 Positive outdoor space, p.121 Path shape, p.122 Building fronts, p.123 Pedestrian density
	Broader community interaction	p.63 Dancing in the street, p.79 Your own home, p.88 Street café, p.90 Beer hall, p.108 Connected buildings, p.124 Activity pockets
	Development of places of permanence and social interaction	p.69 Public outdoor room, p.105 North facing outdoors, p.114 Hierarchy of open space*, p.125 Stair seats, p.160 Building edge, p.163 Outdoor room, p.170 Fruit trees, p.171 Tree places, p.241 Seat spots
	Development of a sense of responsibility and identity with the place	p.37 House cluster, p.67 Common land, p.79 Your own home, p.119 Arcades, p.170 Fruit trees
	Indoor-outdoor contact	p.140 Private terrace on the street, p.164 Street windows, p.166 Gallery surround, p.222 Low sill, p.243 Sitting walls
SE 16 – Light pollution	Solar radiation and lighting control strategies	p.244 Canvas roofs
SE 17 - Labor and skills	Support for local farmers	p.19 Web of shopping, p.32 Shopping street, p.87 Individually owned shops, p.89 Corner grocery, p.93 Food stands, p.177 Vegetable garden
	Support for local products	
	Strengthen local commerce	p.6 Country towns, p.46 Market of many shops, p.165 Opening to the street
RE 01 – Energy strategy	Passive heating	p.107 Wings of light, p.128 Indoor sunlight, p.175 Greenhouse, p.221 Natural doors and windows, p.230 Radiation heat p.234 Lapped outside walls
	Lower energy content materials	p.207 Good materials, p.248 soft tile and brick
	Solar radiation and lighting control strategies	p.244 Canvas roofs
RE 02 – Existing buildings and infrastructure	Strengthening group identities	p.8 Mosaic of subcultures, p.13 Subculture boundary, p.15 Neighborhood boundaries

	Diversity in time	p.33 Night life
	Gender diversity	p.27 Men and women
	Group diversity	p.35 Household mix
	Age diversity	p.26 Life cycle, p. 40 Old people everywhere, p.57 Children in the city
	Diversity of needs	p.36 Degrees of publicness
RE 03 – Water strategy	Water protection	p.25 Access to water, p.64 Pools and streams
	Natural rainwater drainage	p.51 Green streets, p.247 Paving with cracks between the stones
RE 04 - Sustainable buildings	Passive heating	p.107 Wings of light, p.128 Indoor sunlight, p.175 Greenhouse, p.221 Natural doors and windows, p.230 Radiation heat p.234 Lapped outside walls
	Lower energy content materials	p.207 Good materials, p.248 soft tile and brick
	Solar radiation and lighting control strategies	p.244 Canvas roofs
RE 05 - Low impact materials	Lower energy content materials	p.207 Good materials, p.248 soft tile and brick
RE 06 - Resource efficiency	Lower energy content materials	p.207 Good materials
RE 07 - Carbon emissions from transportation	Encouragement of alternative transportation methods	p.11 Local transport areas, p.52 Network of paths and cars, p.56 Bike paths and racks, p.100 Pedestrian street, p.120 Paths and goals, p.174 Trellised walk
	Safe pathways for pedestrians	p.49 Looped local roads, p.50 T junctions , p.54 Road crossing p.55 Raised walk
	Decrease in car prevalence	p.22 Nine per cent parking, p.103 Small parking lots
	Increase the attractiveness of public transportation	p.16 Web of public transportation, p.20 Mini-buses, p.34 Interchange, p.92 Bus stop
	Reduction of expressway interference in communities	p.17 Ring roads, p.23 Parallel roads
LE 01 - Ecological strategy	Respect and preservation of natural areas	p.104 Site repair
	Reduction of human interference in species development	p.74 Animals, p.172 Garden growing wild, p.245 Raised flowers
	Water protection	p.25 Access to water, p.64 Pools and streams
	Natural rainwater drainage	p.51 Green streets, p.247 Paving with cracks between the stones
	Environmental pressure reduction	p.3 City country fingers
	Occupancy control	p.4 Agricultural valleys, p.21 Four-story limit
	Occupancy balance	p.3 City country fingers, p.28 Eccentric nucleus, p.29 Density rings, p.38 Row

		houses, p.39 Housing hill, p.96 Number of stories
LE 02 - Land use	Occupancy control	p.4 Agricultural valleys, p.21 Four-story limit
	Occupancy balance	p.3 City country fingers, p.28 Eccentric nucleus, p.29 Density rings, p.38 Row houses, p.39 Housing hill, p.96 Number of stories
	Scattered activities	p.9 Scattered work, p.10 Magic of the city, p.41 Work community, p.42 Industrial ribbon, p.48 Housing in between
	Activity pockets	p.47 Health center, p.61 Small public squares, p.97 Shielded parking
LE 03 - Water pollution	Water protection	p.25 Access to water, p.64 Pools and streams
LE 04 - Strengthening ecological value	Respect and preservation of natural areas	p.104 Site repair
	Building in harmony with its surroundings	p.168 Connection to the earth, p.246 Climbing plants
	Adaptation to local conditions	p.169 Terraced slopes
	Reduction of human interference in species development	p.74 Animals, p.172 Garden growing wild, p.245 Raised flowers
LE 05 - Landscape	Landscape diversity	p.24 Sacred sites
	Development of places of permanence and social interaction	p.105 North facing outdoors, p.114 Hierarchy of open space*, p.160 Building edge, p.163 Outdoor room, p.170 Fruit trees, p.171 Tree places
	Respect and preservation of natural areas	p.104 Site repair
	Adaptation to local conditions	p.169 Terraced slopes
	Reduction of human interference in species development	p.74 Animals, p.172 Garden growing wild
LE 06 - Rainwater harvesting	Natural rainwater drainage	p.51 Green streets, p.247 Paving with cracks between the stones
TM 01 - Transportation evaluation	Encouragement of alternative transportation methods	p.11 Local transport areas, p.52 Network of paths and cars, p.56 Bike paths and racks, p.100 Pedestrian street, p.120 Paths and goals, p.174 Trellised walk
	Safe pathways for pedestrians	p.49 Looped local roads, p.50 T junctions , p.54 Road crossing p.55 Raised walk
	Decrease in car prevalence	p.22 Nine per cent parking, p.103 Small parking lots
	Increase the attractiveness of public transportation	p.16 Web of public transportation, p.20 Mini-buses, p.34 Interchange, p.92 Bus stop
	Reduction of expressway interference in communities	p.17 Ring roads, p.23 Parallel roads
TM 02 - Safe and attractive routes	Safe pathways for pedestrians	p.49 Looped local roads, p.50 T junctions , p.54 Road crossing p.55

		Raised walk
TM 03 - Cycling Network	Encouragement of alternative transportation methods	p.56 Bike paths and racks
TM 04 - Access to public transportation	Increase the attractiveness of public transportation	p.16 Web of public transportation, p.20 Mini-buses, p.34 Interchange, p.92 Bus stop
TM 05 - Cycling	Encouragement of alternative transportation methods	p.56 Bike paths and racks
TM 06 - Public transportation	Increase the attractiveness of public transportation	p.16 Web of public transportation, p.20 Mini-buses, p.34 Interchange, p.92 Bus stop
	Decrease in car prevalence	p.22 Nine per cent parking, p.103 Small parking lots

The results showed that no items relating to the criteria in the governance category were found and therefore no pattern of sustainability applies in this category according to (Moehlecke, 2010). However there are patterns concerning community projects consistent with Alexander. In the category of social and economic well-being (SE) 27 out of 36 issues were found, contributing to all the principles of sustainability (Moehlecke, 2010). In the category resources and energy (RE) 16 issues were identified, and apply to the principles of urban diversity, habitability, energy efficiency and sustainable mobility, embracing the three pillars of sustainability.

In the category of land use and ecology (LE) 12 issues were identified, contributing mostly to the principle of biodiversity, as well as other principles such as mixed land use, urban diversity, social interaction, habitability and compactness. No mention of the principles in the economic dimension was found. Lastly, in the category transportation and mobility (TM), only the issues of the principle of sustainable mobility were considered.

Final considerations

The research showed that patterns and their contributions according to (Moehlecke 2010) can be connected with environmental certification procedures because they share a common base in the triple foundation of sustainability. In the study of BREEAM, more categories of sustainability were found to be met, which shows the scope of studies by (Moehlecke, 2010) concerning the certification procedure. Although some of the issues assessed were not discussed by the author, it is possible to employ patterns (Alexander et al., 1977) in order to achieve the necessary theoretical support.

(Alexander et al., 1977) also argues that the pattern language allows for the creation of new patterns, in case the ones described are not sufficient. These new patterns should be extracted from the natural order of things. The inclusion of patterns, as suggested for BREEAM, can be done as well for other environmental certifications, leading to better quality in urban design.

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Hybrid cellular automaton – agent-based model of informal peripheral development in Latin American Cities

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Abstract. *The study of the complex dynamics that engage urban form presents powerful instruments to understand the driving forces of contemporary urban development. This research intends to test traditional urban growth tendencies against informal development mechanisms and decision-making behaviors of competition in geosimulated environments. The empirical objectives are the investigation of the morphological patterns of peripheral poverty and its interactions with urban form, in which accessibility has played important parts sided by informal processes from Latin-American contemporary cities. The paper will present a theoretical review of agent-based models in cellular environments stressing urban growth and decision-making processes as basis for a proposal of a hybrid agent-based model in cellular space. The contemplated model expands the cellular automata approaches by including the interpretation of the model's landscape by heterogeneous collective agents that settle and promote growth in competitive dynamics according to preferences and hierarchy. The expected result is an urban development intensities landscape, natural features and agent-types concentration, which should allow one to analyze urban form expansion and fragmentation, socioeconomic segregation and urban policies effects. This work succeeds the research by the LabUrb/UFPEL based on the CityCell modelling framework, which has yielded insights on the linkages between urban morphology, social and environmental attributes through emergent urban phenomena simulation focused on temporal and spatial dynamics.*

Key Words: *Urban Morphology, Urban Growth, Social Process Dynamic Simulation, Cellular Automata, Agent-Based Models.*

Peripheries, urban form and contemporary urban development

Cities make up the largest artifacts made by man and have structured human organizations since the first agricultural sedentary societies 6,000 years ago in Mesopotamia (Portugali 2000). Over history, humanity has become dependent on cities for its subsistence and as cities developed and evolved the growing integration of its inner and outer expansion converged. In contemporary urban development dynamics, important economic and social feedback mechanisms reinforce this bond. Urban form is, therefore, composed through interactive cycles in which both the peripheries and its centers have active roles (Barros 2004; Abramo 2012).

By end of the 20th Century, the urban development process, propelled by economic and cultural globalization, has led the peripheries to the forefront of urban development research. The transition processes that had started in the Industrial Revolution consolidated by changing morphological patterns worldwide and cities could no longer be defined as the compact *intramuros* built mass that exercised absolute contrast with the country surrounding it. Modernity brought about the progressive dissolution of the urban block (Panerai et al. 2004), while post-modernity intensified the dispersal of the urban tissue, its hybridization and the introduction of diverse intermediate stages of urbanization (Chin 2002; Ascher 2010).

The fringes of cities were the stages where sizeable part of this processes took place. The disperse outskirts and the *terrains vagues* from the *arrebaldes* were gradually settled in, assimilated by the overall urban form and overcome in cyclic expansion waves. From the centers outward, city form blended with rural and semi-rural forms, discontinuities and low

densities. It was crossed by vast transportation networks and divided in extensive polynucleated urban areas. The city limits became less clear with the stretching of urban form, as if the city was distended to the point of being penetrated by less dense land uses so that towns begun to blend with one another, forging continuous occupation gradients of varied densities (Chin 2002).

These changes endowed contemporaneity with great diversity of urban forms that elude apprehension and classification. On developed countries, specialized urban nuclei organize vast mono-functional suburban networks. This sprawling urban form expands into very low density and extends as far as the fuel price allows, while urban inhabitants gradually abandon the inner city districts (Berube & Kneebone 2006).

South of the Equator, immense informality and poverty areas are interspersed with industrial facilities and high income enclaves (Davis 2004); social inequality soars and informality is incorporated as the main alternative to access urban land for poor families (Bógus & Taschner 1999). A true urban development kaleidoscope (Abramo 2012) is formed and redefined in continuous cycles, without ever solidifying and keeping permanent impetus towards expansion (Barros 2004).

In this fractured urban condition, the informal settlements scale is such that they start amassing relative autonomy from the regular urban processes controlled by regulations and promoted through the market. They create para-formal logics that escape the normative discipline of the rule of law and work around environmental and infrastructural constraints. Their urban interventions are brought about through family savings, reciprocal relationships and local trust networks (Davis 2004; Abramo 2012). This process establishes a peripheral condition: the co-existence of opposites with little compatibility; the interspersing of compact and disperse urban forms; the connection of specific sites to the global scale and the segregation between adjacent territories based on class; overall low densities; close relation to informality and blatant illegality; and settled extensions that converge to the regional scale (Walker 1978; Polidori 2004).

This spatial differentiation presents the close combination between the formal market and widespread informality. The stock market bound real state is associated with land grabbing practices, with self-help housing in *favelas*, with the popular occupation of urban voids and derelict inner buildings. Since the externalities of one process is captured by the other, the interaction between space and social processes driven by diverse rationalities imposes antagonistic, but reciprocally determined tendencies. Dispersion and concentration of urban form occur in alternate cycles propelled by the land market's logic as well as by necessity's vigor (Abramo 2012). They reveal important systemic ties between the urban territory and multi-scale heterogeneous agent and process networks (Barros 2004).

Global and urban peripheries

In contemporary urban growth processes, cities serve as conduits and motors to globalized capital so that the capitalist processes at work over land and places (Harvey 1978) include the cities as translators of global dynamics to the diversity of local reality (Scott & Storper 2003; Sassen 1999). The contrast between global city-regions and global peripheries is reinforced under global stimuli and in response to local characteristics. The world-economy capitals are organized around their specialized and increasingly anti-human Central Business Districts (Davis 2006) and diametrically oppose immense portions of territory excluded from the capitalist mode of production and its control (Davis 2004). The latter lie on the extreme end of civilization: they are relegated to material inferiority, absence from rule of law and to the deprivation of means for their autonomy.

In the middle ground to these extremes, human societies are pushed towards polarization. While some of its members increase their specialization, others have to make the best of informal labor as the only available route for inclusion (Bógus & Taschner 1999). In Latin-

American cities, in the decades of 1950-1960, informal areas were ignored and if possible removed (UN-Habitat 2010). More recently, though, one can see the resurgence of informal peripheries as majoritarian form of urbanization and shelter for most of the population, especially from the 1990s onwards (Bógus & Taschner 1999; UN-Habitat 2003). What remained was the overall state of incomplete infrastructure, lack of basic services and opportunities, portraying a second-class urbanization (Davis 2004).

In the last two decades, the urban outline is defined: more than half of the world population becomes urban, largely due to the contributions of the borders of urbanization on the edges of cities of peripheral countries in globalized economy (UN-Habitat 2010). These sites, in dual peripheral condition (both global and local), become the object of renewed interest as a tool for explaining the urban question integrally through the provision of intermediate and varying tones of a continuous spectrum of urbanization (Chin 2002).

The role of the peripheries

In third-world cities, the phenomenon of social inequality proliferates fueled by segregation based on spatial disintegration (Bógus & Taschner 1999). This happens not as a secondary consequence of the capitalist development of cities, but as a central mechanism of its reproduction (Harvey 1978). The expansion of cities according to economic and productive stimuli occurs on alternate surges of rapid, disorganized and seemingly chaotic expansion, which are followed by slow, gradual consolidation. In these cyclic processes of capitalist urban development, poverty areas act as compensation valves to cities' expansion mechanisms. They dampen tensions, absorb environmental impacts and infrastructure costs while maintaining flexibility to change according to the settlement evolution. Thus, it can be argued that the precarious and unstable occupations "[...] actually absorb part of the existent social instability [...] in unstable pockets within the city" and that "[...] they are necessary for the structural stability of the global system." (Barros 2004, p.180).

The actual development of Latin American cities is connected to socio-economic inequality. It reinforces it, but is also fueled by it. From colonial times the political and legal frameworks have privileged landowners, which in turn heavily influences the locational process and has pushed the larger part of the population into the informal land market. Contemporarily, capitalism is interwoven with these traditions and composes a complex system of competition, complementation and superimpositions between the legal and informal land markets. While the individual location decision from a family may target the optimization of its choices, the aggregate effect is a conflicting tendency among similar families: while searching for unique opportunities, they drive the market towards homogeneity, which narrows their choices. On the bottom of the social scale, poor families are driven outwards towards the cheaper lands of the peripheries and lesser opportunities, or have to improvise ever-denser inner-city settlements. The conflicts are broadened by social segregation resultant from the "urban convention" that draws middle-class families towards places occupied by families of similar, or higher, social standing, leaving the poor to fend for themselves in self-help, informal support circles (Abramo 2012).

This rationale seeks to expose non-aggregate behaviors that are relevant in the modes of production and occupation of the urban form, acting either in coordination or in competition with the general market mechanisms. The reciprocal influences between formality and informality are based on local externalities and logics of interpersonal knowledge and trust, which add up in consecutive cycles of valuation and de-valuation of urban form (Abramo 2012). This shapes cities through inter-representation networks (Portugali 2000) between urban morphology and socio-economic processes that reveal emerging patterns of "peripherization", which is the alternation between compact and diffuse urban form. These processes increase contrast between city center and periphery and stress the marked social differences of Latin

American societies: the poor end located in the expansion edges or in dense favelas, while the better off live near the city center and public services.

Urban periphery models

Geosimulation supports an embryonic “science of cities” (Batty 2012) that seeks to reveal patterns of order that emerge from actions and decisions where individuals interact with their environment and to each other in collaboration or competition, from the bottom of the systems up (Batty 2007). Urban models in cellular environments have relevant capabilities in describing city growth under these premises (Batty 2007) and urban Cellular Automaton (CA) models allow to coherently articulate the effects of urbanization on the natural environment (Polidori & Krafta 2005), on informality and on poverty formation (Barros 2004; Patel et al. 2012). The simulation of urban dynamics can be achieved through the interaction of adjacent cells in grids that changes states following simple rules, applied locally and in repetition, under stochastic *disturbances*. The accretion of these neighborhood relations is capable of producing order states that emerge from the bottom up, correlating basic elements from the urban environment that shape overall system order (Batty 2007).

Cellular models of urban growth can be further complemented by the explicit inclusion of social agents as these may simulate the decision-making capacity of rationally autonomous entities with limited knowledge. Agent-based models (ABM) bring the detailing of each agents characteristics to enable the modeling of particular behaviors and attributes such as motivation, objectives, goals, decision-making and learning. The combination of cellular environments based on CA and autonomous decision making from ABM may be used to represent social processes articulated to morphological dynamics (Heppenstall et al. 2012).

Agent-based model of peripheral growth

This paper proposes a model that aims to answer questions of location choice, competition and exercise of power in decision-making processes. These processes are executed by non-coordinated social actors during urban external growth in dynamics that put relate urban form to social interests, as demonstrated by image 1.

This research is supported by the CityCell modeling framework, through which initially Polidori (2005) and more recently Saraiva and others (2013) have produced several urban growth simulation models on cities from southern Brazil. Following to the frameworks’ structure, the modeling environment is defined by urban, natural and institutional attributes (

figure 3). They are represented in different intensities on a grid of square cells and can have behaviors of attraction or resistance to urbanization, interacting in accordance with local rules to simulate urban growth processes (Polidori & Krafta 2005).

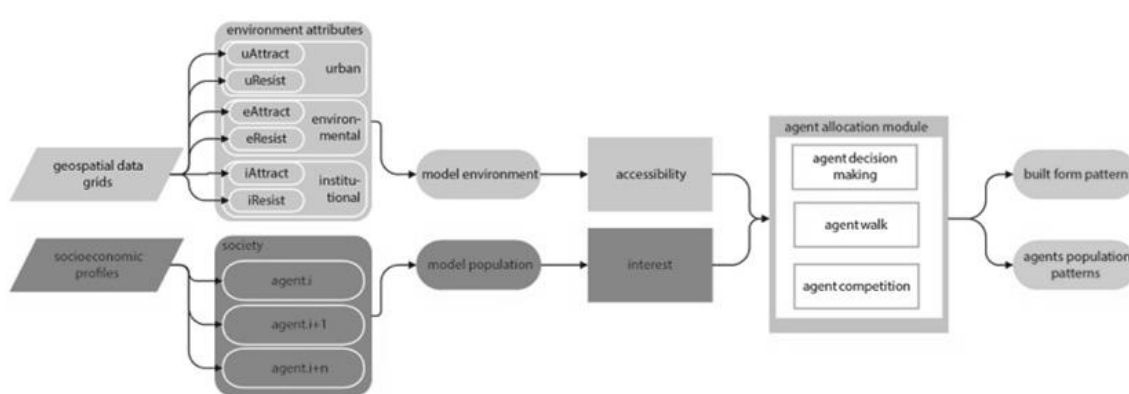


Figure 2. General model flowchart.

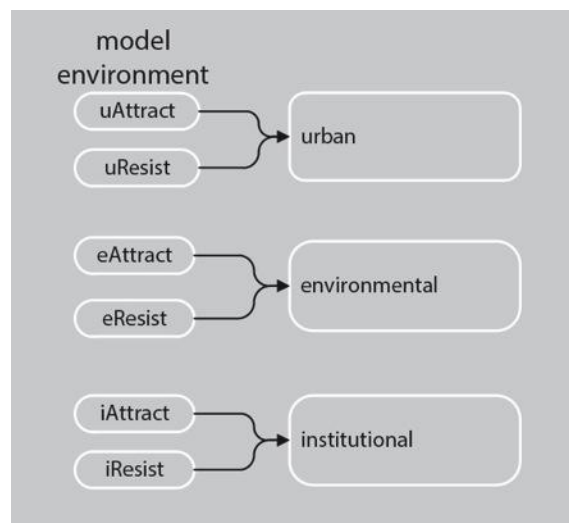


Figure 3. Modeling environment structure consisting of urban, environmental and institutional attributes, which offer attraction or resistance to urbanization.

The society that populates the model consists of autonomous agents capable of decision-making. The agents' categories represent social groups defined by socioeconomic profiles such as social classes. These agents dwell exclusively on urban cells, and may choose to move according to their preferences. This model constitutes a hybrid approach between the fully explicit individual ABM and the implied social behavior contained in traditional CA models.

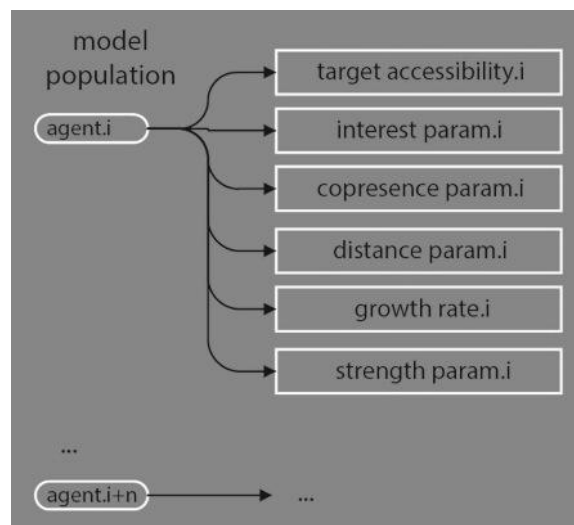


Figure 3. Agents' parameters.

To determine the agents' evaluation of the environment, movement and competition dynamics, as depicted in

figure , agents have the following parameters: (a) *target accessibility* (Av): is the value of relative accessibility (see below) considered optimal by the agent. In its evaluation of environment cells, the agent checks the available range of relative accessibility (from cells in its neighborhood) and chooses the cell that most closely matches its *target*; (b) *interest parameters* (w): are the stated preferences for each agent in relation to the environment attributes and accessibility. They take the form of multipliers to be applied when composing the *Interest*

Matrix (below); (c) *interest matrix* (T): is the combination of interest parameters for each agent and attributes of the model. It is calculated in every cycle, being sensitive to variations from unstable attributes, accessibility and urban area growth; (d) *copresence parameters* (c_p) indicate the tolerance to different agent populations in the same cell as a given agent. These parameters are the base for the copresence threshold on each cell, concerning each pair of agent settled on it. They increase the tolerance to different agents' populations in direct proportion to its value; (e) *strength parameter* (s_p): implies the ability of an agent to exercise power in the competition process. It influences in determining the expulsion of agents when the copresence threshold is overcome in a cell as the "leverage" each agent can use against its opponent. The parameter influences disputes in direct proportion to its value; (f) distance parameter (d_p): is the maximum distance, in number of cells, that an agent is able to go (or see); (g) growth rate (θ): is the growth rate per cycle of each agent. By default, equals the growth rate of urban cells, but can be specified for each agent separately.

Model dynamics

The overall dynamic structure of the model starts with the entry of environmental and social data in the model. This includes the input of urban areas, the initial distribution of agents' and other attributes in the form of two-dimensional data grids, as seen on figure 4.

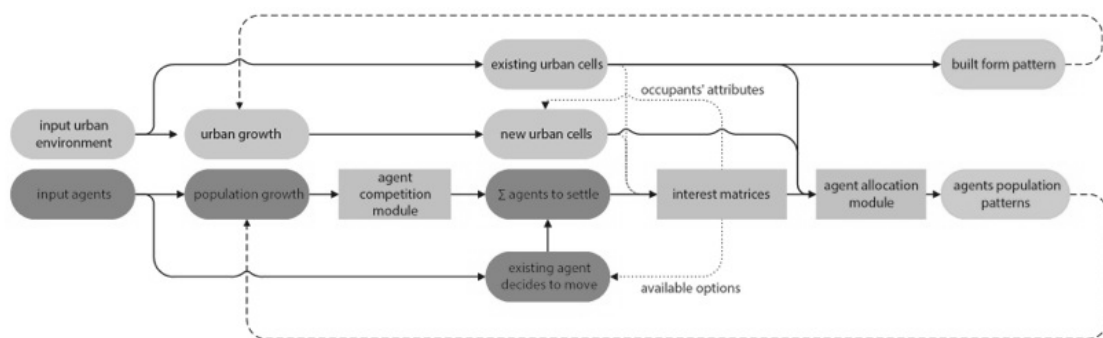


Figure 4. Model dynamic structure.

The first step after initialization is urban growth, which derives from a weighted accessibility measure from Saraiva (2013). In this model, it acts as a subroutine that determines distances among cells loaded with urban attraction that receive “resistances” from environmental attributes (increasing relative distances) to generate an global accessibility pattern. This pattern is then normalized and used as the base for a combination of deterministic and random mechanisms that distribute fixed rates of urban growth, as expressed in Table 1.

The main stage of the agents decision-making process depends on the intersection of agent's preferences with the modeled environment. The agents' potential choices are represented in the *interest matrix* (T), determined from each agents' interest parameters (w) related to the model attributes (A).

For urban, institutional and natural attributes to be included in the *interest matrix*, they need only to be informed and have their weights defined during input. Accessibility, however, must be checked against the economic power of the agent, comparing *target accessibility* (A_v) to *relative accessibility* (A_r) in tandem with the agent's interest on accessibility. The highest values of relative accessibility are close to 1, while the lowest approach 0. The target-accessibility varies within the range of A_r , and therefore has values ranging from 0 (the least economic power) to 1 (the highest economic power). The relationship between the target

accessibility of the agent and relative accessibility of each cell is given by the *particular accessibility* (Ap) measure, as expressed in Table 2.

Table 1. Cell i accessibility.

$AC_i = \sum_{(j \neq i) \in U} \frac{1}{d_{ij}}$	Where: AC_i = cellular accessibility from cell i d_{ij} = distance between cells i and j U = cell set loaded with urban attraction attributes
$d_{ij} = \sum_{c \in C_{ij}} Env_c$	Where: d_{ij} = distance between cells i and j Env_c = cell c weight for the weighted accessibility measure C_{ij} = preferential path cell set between i and j
$Ar_i = \frac{AC_i}{AC_{max}}$	Where: Ar_i = relative accessibility from cell i AC_i = cellular accessibility from cell i AC_{max} = maximum <i>grid</i> cellular accessibility

Source: Saraiva (2013).

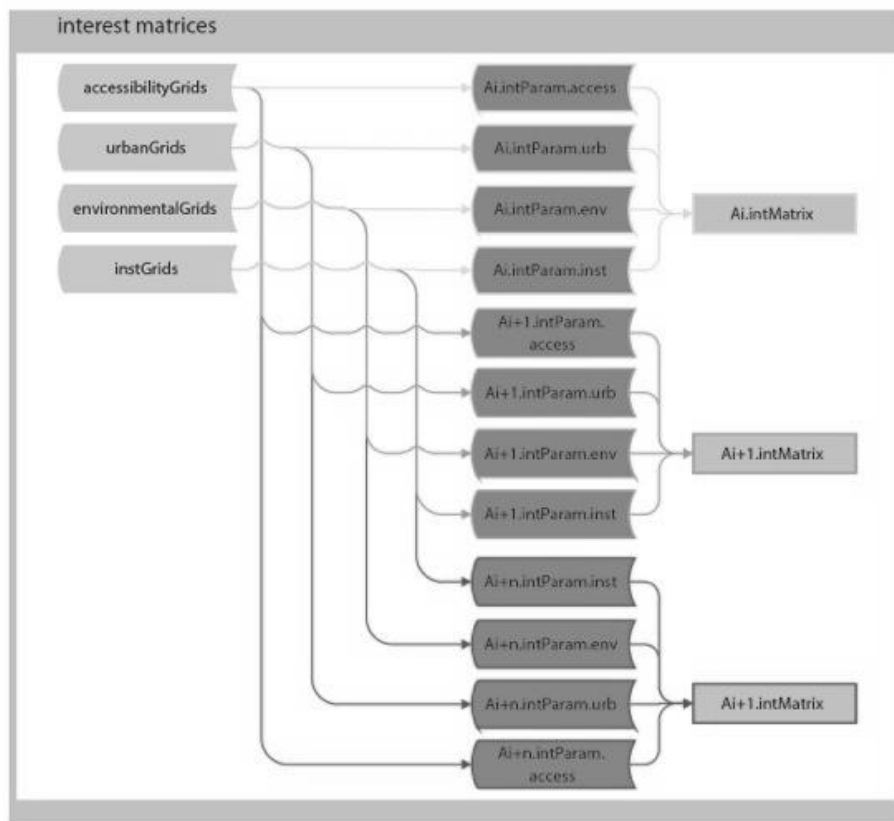


Figure 5. Modeled attributes and relative accessibility form the *interest matrix* for each agent.

Table 2. Particular accessibility for the agent i in cell (x, y) .

$Ap_{i,x,y} = 1 - (Av_i - Ar_{x,y}) $	Where: $Ap_{i,x,y}$ = Particular accessibility for the agent i in cell (x, y) and $(x, y) \in Cd_i$ $Ar_{x,y}$ = relative accessibility of cell (x, y) Av_i = target accessibility from agent i
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Table 3. Agent i interest matrix.

$T_i = \sum_{(x,y) \in Cd_i} t_{i,x,y}$	Where: T_i = is the interest matrix for agent i , drawn from the t_i parameters for every (x, y) cell, and $(x, y) \in Cd_i$
$t_{i,x,y} = \sum_{j=1}^m w_j A_{j,x,y} / \max \left(\sum_{j=1}^m w_j A_{j,x,y} \right)$	Where: $A_{j,x,y}$ = model attributes present in (x, y) cell w_j = each attribute's weight set by the equivalent <i>interest parameter</i> m = number of attributes taken into account.

The sum of all preference measures (t_i) compose the interest matrix (T_i) for the i agent, as in Table 4.

Each agent's decision to move for can take two forms: voluntary or due to competition for a certain space. In the first case, the *interest matrix* subsidizes the decision-making of agents, defining a "topography" of its preferences in the system's cells that is compared with the cell the agent occupies in each iteration. If the current cell is below the average, the agent then decides to move.

In the second case, it is assumed that even if the urban form does not impose a settlement limit to the agents (such as a finite urban form stock to be allocated), there is constant contention over urbanization. The occupation tolerance of each agent's surroundings to different categories of agents is geared to this contention. The limit for this "tension" between the agents is defined (for each of them) by its copresence parameter. This parameter enlarges or reduces the quantity of different agents to be tolerated in the same cell, as shown in table 4. It should be noted that the co-presence factor is directional, i.e., there may be differences between the parameter of agent i to agent j to the parameter of agent j to agent i , indicating asymmetry in co-presence relations.

Table 4. Co-presence test from agent i to agent j .

$Cf_{i,j,x,y} = \frac{P_{j,x,y}}{Cp_{i-j} \times P_{i,x,y}}$	Where: $Cf_{i,j,x,y}$ = copresence factor from agent i to j in (x, y) cell $Cp_{i,j}$ = copresence parameter from agent i to j $P_{i,x,y}$ = agent i population in (x, y) cell $P_{j,x,y}$ = agent j population in (x, y) cell
$Cpres_{x,y}(Cf_{i,j,x,y}) = \begin{cases} true, & Cf_{i,j,x,y} \leq 1 \\ false, & Cf_{i,j,x,y} > 1 \end{cases}$	

Experiment for Jaguarão/RS/BR

Jaguarão, in the Rio Grande do Sul state of southern Brazil has been studied by the Laboratório de Urbanismo³⁶/UFPel in recent years. Outreach initiatives, undergraduate education and research have been conducted in a systematic manner and have provided important data on the municipality. Therefore, in continuity to some of this research, this experiment is set to verify the following hypothesis: is there influence from disaggregate decision in settlement patterns, especially when poverty is considered?



Figure 6. Modeling environment. Jaguarão/RS/BR urban área Quickbird image from 2009 superimposed by 200m celular grid.

This issue serves as a base for future investigation and model development. To address it and to verify the viability of the current proposal, the experiment is outlined as follows: (1) to simulate urban growth in the CityCell framework making use of agent-based model over the weighted accessibility from Saraiva (2013); (2) to consider the agents distribution from urban, natural, and institutional attributes and accessibility influence as a result from agent allocation decision making; (3) to verify the selected attributes influence, seeking evidences of the linkages between morphological attributes and social subjects.

The parameter set for the urban growth dynamics can be found in Table 5.

Table 5. atributos de entrada do modelo de acessibilidade ponderada por fatores ambientais

Atribute	Type	Weight
1947 urban nucleus	urban/attraction/mutable	1,0
Rio Branco (UY) municipality	urbano/attraction/freezing	0
Jaguarão river	urbano/attraction/freezing	0
Watersheds	natural/resistance/mutable	0,7
random layer	natural/resistance/mutable	0,3

Source: Saraiva (2013).

³⁶ Urbanism Lab in the Federal University of Pelotas.

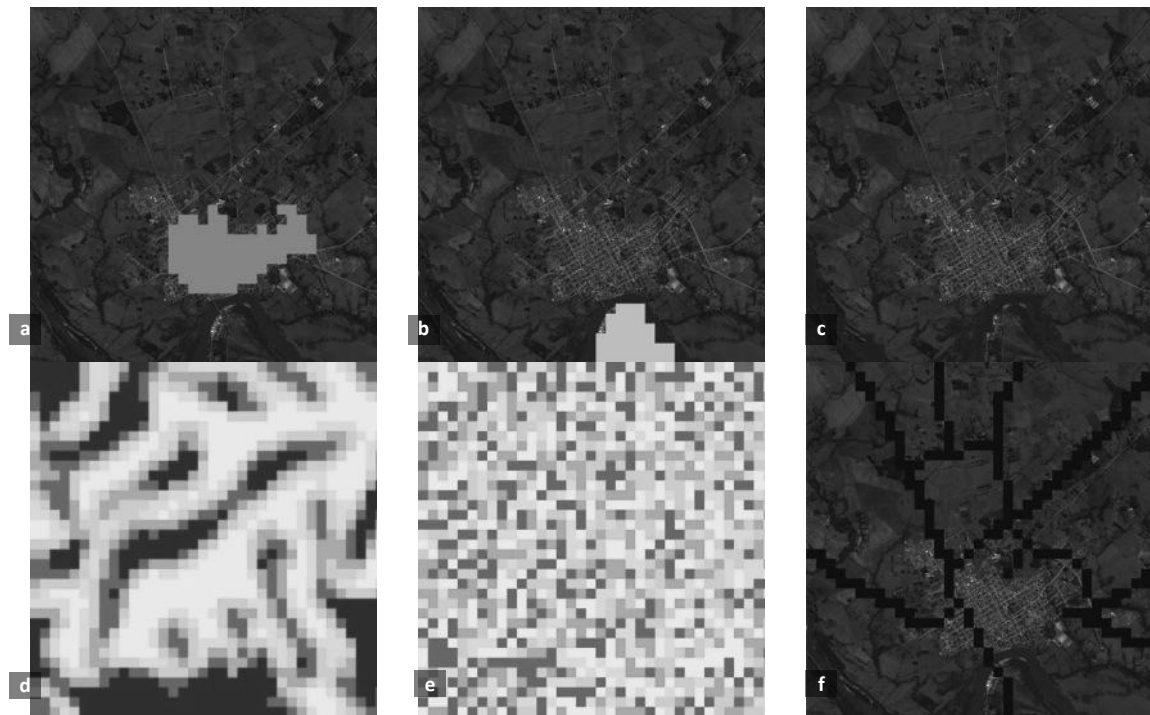


Figure 7. model attributes; a) effectively urbanized area in 1947; b) the territory of Rio Branco, Uruguay; c) Jaguarão river; d) watersheds (dark values are the valley bottoms and clear values the watershed limits); e) random layer; f) roads. (Source: Saraiva).

The modeling environment was established in a GIS in the UTM geographical coordinates system, zone 22 south. It encompasses the extended surroundings of Jaguarão urban area in 2009. It results in the rectangular area shown in

Figure 6, which is divided into 1,476 cells of 200x200m. The growth simulation attributes are shown in Image 7 and its results are the growth patterns illustrated in Image 8, for iterations 01, 11 and 31 (corresponding to the 62 years from 1947 to 2009). On the left column is the resulting urban form for each iteration, while on the right, there is the relative accessibility patterns.

Interest matrix

Three agents' categories are set for the model population. They represent the high, middle and low-income populations on the city and to each a parameter set was assigned, as shown in table 2. For this experiment, their preferences were determined by the modeler according to relevant cases from the literature, considering income stratification, the road system influence, as well as relationships with environmental attributes, topography and non-urban land use (Sietchiping 2004; Augustijn-Beckers et al. 2011; Abramo 2012; Heppenstall et al. 2012).

Table 6. Agent attributes.

agents	accessibility		urban		environmental		
	target	interest	nucleus	roads	Jaguarão	watersheds	crops
			1947		river		
low income	0,2	3	3	9	1	3	3
average income	0,6	1	3	1	3	1	1
high income	0,9	3	1	3	3	1	1

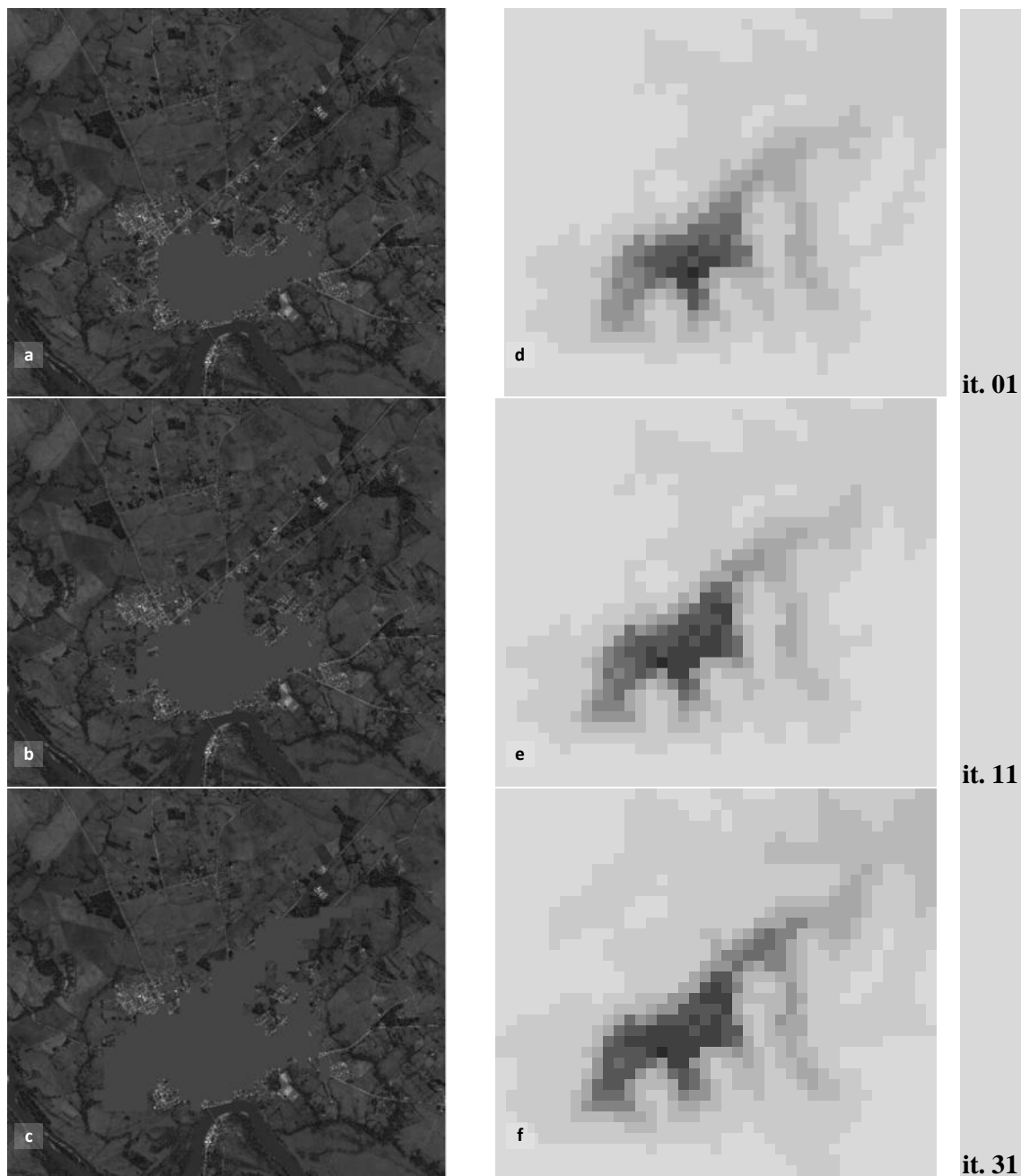


Figure 8. model outputs. From (a) to (c), urban form corresponding to iterations 01, 11 and 31; from (d) to (f), the relative accessibility for the same iterations (Source: author simulation based on Saraiva).

From the target accessibility definition, one can verify its impact on the relative accessibility grid. To this end, the 11th iteration was selected, in which the difference between the *relative accessibility* and agents *target accessibility* was examined, as shown in Figure 9.

The results reveal the influence of the target accessibility parameter for the three agent types modeled. This measure is added to the weighing of the remaining model attributes, making the final interests matrix for each of the agents, as recorded in the Image 10.

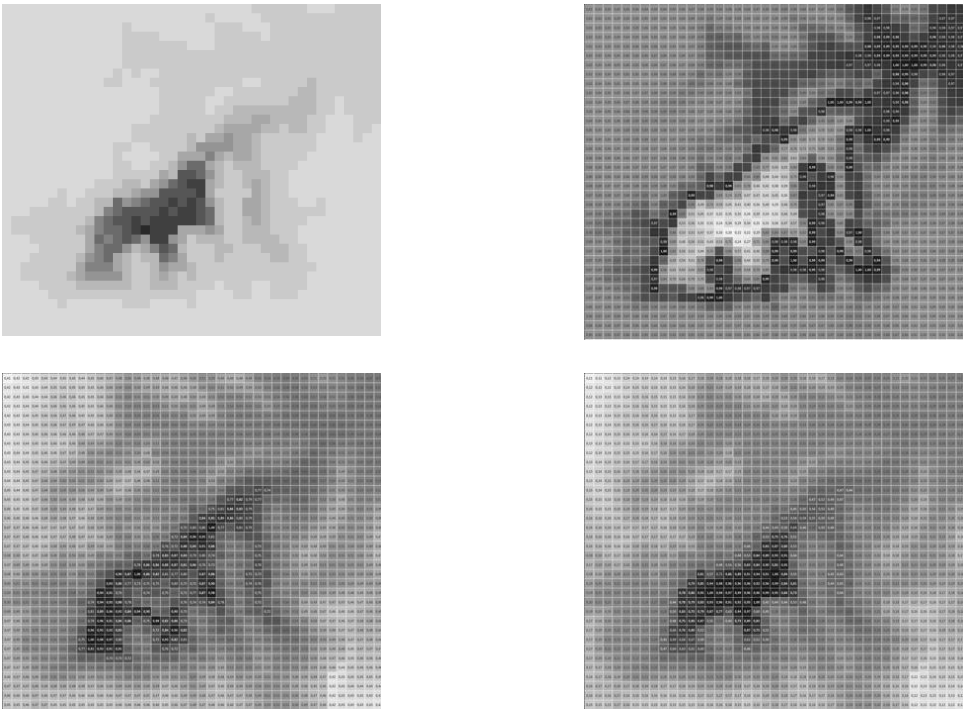


Figure 9. Target accessibility weighing. a) relative accessibility for iteration 11; b) low income agents; c) average income agents; and d) high incomes agents.

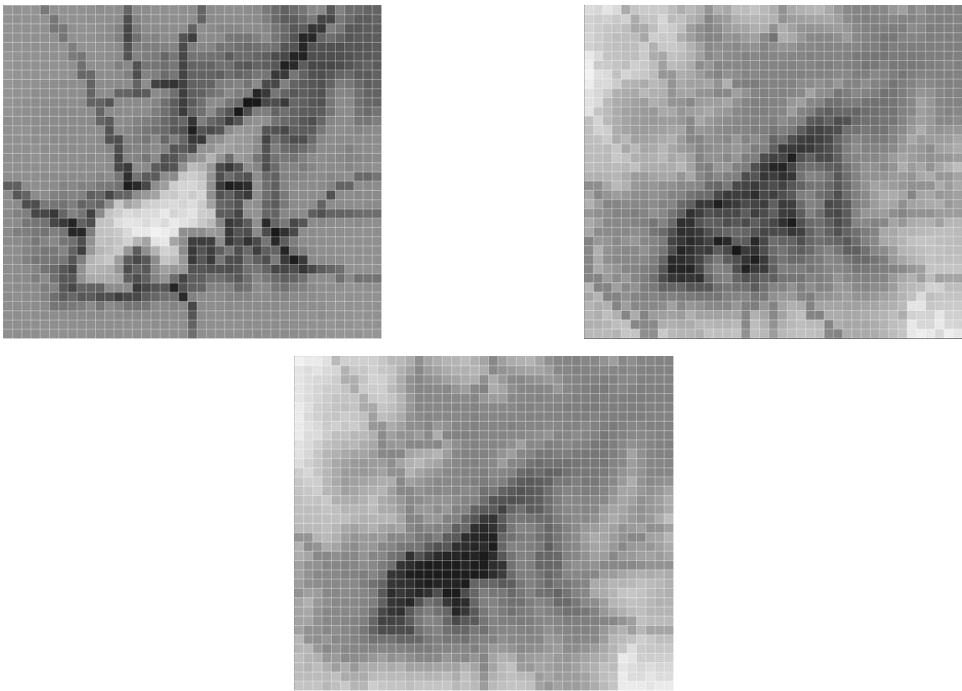


Figure 10. weighting for all attributes; a) low-income agents; b) average-income agents; and c) high-income agents.

The creation of different bands among agents' preferences can be observed in the results. It shows the expected responsiveness and sensitivity of the agents' evaluation of the different environmental settings. In the same vein, in comparing the weights with the results of the growth model, it can be noted how the development pattern of the city may have different readings under these "disturbances" from the agents' points of view. The accessibility (a general system measure, even if locally generated) is then defined by a simple method through the particular accessibility feature, as can be seen in Figure 11.

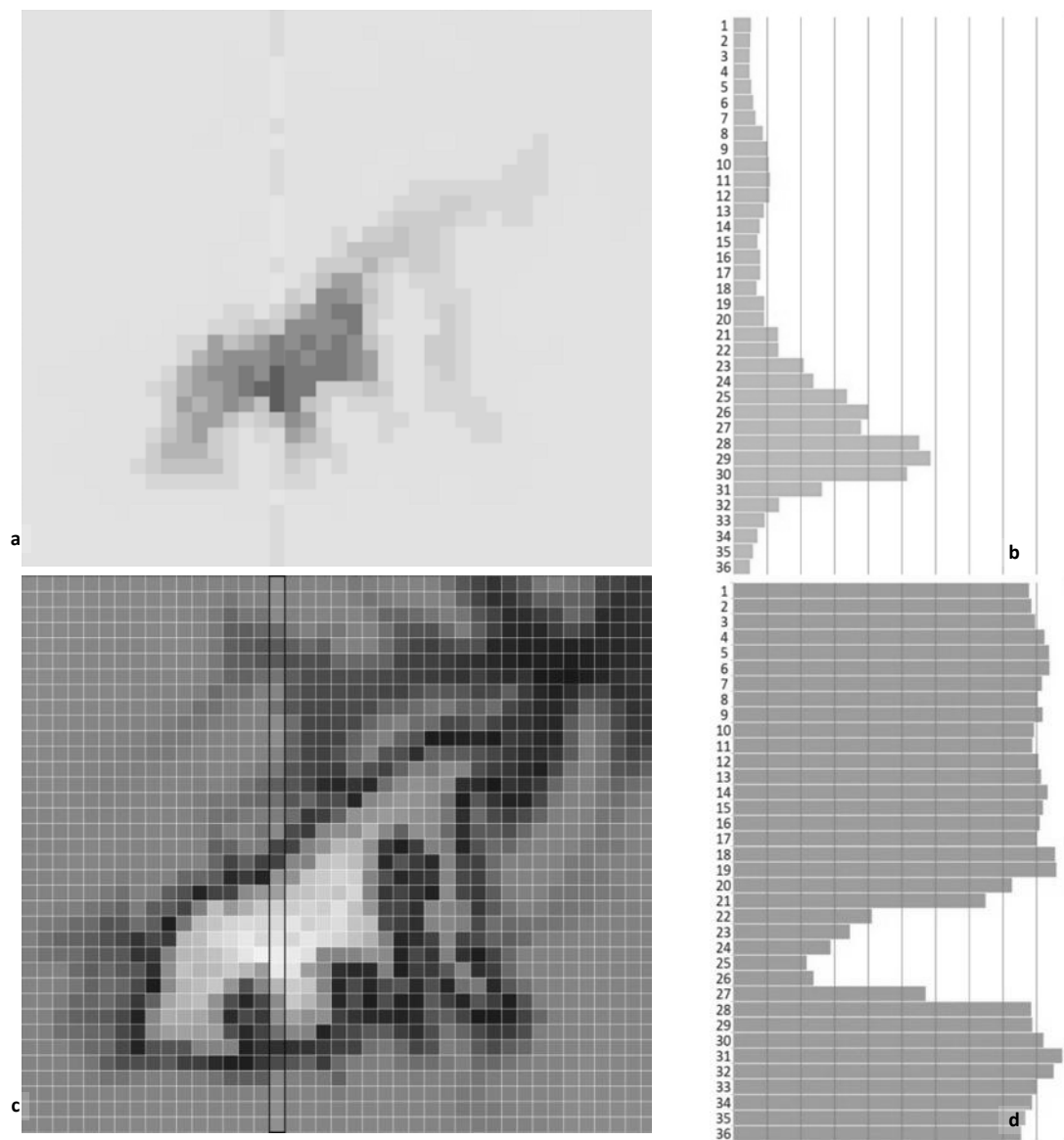


Figure 11. comparisons between model results; a) relative accessibility grid (it.11, highlighting column 17); b) distribution of the column 17 results from the relative accessibility grid; c) low-income agent particular accessibility grid (it.11, highlighting column 17); d) distribution of the column 17 results from the particular accessibility grid.

The relative accessibility and particular accessibility grids comparison expressed in the Figure 11 helps to appraise the impact of this measure. The figures for both variables are shown in Figure 11b (relative accessibility) and Figure 11d (particular accessibility). In these, it can be

perceived that the approximation of the highest values to those areas closest to the agents preferences, such as those cells in which the relative accessibility is around 0.2.

Moreover, the differentiated spatial perception for the low-income agents has largely decreased their interest on the more central cells through the selection of a reference value for relative accessibility, as noted in the Figure 11c. It has also created plateaus of interest that span over the urban areas surroundings. The grid column 17 (shown in Figure 11d) presents interest peaks (around to 0,95) on lines 19 and 20, on those cells which are contiguous to areas which are already urbanized at that time (iteration 11). This pattern is prolonged in a collar shape all around the urban area and lies over cells which are not yet urban (in a prevalent manner at least, so as not to be given the urban cell type in Image 12), but have enough accessibility and will turn urban in the following iterations. This high interest dedicate to these cells coincides with the pioneering role that low-income present in peripheries (Barros 2004; Abramo 2012).

It should be pointed out that for the low-income agents there are large high-interest plateaus on the peripheries beyond the collar region (with values ranging from 0,80 to 0,94). If the modeler would not consider factors such as tenure, urban norms and so forth, these areas can be seen as high potential sites for low-income settlement. This could help explain the great adaptation capacity of low-income populations and their greater flexibility of location choices. If compared to high-income agents, the low-income ones have 28 times more location options (1.238 cells with $t_{\text{low-inc}} \geq 0,85$, versus 43 with $t_{\text{high-inc}} \geq 0,85$). Obviously, these low accessibility areas are lacking in urban infrastructure and are not urban for their greater part. If this were true, low-income agents would have more choices from the worst places (considering urbanization) while the high income would have fewer options on better locations. It seems clear how these relationships can generate conflicts over urban form and its benefits.

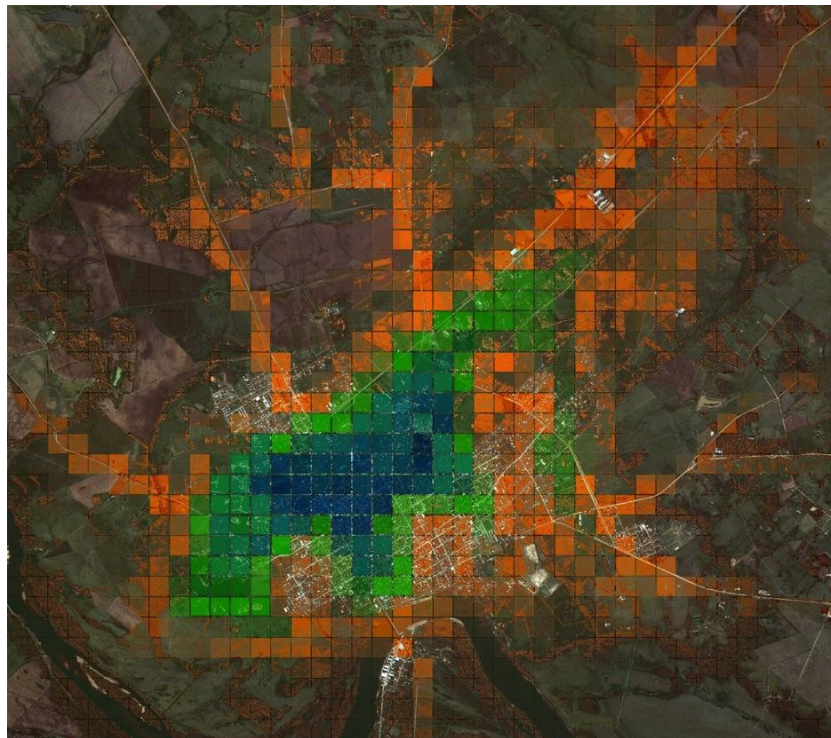


Figure 12. Composite from Quickbird image and agent concentration areas. Low-income agents in orange, average-income in green and high-income in blue.

The consideration of remaining attributes brings into view its links to the agents' profiles. Figure 12 shows the preferred areas for the three types of agents through the classification of

each agent's preference matrix (which stand alone in Image 10a, to low-income agents; 10b, to average-income, 10c for high income).

An inverse Chicago Model is then apparent: the high-income populations settle inside the urban areas and leave the peripheries to the lower-income populations. The outwards expansion tendency for low-income populations is also visible. This happens according to secondary (to the accessibility status) influences as the road network, watersheds and so forth (Bógus & Taschner 1999). Instead of presenting the prevailing economic motivations, these settlement patterns are disturbed by other motivations that actually restrict the final interest spatial pattern. For the low-income agents, the final pattern corresponds to 70% of the particular accessibility pattern (1,238 cells with $t_{\text{low-inc},Ap} \geq 0,85$, against 845 with $T_{\text{low-inc}} \geq 0,85$). Figure 13 shows the difference between the particular accessibility grid distribution and the interest matrix.

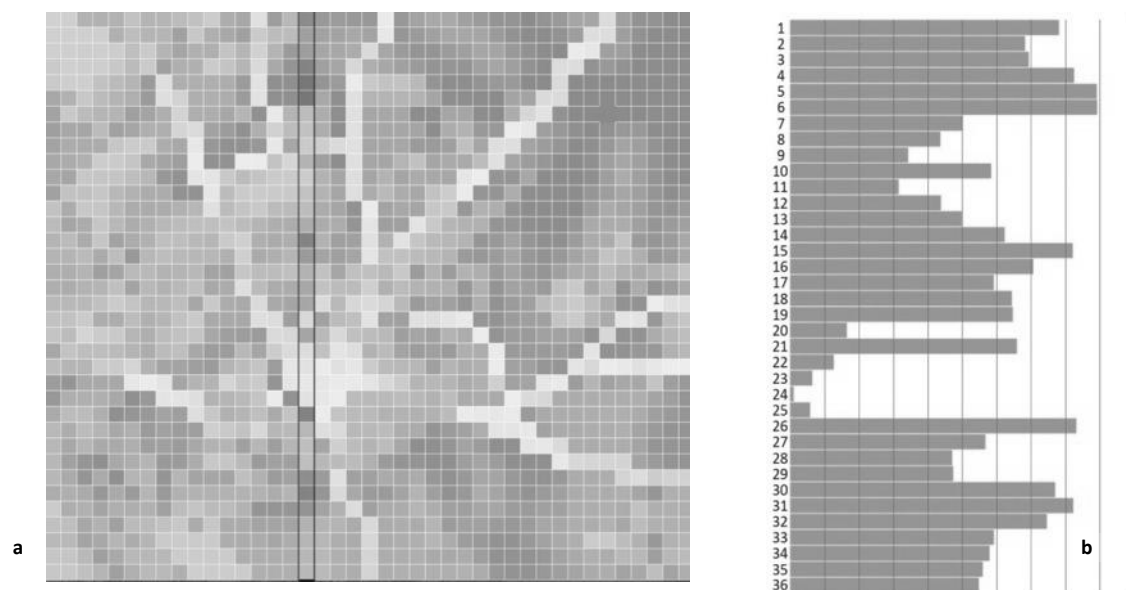


Figure 13. particular accessibility grid compared to interests matrix. a) Particular accessibility and interests matrix subtraction modulus for low-income agent (it.11, highlighting column 17); b) difference between the distributions of the results of column 17 from the particular accessibility grid and interest matrix for low-income agent.

Final remarks

With regard to the question posed for this implementation, the influence of individual decisions on land use patterns can be ascertained, including those associated with poverty. Even on simple weighting of preferences over the environment, it is observed that the inclusion of varying agents' characteristics results in adjusted preferences patterns that drive each agent to a specific cell group on the environment. This steering is sensitive to the attributes selection; the attributes' weights as well as to the attributes' base values, as is apparent in the model results.

Several important challenges remain to be overcome, such as the deeper investigation of the associations of urban attributes and agents; the strengthening of methodological basis for the model; the definition of the movement and allocation processes and the insertion of these features in the software framework.

Even with these limitations, the model displays initial viability for modeling morphological dynamics in interaction with explicit social processes. Regarding empirical questions on the topic of poverty areas on contemporary Brazilian cities, the current implementation has produced embryonic approach to criteria definition for each of the modeled agents. The

registered effects indicate further possibilities on the study of linkages between morphological characteristics, environmental and social agents' motivations. In this sense, the perceived adjustment in the agents' parameters sensitivity reinforces the need for calibration from a theoretical, empirical or even hypothetical basis.

The model also displays some initial progress regarding its theoretical assumptions. It may enable the advancement of decision-making systems grounded social and geographical bases. It seeks to bring urban growth models closer to social modeling tradition of Timmermans and Golledge (1990) and Epstein and Axtell (1996).

Similarly, the Uneven Development Theory (Harvey 1978; Walker 1978) may also be represented by urban growth based on weighted accessibility and the unequal settlement patterns produced for agents. The current experiment suggests that agent environment awareness, preferences and movement, once deployed, will allow the representation of formal and informal market dynamics through divergent preferences and conflicting behavior. The heterogeneity in their preferences, tolerance, power and information culminate in parametric (on their environment assessment) and strategic (as compared with other agents) rationalities (Abramo 2012).

Methodologically, it appears there is a suggested increase in capacity in the CityCell framework, with the addition of micro-specification (Epstein & Axtell 1996) of the attributes weights for each agent. One can then generate modeling hypotheses with greater clarity as to its theoretical and empirical assumptions and include the autonomous rationality principle.

On the issue of formation of poverty areas integrated with city growth, the hybrid approach of cellular automata and agent-based models can qualify investigations in urban models of morphological basis by increasing the specification of its dynamics and by allowing the contradiction between its social actors.

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Urban street tree modelling using high-polygon 3D models with photometric daylight systems

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Abstract. The choice of street tree species, size and placement is an integral part of street design in any city, but particularly in cities with large seasonal temperature variation such as those experienced in Melbourne, Australia. The arrangement and choice of street tree can make a street seem too dark in winter or not provide enough shade in summer. Trees have traditionally been difficult to model digitally and have been considered “polygon-heavy” (thousands of polygons) making them computationally prohibitive to use for three-dimensional modelling and rendering analysis, particularly on an urban design scale. Thus street tree assessment is typically limited to spreadsheet /database form, two-dimensional plans and sections or photographic collage to test aesthetic implications. In this paper we discuss methods which bring together developing research into mathematical algorithm tree simulation, increasing processing power in affordable personal computers along with improvements in render engines with photometric daylight analysis along with efficient ‘proxy objects’ which allow large numbers of highly detailed three-dimensional representations of trees to be rendered. We discuss the initial results of this study demonstrating that it is now feasible to use high quality three dimensional polygon street trees in urban models with photometric daylight analysis. We report that it is now possible to assess the solar amenity and shade impact of a variety of tree species at different seasonal and time intervals with an iterative design process allowing multiple scenarios to be tested effectively in short periods of time.

Key Words: Tree modelling, urban modelling, livability, urban forest

Introduction: the growing importance of street trees

Street trees can have a tremendous impact on the quality of public spaces relative to cost (Moore 2009) and the choice of street tree species, their arrangement and spacing is an integral part of street design in any city.

In cities with large seasonal temperature variation such as Melbourne, the arrangement and choice of street trees needs to be considered multi seasonally. Large dense evergreen trees might seem a good choice for the summer months when we are experiencing heat waves of 40 degrees Celsius for stretches of four or five days at a time (BOM 2013) but this choice might also make the street seem dark and oppressive in winter when the temperature is nine or ten degrees and overcast skies are common.

As a result of climate change, heat waves are likely to increase in frequency, intensity and duration (Akompab et al. 2013) and Australia is particularly susceptible with increasing extreme weather events (Patz et al. 2005). The micro climatic benefits of street trees in heat mitigation of urban environments (Oke 1988) are thus becoming increasingly important as is the need to be able to model these environmental impacts.

Maximizing the health and productivity of Urban Forests is becoming an accountable activity (McPherson et al. 2012). In cities facing great change such as Melbourne with its high number of trees nearing the end of their useful life expectancy councils will need to visually represent to the community why replacing ‘like with like’ (Shears 2009) will not always be appropriate. Without the community ‘buy in’ on trialing new more resilient and conditions specific trees the council may face heavy pressure to replant existing species regardless of the evidenced against it.

In this paper we provide the background of how street trees have traditionally been selected, how they have been modelled and discuss how recent advances in both software and hardware may potentially impact on how we model street trees in the future.

We go on to describe our method of bringing together important aspects of previous street tree modelling along with some of the new hardware and software such as parametric proxy object tree modelling with photometric daylight system modelling.

We test our new modelling approach on a case study area within Arden Macaulay are no the north of Melbourne, Australia and continue with a brief discussion and conclusion based on our findings.

Background: How street tree species have traditionally been selected

Preferred Species List

In the previous decade, when selecting tree species for streets, a designer would refer to the 'council preferred species lists'. The lists were based mainly on the civic image of that a shire or council: (Ely 2009) I.e. Moreland City Council, a suburb of Melbourne had a list with a high proportion of native and indigenous species (MCC n.d.) while the City of Melbourne list had a higher proportion of deciduous boulevard species (COM 1998).

How aesthetic values drive street design

In current practice, aesthetic values such as symmetry still play a greater role in street scape design than do ecosystem benefits; (Ely 2009) for example; larger trees on the north side of an east west street could be evergreen, providing shade for the road and footpath depending on their size and the street width. Traditionally street tree planting would be that the same species used on either side of the street but use of the same large evergreen species could overshadow the adjacent buildings on the south side of the street and make the street appear too dark in winter (Jim & Chen 2003).

How tree spacing can impact both the tree and the environment of the street.

The spacing between trees dramatically effects the qualities of the street environment. Spacing that is too close effects form, requiring trees to grow taller and narrower to compete for available light eventually leading to structural instability. Too far apart and the gaps between the canopies deplete the street scape legibility leaving an inhospitable low thermal comfort environment for cyclists and pedestrians during the summer months (Norton et al. 2013).

Trees as green infrastructure.

In recent years there has been a growing recognition of the ecosystem benefit trees provide in cities (Ely 2009; Young 2010). Their contributions include; mitigation of the Urban Heat Island Effect (Lindberg & Grimmond 2011), air temperature cooling through shade and evapotranspiration (Shashua-Bar et al. 2010), grey water filtration (Gómez-Baggethun & Barton 2013) pollution filtration (Maher 2013) noise attenuation, reduction of pedestrian UV exposure and thermal comfort (Parisi et al. 2000; Parisi et al. 2001). The understanding of urban trees as vital green infrastructure has led to large scale research projects which begin to quantify tree requirements for survival in complex urban environments (McPherson et al. 2012).

Tree model quality and why they are not currently used in precinct scale modelling

While it has been possible to model complex geometries such as trees, shrubs and grass with realistic results for over a decade there have been issues with balancing the level of realism with the speed of the model to regenerate or render for images that contain multiple complex objects. (Weber & Penn 1995) Even two or three polygon-heavy trees can slow down a model and make rendering times prohibitive. Precinct scale plans and perspectives may contain thousands of trees.

Modelling of precinct scale plans and perspectives is not popular as the realism of the trees is usually compromised through abstraction or reduction to minimum polygon 'billboards' (photographs of trees applied to flat polygon faces). Sometimes trees are left out altogether. (Radford et al. 1997)

Due to the difficulties of representing multiple trees in three dimensions, two-dimensional plans and sections; council 'preferred species' lists; and sometimes photographic collages are more commonly used than 3D models to discuss the role of street trees in the urban environment (COM 2012; COM 1998; DCC 2012; MCC n.d.). The result of this lack of three dimensional modelling means that the effects and requirements of trees have not been considered in an integrated manner (Ely 2009).

Current urban forest research is enabling more quantifiable strategic street tree selection. At the same time advances in computer software which calculates and replaces a mesh tree model with a 'proxy object' and hardware improvements, allow highly accurate tree models to be included in precinct scale digital models. This allows tree selections to be included in a rapid iterative design processes with enough accuracy to inform current urban design practice and assess some of the solar impacts of tree canopies over a trees lifetime / season.

2D tree modelling

In traditional planning documents, streets are represented in 2D cross sections and small portions of plan. These types of representation are primarily designed to show pavement and roadway widths, parking provision and building setbacks and are not really capable of expressing the quality of the street environment through the seasons or through the duration of the growth of the tree (Radford et al. 1997). In these drawings tree canopies are commonly represented at about two thirds of their ultimate size which they may take twenty years to attain. Canopies in plan are represented as a more or less a circle which hides some of the common pruning subtractions regularly made from urban trees to allow for building facades, power lines (Figure), tall vehicles such as buses and trucks, pedestrians and cyclists.



Figure 1. Photograph showing impact of pruning around power lines on Arden Street in North Melbourne.

The post-production ‘collage’ modelling

When 3D modelling is used, buildings and street widths are modeled and used to analyze spatial qualities and overshadowing but ‘post-production’ trees are commonly inserted as photographic montages as seen recently in the Swanston Street redevelopment scheme (Melbourne, 2009). This method can be visually compelling and can show reasonable tree shadows but the drawback is it’s intensively manual and inaccurate. To produce images of the street environment over the life time of a deciduous tree, good quality images of the tree in summer, winter and autumn are needed and at three stages of the trees life cycle, nominally five years, ten years and twenty years. Each tree in the montage is manually scaled to the perspective of the render and often scaled to the needs of the image composition rather than true dimensions of tree growth (3DArtistsonline 2007). This makes it an unsuitable method for rapid testing of different scenarios. It is used mainly for final presentation images after all decision making is completed.

2.5D tree modelling – GIS database modelling

In 2006 *Itree*TM was released by the USDA Forest Service. It is an open source, GIS database program and it allows for the creation an abstract model tree. This program has been used by the USDA Forest Service since 2005 to establish an accessible International tree growth database (McPherson et al. 2012) and by Melbourne City Council to catalogue and assess their urban forest. In the USDA case, complex urban growth parameters have been recorded for 17,000 existing tree specimens over 16 climatic regions over the last 10 years. The database can output a height over time predictive lollypop model for specific tree species under differing climatic, management and environmental conditions. This is groundbreaking for the management and selection of trees for the urban forest. The output is a very sophisticated data-rich abstract model, though does not assess complex three dimensional formal aspects of the trees.

3D low detail level tree models - ‘lollypop’ modelling

One method of modelling trees utilized by urban designers and others for a more detailed assessment of the environmental impacts of trees over time is commonly referred to as the lollypop tree or ball on a stick model (Voris et al. 1993). This is a very efficient modelling method which can be used for large scale planning but the drawback is that the visualization output is highly abstracted and cannot be used to assess 3D quantities of shade or aesthetic nuances between a deciduous or evergreen tree or represent individual tree species form.

The need for realistic visualizations to garner community support for tree species selection based on empirical evidence of that species long term ability to survive or thrive in highly specific climatic and environmental conditions is well recognized by urban designers and planners globally (Pettit et al. 2009; Shears 2009).

The production of visualization imagery for community consultation has been explored in a decoupled manner as real-time rendering has been considered computationally prohibitive (Grêt-Regamey et al. 2013). External databases or libraries of low-polygon landscape elements and vegetation which can be drag and dropped into a scene such as those developed for the Victorian Resources Online (Pettit et al. 2009) or as pre rendered urban design scenarios developed in a separate visualization software from given GIS database inputs have been explored in the past few years. These models use the GIS database for decision making and the 3D visualization as an advocacy tool (Grêt-Regamey et al. 2013).

Detailed 3D tree – high-polygon modelling

Tree and plant modelling has been developed for vastly differing purposes in a wide range of disciplines since the late 1960’s. In computational botany (Prusinkiewicz & Runions 2012;

Reffye et al. 1988) the aim of the model is high botanical accuracy. These models represent plants in realistic detail at close range but are often computationally heavy. In computer science the aim of the model has been to capture morphological aspects of plants in the most computationally efficient manner allowing for degradation of the model according to the distance that the plant is from the viewer ultimately aiming for realistic looking vegetation for real-time rendering in flight simulators, gaming and other virtual outdoor environments (Rebollo et al. 2006).

Trees are broadly modelled in three ways: Rule based / procedural models the most well-known of which is L-systems developed in 1968 by Aristid Lindenmayer and Przemyslaw Prusinkiewicz (Lindenmayer 1968; Prusinkiewicz et al. 1990); Image based models using photographs of existing trees either mapped onto billboards or a partially image based canopy mapped over a modelled trunk and branches (Neubert et al. 2007) and more recently; Sketch based models for touch screens (Longay et al. 2012). Many programs hybridize between the three approaches. The focus of each program is different ranging from high botanical accuracy, (Reffye et al. 1988) though to efficient polygon counts (Pettit et al. 2009), to user type (botanist or non-botanist), user edit ability and speed of model creation (Ganster & Klein 2008).

For our purpose we need a balance of both adequate botanically accuracy whilst being efficient enough to render in reasonable time frames.

Improvements in hardware and software

Processing power in personal computers

Processing power and graphics cards have substantially improved in the past fifteen years in affordable personal computers. In 1998, a high end computer used for modelling and rendering may have been a 400Mhz P2 64mb sdram running at 100 mhz with one or two voodoo 2 cards (90mhz core). The rendering for this paper has been produced on a 2013 laptop with an Intel Haswell 4 i7-4940MX 3.10GHz 32GB 1600MHZ DDR3 Memory NVIDIA GeForce Go GTX 880M 8GB. This simple comparison illustrates the incredible advances in personal computers (the ram alone is 500 times greater) and according to Moore's law (Schaller 1997), is an indication of what we should expect in the near future. Modelling with thousands or even millions of polygons is becoming possible.

Parametric proxy object modelling

In addition to improvements in algorithms which degrade the 'level of detail' of tree foliage according to the viewer distance from the object (Rebollo et al. 2006), there have been great advances in software that takes advantage of processor and graphics card hardware improvements by storing the geometry in the main memory or in the graphics card itself (Rebollo et al. 2007). The graphics card can store one render of the modeled tree and use algorithms to calculate the rest of the 'proxy objects' based on that first tree.

'Proxy object' modelling is now commonly available within architecture and animation industry software such as Autodesk's Maya™ and 3ds Max™. Taking full advantage of this modelling method is a parametric tree placement plugin by ITOO software™. This plugin allows thousands of trees to be included in a scene before the model begins to slow down prohibitively. Tree placement is managed through the plugin either by map, region or polyline meaning that the tree model species or growth stage can be replaced parametrically across the precinct in rapid succession. Spacing can also be set to 'self-adjust' by changing the object 'collision' settings. Manual tree placement in models of this scale would take days to adjust for a change in species in particular the change in spacing with many of the previous modelling methods discussed.

Render engines with photometric daylight analysis

Also now common animation software such as 3dsMax™, are the algorithms for daylight rendering which have been improved with photographic quality rendering possible (O'Connor 2010). There have also been advancements in light modelling for energy rating requirements such as 'Green Star' or 'LEED' rating (Reinhart & Breton 2009). It is now possible to calculate a grid of lux levels in a digital model based on daylight expected at a given time of day, for a given day of the year that takes into account direct sunlight, indirect ambient light from the sky and reflected light from surrounding buildings. These light meter grids are designed for internal use (to assess task lighting etc.) but here we are using them externally to assess light and shade levels of streets.

The software also allows control over the model to output the shade cast by the tree even though the tree model is turned off or rendered 'non visible'. The render output allows the shade of the tree(s) to be assessed without the obstruction of the canopy or structure of the tree itself (Figure) and data grid exported for further analysis in spread sheet form (Figure).

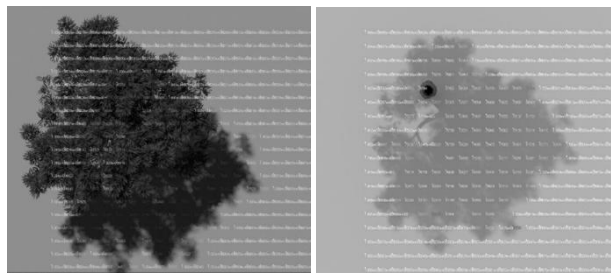


Figure 2. Rendered plan view of tree showing lux meter grid. LHS showing top of canopy, RHS showing the tree 'hidden' but still casting shadows.

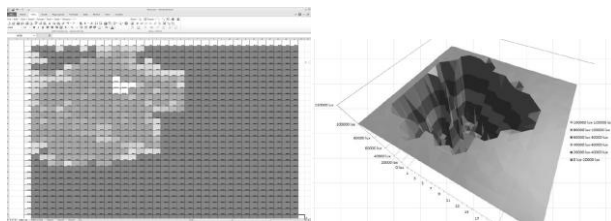


Figure 3. Lux meter grid exported to MS Excel for further analysis.

The aim

The aim of this paper is to demonstrate a new, rapid, integrated approach for precinct scaled streetscape modelling with highly detailed 3D trees. The approach is aimed at providing landscape architects and urban designers a swift method for quantitative solar/shade impact assessment; visual assessment; impact of tree development over time; impact of species selection; spacing; and positioning so that street trees are a more integral part of the street design process resulting in higher quality, resilient and more comfortable urban spaces.

Method

In this paper we discuss a new approach to street tree modelling which bring together developments in highly detailed and botanically-accurate algorithm tree modelling; increasing processing power in affordable personal computers; improvements in render engines with

photometric daylight analysis; and efficient parametric ‘proxy objects’ which allow large numbers of highly detailed three-dimensional representations of trees to be rendered.

We demonstrate this new approach to street tree modelling with a simple case study – modelling a precinct within Arden Macaulay a suburb within the City of Melbourne.

Case study application: Arden Macaulay

Arden Macaulay – an area of future change

Arden Macaulay is a precinct within the City of Melbourne which will be rezoned from industrial use to residential. By 2030 this precinct, which currently houses two to three thousand people is expected to house twenty five thousand (COM n.d.). The structure of the precinct will undergo great change from predominantly low rise one and two story buildings to multi story buildings between four and ten stories high putting pressure on public open space amenity. The green infrastructure of this precinct will be provided predominantly on the streets and the council is currently formulating a 40% canopy coverage strategy which means that this particular renewal area is set for dramatic change.

Applying the high-polygon parametric ‘proxy object’ and daylight assessment approach

The modelling shown here is our first test of this rapid high polygon parametric proxy object and daylight assessment approach applied on this precinct of Melbourne.

We built a simple 3D model of the precinct using a mix of the council’s cadastral data, Lidar contour data and 3D textured buildings using Google Building Maker™.

The individual tree models we used for this test combined the empirical modelling techniques of L-systems with parameter based controls (Lintermann & Deussen 1999). The tree models combine high level botanical detail and potentially photo-realistic material qualities and high quality shadows, the accurate of which is the topic of concurrent ongoing research.

The parametric L-system trees were converted proxy objects and then parametrically arrayed along footpaths so as to allow rapid adjustment of tree spacing or tree size and species. A variety of tree species were tested as well as different spacing’s and different times of the year.



Figure 4. Aerial rendered view of Arden Macaulay area showing planting of: *Corymbia maculata*.



Figure 5. Aerial rendered view of Arden Macaulay area showing planting of: - *Corymbia maculata*, 20m spacing.



Figure 6. Aerial rendered view of Arden Macaulay area showing planting of *Corymbia maculata* 7m spacing. Summer.



Figure 7. Aerial rendered view of Arden Macaulay area showing planting of *Platanus orientalis* 7m spacing, Summer.



Figure 8. Aerial rendered view of Arden Macaulay area showing planting of *Platanus orientalis*, 7m spacing, Winter.



Figure 9. Aerial rendered view of Arden Macaulay area showing planting of *Platanus orientalis*, 20m spacing, Autumn.



Figure 10. Aerial rendered view of Arden Macaulay area showing planting of *Platanus orientalis*, 20m spacing, Summer.



Figure 11. Aerial rendered view of Arden Macaulay area showing planting of *Platanus orientalis*, 20m spacing, Winter.

As the model was parametric, simple parameters were able to be adjusted and the model would update immediately. To change the species of tree was just a matter of clicking to substitute the original high-poly tree model with another.

A lux meter grid was also set up to measure light levels on the street and footpath, with readings taken for each of the different scenarios. The lux meter grid was calculated with a few seconds and was exported to Microsoft Excel via a .CSV exchange file for further processing which allowed qualitative comparisons of the data.

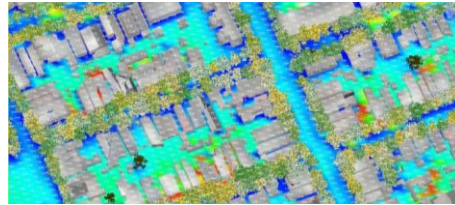


Figure 12. Aerial view of lux meter analysis of the Arden Macaulay area of Melbourne assessing light levels of the street taking into account tree shade and light reflected from building forms for 4pm 21st of June.

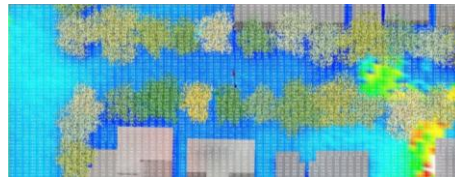


Figure 13. Plan view of lux meter analysis set to higher resolution for the Arden Macaulay area of Melbourne assessing light levels of the street taking into account tree shade and light reflected from building forms for 4pm 21st of June.

Discussion and conclusion

This method allows for several thousand trees to be included in a scene without making the model untenably slow to regenerate or render. The models are accurate enough to measure canopy projections under zenith angle when rendered with the photometric sun producing realistic images of quantities and qualities of shade in urban design scale projects. In this study we were only looking at shade and accurate iterative visualization but there is scope to develop the method to output eco-system benefit, micro climate and thermal comfort mapping.

Future research is required to ascertain if the models can be calibrated accurately enough to output other predictive measurements such as leaf area index, leaf area volume and rates of evapotranspiration of urban trees in specific microclimatic and spatial conditions such as pruned for power lines, facades, footpaths and road clearances, low light availability and constricted soil quantities.

This new approach to modelling street trees could potentially be used by urban designers and landscape architects working with Councils to supplement GIS/database decision making, allowing solar impact and visual assessment alongside other less three dimensional aspects of tree data.

Being able to present change involving trees in an iterative manner which expresses their visual and shade impact in very realistic terms may be beneficial to the study of urban forestry and presentation of the strategic decisions it makes possible and potentially be a powerful advocacy tool.

Our research allows further analysis of the impact of large scale tree planting or replacements. It makes a contribution to an iterative street design process where multiple scenarios and multiple species can be tested and assessed quickly at different stages of growth with a reasonable level of accuracy, using detailed three-dimensional representations of trees at various growth stages in a spatial environment which provides accurate sun positioning and therefore shade qualities through its photometric daylight system. This method raises potential further investigation of the three dimensional street qualities with the additional dimension of time – looking at how the movement of the sun over different times of the day and different angles throughout the year might influence the design of north-south or east-west streets.

Our initial results of using this new approach to street tree modelling demonstrate that it is now feasible to use high quality three dimensional polygon street trees in urban models with photometric daylight analysis. We are now able to assess the solar amenity and shade impact of a variety of tree species at different seasonal and time intervals with an iterative design process allowing multiple scenarios to be tested effectively in short periods of time.

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The recomposition of urban public spaces. Case study of the historic centre of Noale, Italy

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Abstract. *The theme of this paper is the recomposition of public spaces in the ancient town when compromised by old and recent speculative interventions. The working method is based on the belief that, in the study of urban morphology, is basic to analyse the history of the city, clarifying the relationship between permanent structures on the one hand and temporary ones on the other. The history becomes an indispensable tool to know the deep reasons of the urban structure which is the memory and the image of the community. The paper is based on fundamental 1960s studies and following about typological analysis (Aldo Rossi, 1966; Carlos Martí Arís, 1993) specifically oriented towards the theme of public spaces. The spatial aspects and formal image of the transformations in the city are studied as a premise for the design of the new architecture. Noale, not far from Venice, was one of the subjects the students on the course of Architectural and Urban Composition 2 at the Department of Civil, Environmental and Architectural Engineering of the University of Padua specifically investigated as an opportunity to redesign the unity of the historic centre of this town that had previously been lost.*

Key Words: Memory, history as a tool for the project, public space, city centre

Introduction

The town of Noale, which has about sixteen thousand inhabitants, is situated at an equal distance from Venice, Padua and Treviso. The centre of the town is crossed by the busy regional road No. 515 Noalese, in a rural area that is completely flat and marked by the remains of the Roman 'graticolato' grid system, a checkerboard of land division that goes back to the time of ancient Rome. The ruins of the medieval castle and the course of the Marzenego river enrich the site of the city.

A lively centre as far as social and economic life are concerned, Noale still has some unresolved issues in the relationship with the wider urban area that bears witness to its rich past. The city in fact shows aspects of pronounced inconsistency related to random and disproportionate architectural constructions built in successive periods of the last century, and heavy car traffic. In particular, it seems disorganized in the form of the fabric of the area today called Largo San Giorgio, located east of piazza XX Settembre, the centre of nineteenth century Noale. This paper concentrates on the Largo San Giorgio area, and also considers some nearby areas of the historic city.

With our students on the course of Architectural and Urban Composition 2 at the University of Padua (regular professor Enrico Pietrogrande, coworkers Adriano Rabacchin and Alessandro Dalla Caneva, academic year of 2012-13), we studied new architectural proposals to recompose the unresolved condition of the Largo San Giorgio area based on analyzing the history of the village to understand its urban morphology. This is an indispensable tool in discovering the underlying reasons for the development of the urban structure, which forms an indelible reminder made in the image of the community. Fortunately, enough traces of the previous physical reality remain for understanding the morphology that underpinned the urban evolution to be recognized and read. Students were required to modify the existing buildings whenever they are in conflict with the surroundings. This request assumes that history is an instrument in opposition to the museumification of the historic city and in favor of its transformation since in

terms of structural features it accepts the insertion of new buildings in the historic urban fabric on condition that these are planned by studying the pre-existing organization of the space, the construction system, and the urban relationships of the buildings with the environment from a planning point of view.

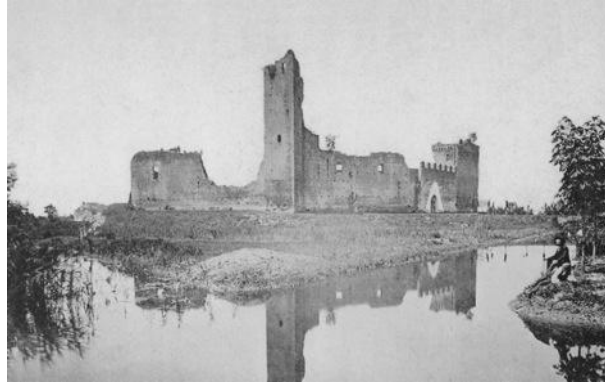


Figure 1. The ruins of the Tempesta family castle in Noale. Picture taken at the beginning of the last century.

The idea that the transformation and the protection of the urban landscape can occur according to a unitary process is the basis of the teaching experience described below. The assumption is in line with the main contribution of the most advanced teachers in Italy on this subject at the University Institute of Architecture in Venice during the second half of the twentieth century, the so-called School of Venice. According to them, the relationship between a city and architecture, referring to the city's scale in the study of architecture, is the fundamental fact that is at the origin of an effective theory on the project, which defines a synthesis between analysis and design, architecture and urban planning. Aldo Rossi was an architect and a teacher particularly relevant in the School of Venice. He insisted on the absolute consistency between the analysis of building and urban analysis, emphasizing the importance of finding precise relationship between architectural and urban structures (Rossi, 1970). His fundamental 1960s studies about typological analysis, specifically oriented towards the theme of public spaces, were published in 1966 in the book *L'architettura della città* (Rossi, 1966), in which the spatial aspects and formal image of the transformations in the city are studied as a premise on which to base the design of the new architecture.

In the teaching experience presented in this paper the first phase of the project the students had to elaborate was composed of analyzing the land registry survey map and written, pictorial, photographic records, in order to acquire informations about the past of the city centre and study the relationship between architecture and urban structure.

Context

The development of Noale, village of late Roman origins, occurred during the medieval period in conjunction with the construction of the castle of the Tempesta family (Figure 1) and the fortification of the village. The castle and the fortified village, surrounded by ditches fed by water from the Marzenego river, constitute the core (even today easily identifiable) around which the city expanded (Figures 2 and 3).

The area on which students focused attention extends east of the ancient village, at the convergence of roads coming from the towns of Mestre and Mirano that originated in the encounter point piazza XX settembre, the 19th century Noale centre. Here a new space took shape, that is today without order in the arrangement of buildings. This space, that stands at the

east limit of piazza XX settembre, is named Largo di San Giorgio (Figure 4).



Figure 2. Noale: planivolumetric representation of the current condition. The area is cut vertically in two parts by the regional road No. 515 Noalese. The old castle and what remains of the ancient fortified village are to the left, while to the right is possible to see the town later developed with the triangular piazza XX settembre and the two convergent roads from Mestre and Mirano. From the work of the student Silvia Tarallo.

The dedication to San Giorgio derives from the name of the church and the hospital which stood in the area already by the second half of 13th century and were complemented by a convent at the beginning of the following century. In the early years of the 15th century the church and the hospital were demolished and rebuilt with larger size, the church where previously insisted with the façade on the current piazza XX settembre (Figure 5) and the hospital on the other side of the road to Mestre. The convent, behind the church, was enlarged a few years later and housed until 1769 the Minor friars religious order.

Then, after the expulsion of the friars, the landlord Diodato Bembo purchased the property and proceeded to recast the church eliminating some parts (such as the sacristy, the bell tower and the additional nave) and to build in 1770 palazzo Bembo (Figures 6 and 7), a “building with portico that delimits even today the piazza XX settembre on the east side” (Dal Maistro, 1994). In the same period boundaries with the road to Mestre were also modified and the convent was demolished.

From that moment, the church of San Giorgio lost importance, until in the last years of the 19th century it was demolished too. In subsequent years, the area did not undergo further revisions as regards the boundary on piazza XX settembre while on the back, to delimit the part that we call Largo San Giorgio and which constitutes the project area in the workshop conducted with the students, two buildings aligned on the road to Mestre were constructed, a covered market (Loggia del mercato) in 1930 near palazzo Bembo, and an imposing building designed to accommodate a bank in 1910.

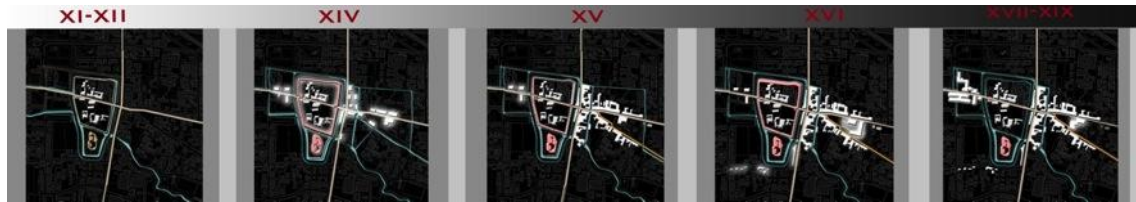


Figure 3. Noale: growth of town from the 11th century to nowadays. From the work of the student Silvia Tarallo.

Current problems

The area of intervention today has very special connotations. Piazza XX settembre continues to be in fact a node of fundamental traffic as the place of intersection of the roads to Mestre, Mirano, Padova and Treviso (Figure 8). It isn't managed as a square, but rather as a parking lot, and for the characteristics of the traffic that has got, this place has become a roundabout road.

To the state of decay of the piazza is to sum up a veritable state of degradation of the specific area of intervention, largo San Giorgio. Here, near the mansion built by Bembo on the square in 1770, the bank and to the Loggia del mercato, have arisen from many years, so random and disordered, a new housing block, several garages, a two storey house with run-down aspect and other incoherent volumes.

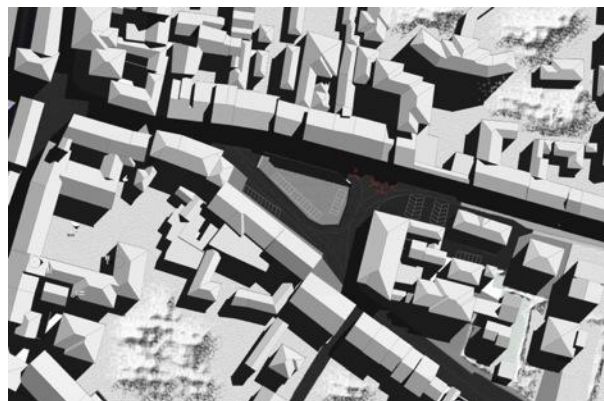


Figure 4. Piazza XX settembre, planivolumetric plan of the current state. The Largo San Giorgio area is located east of the piazza, delimited by the piazza itself, the road to Mestre (north side), the road to Mirano (south side). From the work of the student Silvia Tarallo.

Largo San Giorgio has therefore today the following negative characteristics. First of all, the discontinuity of the volumes on the front of the road to Mestre, culminating in a empty space, which is also a parking lot, at the point where the road originates from the square. Then the neglect of the area behind the building of the bank, a garden not cared and unused. Finally, the low quality of the façade on largo San Giorgio of the new residential building which has the main front located along the road to Mirano.

It's then necessary to dedicate a reflection to the viability of the zone, with regard to the system of the car parks and the traffic of cars and bicycles. In the area there are many car parks: the road to Mestre has parking on both sides, the piazza XX settembre is used as a car park, largo S. Giorgio and the area behind the Loggia del mercato have also the same function.

About the road system it's then interesting to observe the management that is set in such a way that piazza XX settembre is actually a roundabout with a single access road, the connecting

road between Noale and Mirano, and a single track of output, the connecting road between Noale and Mestre. The road that leads into piazza XX settembre at the western boundary of this is instead only accessible from the residents.

The complex system of automobile roads is accompanied by a system of partial bike paths that passes through the piazza. It is important to emphasize that the study of the organisation of the roads of the area has been amended several times recently and that it's still intention of the Public Administration of Noale to find a definitive solution different from the current.

The didactic experience

Two of the four projects presented here refer directly to the object of the study, the Largo San Giorgio area. The project proposals from students that put the stress on this area originate from the same premise, that is considered unavoidable: the premise that the area could be redeveloped with the demolition of the incongruous constructions, finding solutions that are conscious of the character of the place and that are able to pursue, in the intentions, a formal recognition of the place as being progressively lost within the community.



Figure 5. The church of San Giorgio in 1890, a few years before the demolition.

The issue of formal recognition refers to the possibility for people to belong to the place where they live through a process of symbolization of form. In fact, as stated by Cristhian Norberg-Schultz “the term ‘establish’ does not indicate a purely economic term, but an existential concept, which denotes the ability to symbolize meanings. When the artificial environment is significant, the man feels at home” (Norberg-Schultz, 1979). In this sense, the proposed projects represented a rather ambitious attempt to attend, in the project design, to the formal features of the tradition of Noale to rediscover and renew continuity with the historical memory of the community. The simple shapes that students often refer to in the project have this aim. The possibility is that these will be recognized by the people collectively, thus recalling a civil dimension of architecture in which a community recognizes its being in the world.

“I therefore support a civil dimension of architecture”, Malacarne wrote, “in which urban and architectural forms are the reflection of a collective experience that can minimise the individual aspect of the works by subjecting the form to an idea intended to be intelligible and even shared” (Malacarne, 2008).

Therefore, the project is part of the dialectic of the historical process in which preserving and building are components of the same act of consciousness. It is thus passed the irremediable antagonism between conservatives and innovators because the restore has to be understood in the sense of a re-enactment of the past and the building activity as a continuation of the historical process. In this regard Ernesto Nathan Rogers explains: “Many, who think to be innovators, have in common with so-called conservatives the wrong that both have deep-rooted prejudices, thinking that new and old are in opposition instead of representing the

dialectic continuity of the historical process. One and the other don't go beyond the veneration for certain fruitless appearances. They are not able to penetrate the essences of the styles, pregnant with inexhaustible energy. To try to a priori build in a modern style it is equally absurd to impose respect for the taboo of past styles" (Rogers, 1958).



Figure 6. View of the Bembo palace, built in 1770 aside the church of San Giorgio (1950).



Figure 7. Piazza XX settembre, with the Bembo palace to the right. The church of San Giorgio stood in the empty space aside the palace. Picture taken in 1960.

The first project of the student Valeria Gallana (Figures 9, 10 and 11) starts from the assumption of attributing to largo San Giorgio a public dimension. Gallana imagines to structure the empty space derived from demolished volumes through the narrative sequence of courtyards that reinterpret the idea of the Noale courtyard, inside which, in two of the four cases, a cylindrical volume refers to the typological idea of a building with a central plan. Therefore the court, as a formal feature belonging to the town of Noale, becomes the pretext for the invention of the design. The narrative sequence begins exactly where the demolished church of San Giorgio once stood, a space now turned into a court by walls of separation that found a link with the ancient wall with arches, which is all that remains of the vanished church. The court presents in the internal organization the same plan of the church reinterpreted as an outdoor garden. In a non-random way, another garden is located in the hollow cylinder at the conclusion of the narrative staged by the student.

The four courts each with a specific role have different hierarchies. The principal court to which the smaller ones are related has a close relationship with the Loggia del mercato that becomes the pivot around which the entire composition is disposed. The minor courts set out on an axis arranged to skirt the main public space are occupied inside by a building which, as

already stated, refers clearly to the idea of a central plan: cylinders that house within them, respectively, an exhibition hall and a secret garden for temporary sculptural exhibitions. The two cylindrical volumes are related to each other by a portico with two levels that mimics the classic idea of the *stoà*. Its presence is essential for at least three reasons. Firstly, to play the role of a system of relations between the cylindrical buildings; secondly, to separate the main space of the square from the private space giving access to existing residential buildings, thereby establishing an appropriate relationship between public and private space; and thirdly, to make a backstage area for the main square. The rhythmic pattern of the portico provides a principle of decorum to the square itself.



Figure 8. Noale, aerial view from the east. You can see the two roads, coming from Mestre (to the right) and Mirano (to the left) convergent to the piazza XX settembre.

The second project of the student Silvia Tarallo (Figures 12, 13 and 14) aims to redevelop the area through the achievement of a new market square. The square is exactly arranged in close relationship with the Loggia del mercato, the real pivot of the whole composition built during the Fascist period. The new square increases the value of the important pre-existences of the area as the cube-shaped building by classical form placed on the west and the same Loggia del mercato.

The module that marks the rhythm of the arcade of the Loggia del mercato is an opportunity to define a geometric trace on which the other volumes of project lie according to the well-known principle of unity in diversity: the tower and the public library.

The modularity of the geometric grid is achieved not only on the horizontal but also on the vertical plane, knowing that the geometry is only a means and not a goal through which you can pursue the aesthetic idea.

On the rhythm identified by the square module, the arcade with double height marks the square on the south. It's understood as a *promenade architecturale* that links the tower to the public library. The whole board of the pavement is related with the same grid. The identity of the library is here achieved through the arrangement of a body on the top that, mentioning the form of a classical temple, would metaphorically alluding to the sacred value of the library as a place custodian of knowledge.

The student put special effort to make clear the nature of the library of which appeared important to make clear not so much its way of functioning, but rather the representation of its value. Partly this explains the design process of the student who wanted first of all to think to the image that the library must have got and only later the way in which it must functioning, according to the assertion still considered valid of Étienne Louis Boullée for which the architecture is not the art of building and "we must first conceive and then we can build. The ancients built their huts only after having conceived the image (...). The art of building is therefore only a secondary art that we can define the scientific part of the architecture" (Boullée, 1780-1795).

Aldo Rossi who based the study of the city on its shape – “I always refer to the shape and architecture of the city, not its institutions” – came to the conclusion that the identity (of the form) depends mainly on the form itself, rather than on reason of a functional nature or, more generally, on political, social and economic values. This is especially clear in the direct words of Aldo Rossi, who, for example, expresses his opinion in these terms about the Palazzo della Ragione in Padova: “When you visit a monument of this kind, one is struck by a series of issues that are now intimately linked. Above all, one is struck by the plurality of functions that a building of this type can hold, functions that are quite independent of its form. It is this form that remains clearly imprinted in our mind, which we live and perceive and that, in turn, structures the city” (Rossi, 1970).

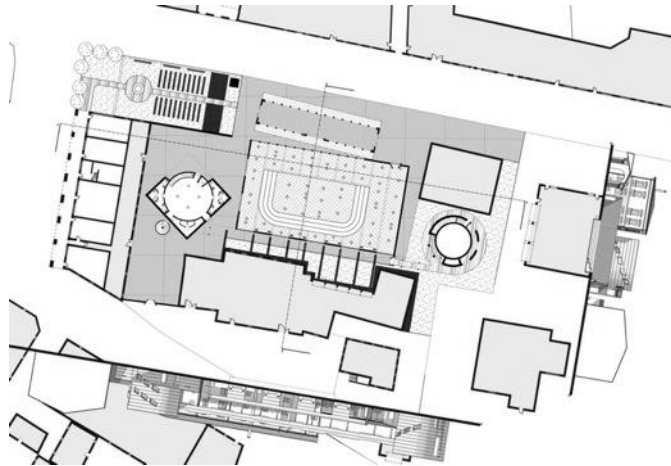


Figure 9. Project for the requalification of the Largo San Giorgio area in Noale proposed by the student Valeria Gallana. Ground floor plan.

The arrangement of the portico-loggia, as in the case of the project presented by the student Valeria Gallana, has the function of cleanly separating the public space of the square from the private space for access to the residences on the northern face of the square.

The city's tower, besides suggesting the presence of the lost tower of the church of San Giorgio, is a memory of the towers that make recognizable the secular square and the religious look of the figurative tradition that is found in Italy and beyond.

The scope of intervention chosen by the student Giacomo Orlandini (Figures 15, 16 and 17) regards a focal point of the historical residential buildings of the city of Noale, immediately behind the historic piazza XX Settembre. It corresponds to the long path that is perpendicular to the north front of the triangular square and connects this one with outlying parking space in the Piazza della Bastia at the point where the city meets the historic expansion of the twentieth century, recently completed to extend into the countryside. Piazza della Bastia has a close relationship with the railway station.

The choice to act on that connection axis originates from an unavoidable premise, namely that of redeveloping a historic pedestrian path, now Via De Gasperi, which has over time gradually assumed an increasingly important role in the system of relationships of the city. In fact, historical analysis has shown how a secondary path has with the advent of modernity become a privileged axis joining the historic centre and the train station. It was once a lane leading into the country through the private gardens of the Soranzo family, owners of the eponymous palace that now houses the public library.

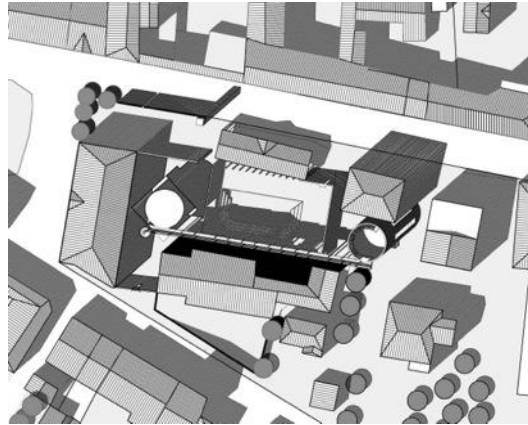


Figure 10. Project planivolumetric plan proposed by the student Valeria Gallana.

The project aims to enhance the pre-existing environmental and historical conditions, tailoring them to the needs of the contemporary world, finding a formal relationship with the existing logic based on the paratactic arrangement and alignment of the long, narrow lot of medieval origin. The project is expected to recover, complete where possible, and extend what remains of rural housing, partly demolished during the World War Second, of which only traces remain in the sediment, arranged laterally along the connection path in long and narrow segments. The planned extension of the path is an opportunity to organize the volumes of the project around a courtyard, making a public space to pause along the way, but without invalidating the disposition of the parts according to the type of block built in depth. The proposed continuity with history, found through the use of a building material like the brick typical of the Venetian tradition, is accompanied by the will to respond to the demands of the community. In this sense, the project is intended as a cultural hub characterized by the presence of a museum and a public library to complete the existing library of Palazzo Soranzo. These buildings have their own individuality, each with its own recognizable form. The student's desire has been not to connect the entrances directly to the courtyard, but to intermediate spaces under the open sky and with an intimate character, echoing the medieval idea of secret gardens, where the controlled presence of trees and water suggest and demonstrate the picturesque character of the space, that belongs to the figurative tradition of the Middle Ages. This being a predominantly mediaeval environment, it seemed appropriate to stress the picturesque atmosphere of the place through a careful composition of asymmetries and misalignments, both in the plan and in elevation, rather than the symmetries that suggest a research mode of monumental effect, this not being considered suitable to achieve a formal mimesis with the existing environment. Rounding out the idea of an *ortus conclusus*, the volumes of the project are contained within the existing side walls, ancient elements of separation of property. These walls are reclassified and shown as elements of separation through a discontinuity with the buildings of the project, obtaining a functional gap in the perimeter circle of the water, an element that characterizes the atmosphere and history of the town of Noale.

The area of intervention chosen by the student Diego Bonaldo (Figures 18, 19 and 20) is located near the castle. Located in a space with an irregular trapezoid shape, it is defined by the presence of two permanent features: the environmental one of the Marzenego river and the artificial one represented by the axis of the main road linking Padua to Treviso. The area is located within a broader historical residential zone of support for the industrial district, built in the Second World War, which marks the limit of the partition between the historic city and the city of the new expansion. Historical analysis has shown that this area has remained over the centuries an empty space, only characterized by the presence of temporary wood buildings during the sixteenth century, defined by the presence of a residential building in the Napoleonic period, in line with the road leading to the territory beyond the city limits.

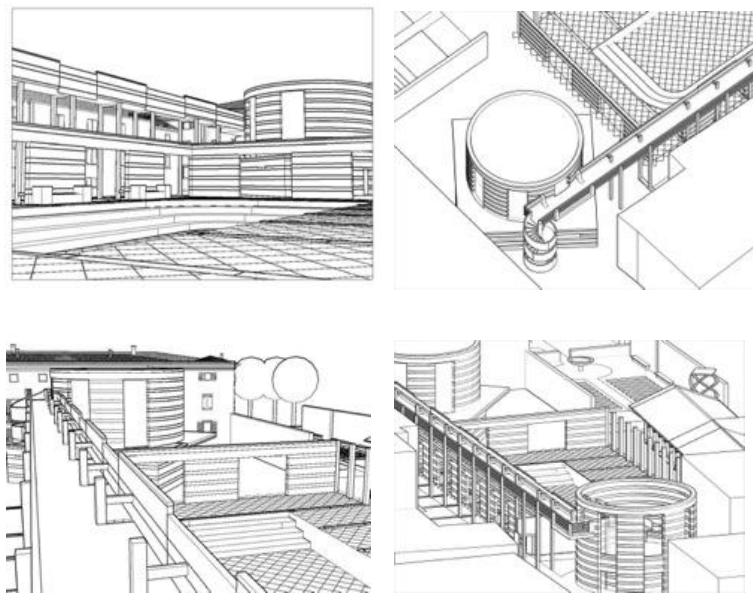


Figure 11. Views of the solution proposed by the student Valeria Gallana.



Figure 12. Project planivolumetric plan of the Largo San Giorgio area proposed by the student Silvia Tarallo.

The student decided, through more general morphological analysis of the city, from which he identified the particular character in the formal arrangement in depth of residential lots at right angles to the main road, to think of the project as a theoretical opportunity to revive the residential settlement in an existing line according to the type of the Gothic lot - long, narrow and perpendicular to the road, thus finding an analogy for and continuity with the historic city. The existing residential buildings are not changed in their appearance, so as not to lose the historical memory of the urban façades; however, the internal layout of the accommodation is redesigned, in keeping with the standards of quality of modern life, while a new element is the fragmentation of the property with external partition walls opposite the main facade, interpreted in the logic of the lot built in depth. The student was given the opportunity to rethink the two existing buildings facing north, the result of a late addition that is inconsistent with the existing buildings, through the provision of two volumes closing the northern front, a library and a small

exhibition space that meet the expectations of the community. The position of the two volumes plays a strategic role in terms of the urban view, becoming the fulcrum around which the public life of the residential district revolves. By virtue of this, the student decided to propose urban forms in an easily understood and recognizable form, directly linked to the history of the forms of historical tradition: the cuboid and the cylinder. The first contains the library, the second the exhibition space. This clear typological reference to buildings with a central plan of classical tradition and beyond becomes in particular an urban sign capable of interacting with its surroundings through its cylindrical shape and vertical rise, making it visible from a distance. The use of simple shapes stems from the belief that the specificity of architecture is to be attributed to the ability to produce typical forms, of general and popular impact, able to represent the collective memory: "I believed and still believe that if monuments are to be meaningful, they must not be difficult to understand. Therefore they should make contact with common awareness using patterns or stereotypes proper to the figurative universe of the masses and of all people together: they must belong to the common consciousness" (Polesello, 2003).

One last sign is placed to complete the composition. The presence of a high wall, pierced towards the castle, that follows the topographic trend of the site, designed to protect residential life, separating it from the existing public path which follows the course of the Marzanego river.



Figure 13. Project planivolumetric plan of the Largo San Giorgio area in Noale proposed by the student Silvia Tarallo.

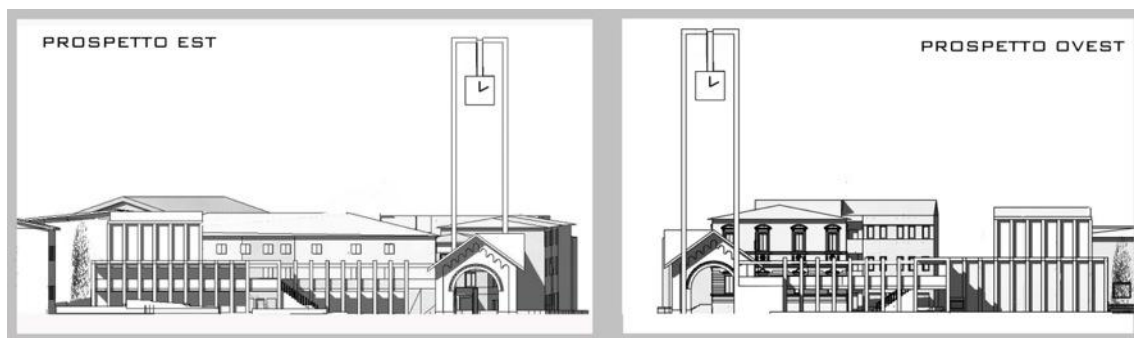


Figure 14. Project planivolumetric plan of the Largo San Giorgio area in Noale proposed by the student Silvia Tarallo.

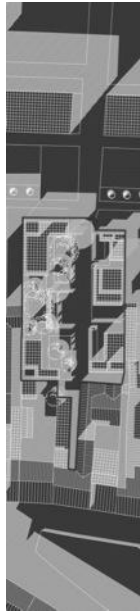


Figure 15. From the work of the student Giacomo Orlandini. Planning solution of the footpath from the new car park to piazza XX settembre and Largo San Giorgio, planivolumetric plan.

Conclusions

The study of the relationship between architecture and culture of the city lies at the heart of the above displayed planning hypotheses. In-depth study of the history of Noale is an instrument that clarifies the main aspects and opportunities. In particular, the research into the transformations of the spaces and shapes developing through time represented an indispensable premise for checking the planning proposal that aimed at reconstituting a coherent urban fabric in which residential and touristic uses play a role in connecting the distinct monumental phenomena present.

The investigation of the history of the city formed the basis of the project solution illustrated above, in harmony with the belief that in teaching it is essential to promote a synthesis between knowing and doing. The study of what is already present in the area and the broader historical-building framework is an essential tool in the promotion of a new cultural layout based on the needs of the area.

The future image of Noale also depends on the choices that will be made about the old city. The search for a formal reordering is motivated by the conviction that architecture is a fundamental means for promoting a new cultural and social asset in the areas investigated, where the new architecture draws inspiration from the needs of the territory. The on-going teaching experience at the University of Padova has also proved to be effective in making the relationship between lecturers and students a cohesive one.

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Landscape design methods for surrounding mountain tops Yama-ate in Murakami Castle Town. *A test of GIS analysis*

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Abstract. *The crowned mountaintops of Japanese castle towns are visible from the streets. This landscape composition is also common in East Asia, for worshipping Nature – a landscape design worthy of consideration. Although landscaping phenomenon can be verified via large-scaled maps, for specific aims, worship for example, it must be processed with scientific accuracy. Thus, this paper concerns itself with the relation between mountaintops and street centrelines; typological location accuracy needs GIS and GPS. With the numerical data from types of Object Roads, the Murakami Yama-ate shows three characters: i) its Object Road as framework, it holds a specific Vision Axis, ii) its periphery roads get twisted, so the Axis is adjusted to face Mountaintop, and iii) its Axis slides sharply; the appearance of Mountaintop becomes vaguely unpredictable. This research, concerning the Yama-ate Object Mountains numerically, believes in, also, the necessity to make these Mountains manifest from their histories, poetically; four points yielded, i) the Water God Animism in Miomote River, ii) Compass Direction, iii) Location and Boundary seen from the sea, and iv) Distribution of Ancient tombs and Castle. These four points are relevant to Murakami Mountains; historical and religious aspects are inseparable from their life on a day-to-day base.*

Key Words: Landscape design method, Sacred Mountain, castle town; GIS; Yama-ate.

Introduction

Research background and purpose

Basing on the Japanese aesthetic sense, the urban compositions of castle town are distinguished for their formative Arts of landscape, for the nature features and climates; topography and geological features were all respected and adopted in structuring urban design thinking. The main street of each castle town, built perpendicularly to the castle-crowned mountain, provides the pedestrian “Yama-ate” – facing the mountain castle view – including Shinto Shrine, Buddhist Temple and the Turret of Castle along the landscape axis. Renovating river for flood control, drawing river water for town use and so on was well planned. The town dividing and urban planning were done with religious respects to the sacred mountains and castle foundation banding with Nature.

Such urban composition was verified and common in Japan and other countries in the East Asian Continent, banding their life to surrounding mountains, paying respects, religiously, to Nature and perhaps even animism – a landscape design thinking with ecological wisdom and order, a way of urban construction working hand in hand with local culture – the ancient methodology worthy of consideration.

This research team, whilst intending to reveal the actual conditions of Yama-ate in bibliography 1) & 2), 3), has acquired the knowledge, by and large, of most castle towns and the adjacent cities in Japan. And so, this team is strongly conscious of designing the Mountain View enflaming the castle-crowned scene in particular, and those natural phenomena that are irrelevant to Yama-ate are roughly divided (from this research). Hitherto, this team consciousness is so far a hypothesis, and the designing intention of Yama-ate, planning and methods, are not yet verified.

This research employ the precise measuring capability of GIS, seeking to discover the *then* actual designing process of castle town from researching the landscaping of Yama-ate by means of GIS data examining. Then, studying these collected numerical data to reveal the characteristics of object roads, of the local culture associated with mountains, of documentary literature (about animism phenomenon for instance) and so on and so forth, this research concerns itself with the actual condition and wish to let the actual situation of the then castle town motivated Yama-ate design become manifest.

Research methods

This research starts on from making the data map for analyzing Yama-ate by GIS. The research team, to begin with, adopts the “2500 Base Information Map” issued by the Geospatial Information Authority of Japan and makes the Base Map of Murakami City; bettering up the map by using the geometry compensation tool of ArcGIS, and piling this map upon the historical map, this methods, piling and making a two-fold maps, reflecting the past and modern days, helps to recover the urban structure from the Feudal Regime. Next, adopt, again, the “Surveying Reference Point” published by the Geospatial Information Authority of Japan, study the historical documents, this research team then is capable of verifying the entire coordinates of mountaintop points from the old town below the castle-crowned mountains.

Secondly, this research team tries to specify the methods by GIS, tackling the relationship between streets, moats and Mountaintop. Thirdly, describe the actual condition of Murakami Castle Town and its urban structure.

Fourthly, the team considers it a mission to verify the “Yama-ate” by inspecting the real historical situation. The particular features of the road to visualize the Yama-ate are collected, made as numerical data; three types of Yama-ate are classified to present the characteristics of each Yama-ate. About the Object Mountain, the culture-historical literature since the middle age are reviewed and researched.

In the light of the above action, the urban structure and Yama-ate of Murakami city may become manifest.

Previous researches

Besides the documents 1) and 2), 3) mentioned above and the series of group research directed by Agemura and Tsuchida about the castle in Satsuma 4), the research proposed by Takami 5), applying Visual Axis and Vista, as the major design methods, to design modern castle towns. Also, in Kirishiki 6) and 7) the relation between Edo and Mt. Fuji, between Edo and Mt. Tsukuba and between Sunpu and Mt. Fuji was discussed in 8). And further, Yamamoto 9) also discussed the Vista method to frame the castle Turret and the donjon, the castle tower in Sendai, Kumamoto and Hirosaki, including each “Yama-ate.”

All these were done in accordance with field inspection and small scaled maps; a phenomenon, as a piece of verified phenomenon, can be nothing but a reference; the methodology of numerical measurement, investigation on document, reports or historical literature would end up producing another investigation report without precise, edgy and convincing results. Thus so, this paper concerns itself with how to obtain accurate and specific results by means of GIS analysis with documentary investigation in field inspection, and with how to grasp the basic data for the legitimacy or ground to infer the original design intention of the Castle town. Also, Zhao 10) presented the study, using the concept of “landscape corridor,” analyzing the relationship between the castle town and the periphery mountain. Higuchi 11) concerned himself with the blocking factors in the horizon, or within the vista of Yama-ate. All these, however, are studies basing on vista methods or documentary literature without the accurate measurement as the legitimate ground for research. Although Takamori’s researches, 12), by computing the topographical data and information collected from a significant wide region, did work out the “road ratio” of Yama-ate in this region and be approved as significant

level of studies statistically, Takamori's researches were not done by means of specific measurement and mathematic analysis; viz. measuring from the visional point where the viewer stands in the main street, for example, and face the mountain through the visual axis perpendicular to the crowned mountaintop.

Definition of technical usages (Figure 1)

Basing on the usages used in the previous researches, their definition are given below:

1. Object Road: The Road, Moat or River verified in the Vista of Yama-ate and Turret.
2. Object Mountain: the Mountain that faces the Object Road.
3. Field of Vision (point a): the starting point in the center line of main road that faces the Mountaintop.
4. Center Point (point b): the Vanishing point in the center line of main road that faces the Mountaintop.
5. Mountain Top (point P): the top of triangulation point is the Mountaintop, or the coordinates of Mountaintop.
6. The Center Line of Main Road: The line linking the Field of Vision (point a) and the Center Point (point b) on the ground plan.
7. Mountain Line: The line linking the Field of Vision (point a) and Mountaintop (point P).
8. Internal Angle of Lines: (α) the horizontal angle between The Center Line of Main Road and Mountain Line.

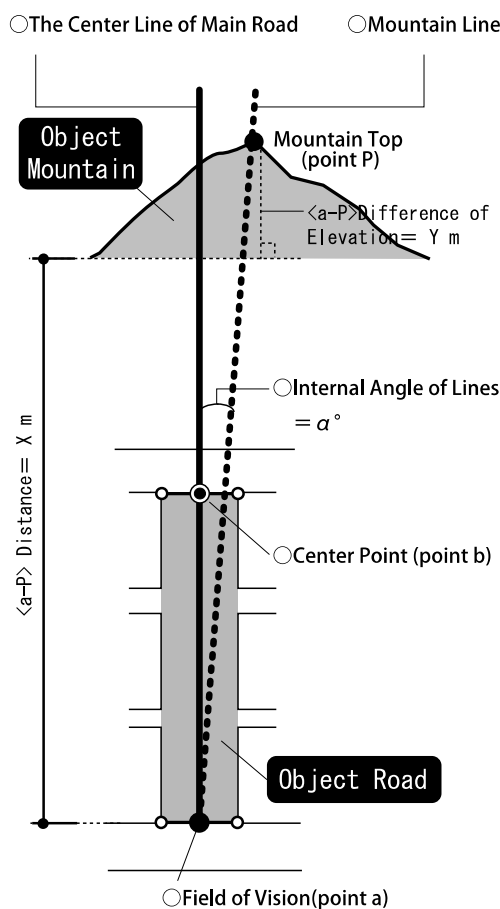


Figure1. Definition of Technical Usages.

About Murakami the Castle Town

Murakami, located on the top north of Niigata prefecture and being adjacent to Yamagata Prefecture, has recently become a contemporary Castle Town with the population of 64,000 (2014).

In the era of Daimyo Honjyo from the mid-sixteenth century till the turn of the seventeenth, the castle was built on the top of Mount Gagyū; consequently several villages got settled in below. The then castle, before Murakami Yorikatsu and his retainers came to occupy it in 1598, was still medieval in style; Murakami started on renovating the castle and his successor carried on to do so. After Hori Naoki entered into a castle in 1618, the Magewa: castle wall design in the time of Murakami Yorikatsu, was expanded, the castle donjon and turret were reconstructed and the moat was rebuilt, fortified to be the sort of (prototype of) Modern Castle Town.

The urban area today has kept expanding around the Murakami subway station of Uetsu line; yet large scaled land division and preparation were not processed except a small portion of streets were expanded in width, the Murakami urban structure remains its shape as a modern Castle Town.

Methods of making the GIS Map Data for analysis

Making the base map

The GIS map-making is processed by ArcGIS for Desktop 10.0 (made by ESRI). The level-2500 scaled Base Map, issued by the Geospatial Information Authority of Japan is selected, and the frame of reference is defined WGS, rectangular plane, eight systems. On 11 March 2011, the super earthquake struck the Northeast of Japan from the Pacific offshore and the earth crust fluctuation, thus, caused the periphery of Murakami city slightly to move off their original longitude and latitude. This map-making is re-corrected and modified in accordance with the official adjustment issued by the Geospatial Information Authority of Japan (land survey report 2011).

Restoration of the urban structure in feudal regime

In order to process the mathematic (numerical) analysis of the urban structure of the Edo period, the urban structure of the Murakami city in the Feudal Regime Era was restored in level-2500 scaled Base Map. Three grand restoration projects include the following: i) to specify the location of the historical roads before their expansion and ii) to work out the disposition of castle moat, fort and castle gate and prepare the division of land use.

The specific plans to restore these projects are the following: i) reading the inspection drawings plans inscribed in the 56th year of Showa era (1981) about the width of road expansion, this research subdivides these plans – from the dawn of Meiji Era (1868) till 1981 – and then compares these 1981 plans with the expansion width in the inspection drawings plans collected in the modern Maps of Land Registry issued by the Legal Affairs Bureau. Through such comparison, the original locations of the roads before expansion may be restored and inscribed on the Base Map; ii) using the GIS tracing function, the two-layer map – piling the early Meiji Era castle town map onto the map today² may be more accurately represented.

Specify the mountain top coordinates

Basing on the “surveying point of reference” issued by the Geospatial Information Authority of Japan, the data of mountaintop coordinates can specify the entire Mountaintops (point P) and let all the Mountaintops (point P) be visible from the entire area surrounding the castle on the mountain. Yet, since the Mountaintops with the same coordinates stand among different

locations, this research also checks the mountain coordinates – the Sea Level Heights of Major Mountains in Japan (recorded by the Geospatial Information Authority), adjusts the errors and specifies the Mountaintop coordinates.

Yama-ate and its analytic methods by GIS

Visual field inspection

On September 2013, this research group did a field inspection about the roads found in the Murakami drawings completed in the Early Meiji Era, seeking verify if these “object roads” may provide Yama-ate mountain views. Meanwhile, to grasp the “starting point” and the “vanishing point,” where the mountain view appears from the road or disappear owing to the bending or curving mountain shapes.

Specify the Yama-ate by GIS (Figure 2)

The city road structure of Murakami town remains, basically, as it was in the time of Feudal Regime, except that the waterways connecting the castle moat were already buried. Also, several high-rise buildings do stand along the road, hindering the Mountain View from the road. With regard to this, the mountaintop (point P) is written down in the postscripts of Base Map and connected with the center point of main road – the point of Field of Vision (point a) – of the street blocks and moat embankment. This connected line between “point a” and “point P” is written as Mountain Line in the Base Map, and in the places where the street crossings or junctions are absorbed by the width of road expansion, this road regarded as Yama-ate. The adjacent city blocks and moats that match this condition, the line was regarded as one sequential Object Road face the Mountaintop (point P).

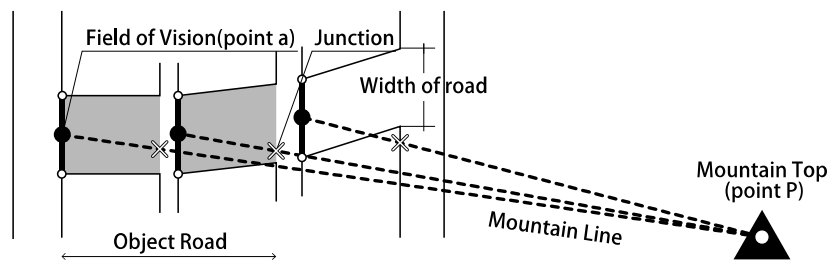


Figure2. Specify the Yama-ate by GIS.

Computation of Interval Angle (α) and Elevation Angle (β)

The center point of Moat, the starting point and vanishing point of the Object Road are various center points (point b) in the field of vision (point a), and these points are linked up to be the Center Line of Main Road. And, as for the Roads that were expanded in width, the center line of the road before width expansion must be put in the Base Map. Then, make the Mountain Line by connecting the Mountaintop (point P) and the Field of Vision (point a). Compare both Center Line of Main Road and Mountain Line, calculate the tolerable errors of horizontal angle of both Lines and yield the Internal Angle (α) of Lines. That is, if (α) is smaller, the castle-crowned mountaintop can thus be visible from nearer place of the center line of Road and Moat.

Still, from reading the 5-meter mesh information closest to the Field of Vision (point a), the sea level heights can be made, and the numerical difference of sea level heights between point (a) and (P) can be calculated. This numerical value, together with the horizontal distance

between (point a) and (point P), the elevation angle (β) from the Field of Vision (point a) up to Mountaintop (point p) can be calculated.

Actual Condition of the Yama-ate viewed from the Object Road (Table 1)

From the results of the Yama-ate analyses via the analyses methods above, 24 cases of Yama-ate may be verified from seven Object Mountains: Mt.Wahsigasu, Mt.Nakadake, Mt.Takatori, Mt.Kokuzo, Mt.Sankyo, Mt.Geto and the Mountain without Name. And, the internal angle ranges from $0.028^{\circ} \sim 4.774^{\circ}$ with an average of 1.09° , the elevation angle from $3.014^{\circ} \sim 9.501^{\circ}$ and average of 5.41° . The details follow.

Table1. Numerical Analysis Yama-ate, and classification of Object Road

Pattern of Object Road	Name of Object Road	Object Road			Object Mountain Top		Object Road – Object Mountain Top				
		a-b Distance	Angle of the Center Line of Main Road	Elevation	Name	Elevation	Angle of Mountain Line	Internal Angle of Lines	a-P Distance	a-P Difference of Elevation	Angle of Elevation From point a
		m	(a→b) Degree(°)	(point a) m		(point P) m	(a→P) Degree(°)	< α > Degree(°)	<X> m	<Z> m	< β > Degree(°)
1.The Main Town Roads built in Straight Line	a.The Koshindo Line	261.4	13.5	8.8	Mt.Kokuzo	463.0	13.7	-0.175	8,585.6	454.2	3.029
	b.The Akiba Gate – Korinji Gate Line	538.4	113.2	8.4	Mt.No-name	535.0	113.9	-0.716	9,841.6	526.6	3.063
	c.The Fukuro Gate Line	712.1	113.0	7.9	Mt.No-name	535.0	113.3	-0.389	10,011.9	527.1	3.014
	d.Koishigaki Gate – Nakano Gate Line	246.8	199.7	11.4	Mt.Sankyo	100.0	199.2	0.503	1,229.3	88.6	4.123
	e.Nagaimachi – Komachi Line	754.7	7.5	9.8	Mt.Geto	237.8	2.7	4.774	2,152.4	228.0	6.048
		754.7	187.5	10.4	Mt.Sankyo	100.0	184.4	3.093	1,365.8	89.6	3.755
2.The Waterway built in Straight Line	a.Koishigaki Gate – Nakano Gate Moat Line	292.6	195.1	9.6	Mt.Sankyo	100.0	195.3	-0.186	1,218.9	90.4	4.240
	b.Fukuro Gate – Akiba Gate Moat Line	240.9	91.1	8.0	Mt.Wahsigasu	1,093.3	91.1	0.035	16,309.0	1,085.3	3.807
	c.Main Gate – Iino Gate Moat Line	314.7	188.2	10.7	Mt.Sankyo	100.0	187.5	0.701	1,167.4	89.3	4.375
	d.Main Gate Moat Line	213.7	4.7	10.7	Mt.Takatori	418.8	5.3	-0.536	4,065.4	408.1	5.732
3.The Town Roads built as Side Street in Straight Line	a.Akiba Gate Side Street Line	82.0	207.2	8.4	Mt.Sankyo	100.0	208.0	-0.722	1493.2	91.6	3.511
	b.Geto Gate Side Street Line	87.3	206.4	8.0	Mt.Sankyo	100.0	206.2	0.147	1394.8	92.0	3.773
	c.Samurai District Side Street Line	170.1	158.7	9.2	Mt.Sankyo	100.0	158.5	0.216	795.2	90.8	6.514
4.Key-typed Road	a.De-yagura Turret Line	31.4	359.6	7.7	Mt.Takatori	418.8	357.5	2.101	3,575.5	411.1	6.559
	b.Yuki-yagura Turret Line	18.4	355.9	8.2	Mt.Takatori	418.8	355.6	0.338	3,505.0	410.5	6.681
	c.Highway Line	51.3	91.2	8.3	Mt.Nakadake	950.0	89.9	1.240	14,645.3	941.7	3.679
	d.Wahsigasu-key-typed Line	85.0	87.9	7.4	Mt.Nakadake	950.0	89.0	-1.047	15,135.7	942.6	3.564
	e.South Outer Moat Gate Line	28.8	184.7	10.3	Mt.Sankyo	100.0	181.8	2.871	585.0	89.7	8.720
	f.North Outer Moat Gate Line	83.2	3.3	7.9	Mt.Geto	237.8	0.8	2.465	1,373.8	229.9	9.501
	g.Temple District Line	18.9	2.3	10.0	Mt.Geto	237.8	3.2	-0.898	1,496.2	227.8	8.658
	h.Gate Line	77.0	2.3	6.9	Mt.Takatori	418.8	1.8	0.454	3,708.2	411.9	6.338
5.The Key-shaped Waterways	a.Moat Gate Line	87.9	91.9	6.7	Mt.Wahsigasu	1093.3	92.1	-0.229	16389.6	1,086.6	3.793
6.The Sando in Shrine as Worshipping Path	a.Fujimoto Shrine Line	77.1	357.5	10.0	Mt.Geto	237.8	357.6	-0.060	2006.8	227.8	6.476
	b.Kawauchi Shrine Line				Mt.Geto	237.8					
	c.Kannonji Temple Line				Mt.Geto	237.8					

Classification of Object Roads

There are six types below, from classifying the special features and forms of Object Roads.

1. The Main Town Roads built in Straight Line

It refers to the Road built along the front side of the street building for more than 200 meters. There are eight cases of such Straight Line of Main Town Road:

1a. The Koshindo Line: the Road was built facing the front façade of Koshindo Hall, which was built at the Gate of Katamachi Gate as the Defense against Evil Spirit; both Mt.Koshindo and Donjon are visible from the Koshindo line.

1b. The Akiba Gate – Korinji Gate Line: the line was built in the Samurai Residence, linking the Gate of Akiba and Korinji; it faces the Mountain Without Name.

1c. The Fukuro Gate Line: the Road was built by extending the Fukuro Gate and parallel with the 1b line by a slight tolerance of 0.20° . The internal angle of Fukuro Gate Line is smaller than 0.33° . The Mountain without Name is visible as well.

1d. Koishigaki Gate – Nakano Gate Line: the road was built in a Samurai Residence, connecting Koishigaki Gate and Nakano Gate; Mt. Sankyo is visible from the South.

1e. Nagaimachi – Komachi Line: built on the Hokkoku Highway, it is the longest line, 754.7 meter, of the south-north bound; Mt. Geto in the North and Mt. Sankyo in the South are visible. Both ends of the line are bent into Key shape, respectively connecting the South Outer Moat Gate Line(4e) and North Outer Moat Gate Line(4f).

2. The Waterway built in Straight Line

These man-made Waterways, or Moats, were built with embankment for castle protection and river improvement, extending in straight line for more than 200 meters. There are four cases as:

2a. Koishigaki Gate – Nakano Gate Moat Line: the Moat connecting Koishigaki Gate and Nakano Gate faces Mt. Sankyo in the South. It is adjacent to, but not parallel with, 1d Line by an error of 4.57° .

2b. Fukuro Gate – Akiba Gate Moat Line: It connects Fukuro Gate and Akiba Gate, about 91.1° perpendicular to Mt. Wahsigasu in the true East.

2c. Main Gate – Inno Gate Moat Line: It connects Main Gate and Inno Gate, facing Mt. Sankyo in the South. It is parallel with the 1e Line by a small error of 0.78° .

2d. Main Gate Moat Line: It was built north to Main Gate, facing Mt. Takatori in the North, being adjacent to 1e Line but sliding away by 2.71° . Also, the 2c Line, sliding away by 3.49° , is connected within the territory of Main Gate, and the Moat at the Main Gate is hugely bended.

3. The Town Roads build as Side Street in Straight Line

It refers to the town road built along the side façade of town buildings; the center line of such type of Side Street intersects the Straight Town Road along the front façade. There are three cases of such Side Street.

3a. Akiba Gate Side Street Line runs from Akiba Gate toward Mt. Sankyo in the South. It interests the 1b Line by 94.1° and the 1c Line by 85.7° , sliding away from the 90° angle by more than 4° .

3b. Geto Gate Side Street Line starts from Geto Gate and runs towards Mt. Sankyo in the South; it interests the 1c Line by 93.4° instead of 90° angle.

3c. Samurai District Side Street Line was built in the Samurai Residence outside of bailey and runs towards Mt. Sankyo. It interests the main town road by 88.2° .

4. Key-typed Road

It refers to the short span Town Roads shorter than 100 meters, featured with its bent form in key shape at the end of road, and there are eight cases of such types of Road Line.

4a. De-yagura Turret Line: the line was built on a historical Highway; Mt. Takatori in the North and the De-yagura Turret of Mt. Gagyū in the south may be seen without hindrance.

4b. Yuki-yagura Turret Line: the line was also built on a historical Highway; Mt. Takatori and the Yuki-yagura Turret may be fully seen.

4c. Highway Line: the line was East to 4b Line, bending toward the East and facing Mt. Nakadake.

4d. Wahsigasu-key-typed Line: unlike other lines which are bending almost in right angle, this line changes direction only with the town street.

4e. South Outer Moat Gate Line: it connects 1e Line south, facing Mt. Sankyo

4f. North Outer Moat Gate Line: it connects 1e Line north, facing Mt. Geto.

4g. Temple District Line: the line connects Temple district and the territory/border of merchant district, facing Mt. Geto.

gh. Gate Line: it links 4d Line and bends itself with the Highway in the north, Mt. Takatori is fully visible over the gate.

5. The Key-shaped Waterways

It refers to the short-spanned Waterways or Moats under 100 meters typically built with bended form at either ends of the water.

5a. Moat Gate Line is the only example, it gets bended in the form of Gate and flows toward the direction facing Mt.Washigasu.

6. The Sando in Shrine as Worshipping Path

The Sando in Shrine is the road built on the Axis that connects the Torii as its entrance and the Main Hall. There are three cases:

6a. Fujimoto Shrine Line: from the Sando, Mt.Geto is visible in the North.

6b. Kawauchi Shrine Line: from the axis that links Torii and Main Hall, Mt. Geto is visible.

6c. Kannonji Temple Line: the axis of Kannonji Temple runs towards Mt.Geto.

Three major types of Yama-ate (Figure 3)

Basing upon the differentiations of the six kinds of Object Roads discussed above, three kinds of Yama-ate may be classified from analyzing the relation between the shape of each Object Mountain and the Roads in the periphery.

a) The Yama-ate facing the Mountaintop with precise, straight Axis

Following the patterns of Straight Town Roads and Straight Waterway built, each Object Road that made the major framework of Castle Town is in long span and independent from other Object Roads; e.g., axis for defense against evil spirit (Ghost Gate) and axis links the Castle gate, the Southeast Axis of Highway. Disregarding the 1e Line, the axis of the Object Road in the Vista towards Yama-ate has very small angles – from 0.035° to 0.716° ; on the one hand, the average internal angles of these three Mountain Lines facing the cone-shaped, visibly easy Mt.Kokuzo, Mt.Washigasu, Mt.Takatori is 0.25° , which is accurate. On the other hand, the average internal angle of those five visibly uneasy Mt.Sankyo, Mt.Geto, Mt.No-name is 0.50° , which is a big deviation. Also, the internal angle of the 1a Line, from Donjon to the Ghost Gate (of Northeast orientation) is -0.175° , a straight mountain line toward Yama-ate.

b) The Yama-ate facing the Mountaintop with adjusted Axis

The Axis of the Key-typed Road and the Key-shaped Waterways are twisted owing to the bended part at the end of the line, and from the end of either road or waterway the mountaintop and castle turret are visible. Also, the Straight Side Street that intersects the Straight Town Roads fails the 90° right angle by the errors of $1.8^\circ \sim 4.1^\circ$ and let the Mountaintops be visible. And also, the Sando built on the Axis connecting Torii and the Shrine's Main hall was adjusted to let the Mountaintops be visible.

c) The Yama-ate facing the Mountaintop with sliding Axis

Although both Mt.Sankyo and Mt.Geto are visible from the 1e Line, the mountain lines have the internal angles of 3.093° , 4.774° – the only Town Roads built in Straight Line that slides from its Axis gravely. And yet although each Mountaintop is vanished from either ends of the 1e Line, from both 4f Line and 4e Line that link the 1e Line, these Mountaintops of Mt.Sankyo and Mt.Geto are visible.

Closing comment

Basing upon above, the specific features and characters of each Yama-ate in Murakami may be concluded as the following three points:

First, each of the Object Roads that made the major framework of Castle Town are not parallax to each other, and thus from each Vision Axis the Yama-ate can be recognizable and, furthermore, since the Vision Axis is accurate, the mountain scenery is easily visible.

Second, the Straight Side Streets and the Key-shaped Roads intersect the Main Town Roads fails the 90° right angle, for the Vision Axis has to be adjusted in order to face the Mountaintop. And, the Sando starting from the Torii and lining to the Main Hall must also be adjusted to face the Mountaintop.

And third, the Visual Axis that is gravely slid from the Mountain Line, its Yama-ate offers appearing and disappearing mountain views.

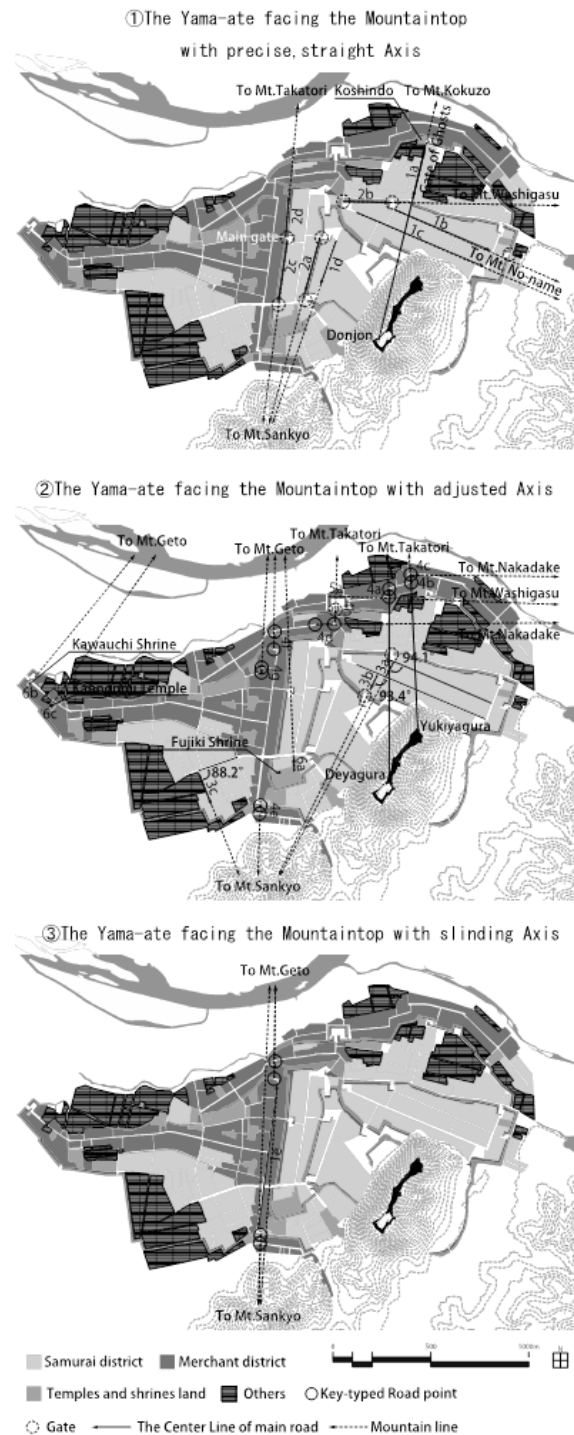


Figure3. Three major types of Yama-ate.

Between the Object Mountains and Murakami – culture aspects on Documentary Literature

Although there are seven Object Mountains appearing in the respective Yama-ate, in this section this research wishes to make manifest the significance that how the Object Mountain has any relation with the local culture.

The Belief in Animism, Water God, Goblin or Water Sprite in Miomote-River Basin

Mt.Washigasu has been enshrined by *Washinosu Gongen* – literally the Gongen in the Eagle's Nest (and Gongen refers to the Buddha that appears as *Kami*, the Japanese deity in Shinto) – deified in Mountain cave some 1093 meter above sea level in the Satomiya Shrine that was joined by Kawauchi Shrine in Nunobe, in which the *Daimyōjin Kami* is deified. The Kawauchi Shrine has two divisional shrines: the Ichinomiya Shrine Miyanoshita and Ninomiya Shrine Nunobe.³ The Nyorai Buddha of Medicine used to be deified in Ichinomiya Shrine, is now deified in Mt.Takatori. The Nyorai Buddha of Medicine is also deified in the Nakadake Height of Mt.Washigasu.⁴ Since the middle age, the belief in Animism has deeply rooted and thus, Kawauchi Shrine has been strongly associated with Water Deity, Goblin or Water Sprite in local belief. And also, since the old days, “the people living in the basin of Miomote-River and its tributary had very unusual relation with rivers and salmons,”⁵ it was believed to be their “Salmon Culture.” According to the history of Ichinomiya Shrine, worshipping the Water God – Ishigami – whilst sailing along the rivers has been their tradition.”⁶ From these cultural aspects, the belief of Water Deities in Kawauchi Shrine, the Shinto ceremony in Miomote River and the festivals inherited from the “Salmon Culture” become the culture heritage today.

Relation with Compass Direction of belief

The Mt.Kokuzo is located in Sarusawa of Murakami City, marked with its 463.0 meter above sea level; the Bodhisattva of Kokuzo has been deified in the Mountaintop. The annual ceremony, as written in the city history, section 3, of Murakami, has been carried out by every village, “paying respect to Bodhisattva of Kokuzo, give a wish in the Spring and pray in the Autumn with one-syo (1.5 kilogram) unhulled rice one village.”⁷ The significance of Bodhisattva of Kokuzo, as rooted in the Murakami region since the old days, is profound and beautiful. Ox and Tiger, the second and the third in the twelve horary signs, respect Bodhisattva of Kokuzo as the protector of the people born in the year of Ox and Tiger, yet the direction where Kokuzo Bodhisattva exists is Northeast, and it is commonly believed that the Northeast direction on compass is the Gate of Evil Ghosts. Therefore, the Katamati Gate that faces the Northeast has built Koshindo to pray for protection from Bodhisattva of Kokuzo to guard the people in the Murakami Castle Town.⁸ It is clear that the Koshindo Line was designed with strong Buddhist consciousness to face Mt.Kokuzo, when the Castle town was planning.

In the painting “*Senami Gun Ezu*”⁹, 2nd year of Keicho (1597), it showed that Mt.Washigasu was noted as True East from Murakami. It is clear that the sense of sunrise direction is strong.

Land Boundary Orientation seen from the Sea

“The fishery spots of Miomote-River and Senami are ‘where Mt.Washigasu seems to be visible.’”¹⁰

Also, the methods to use Yama-tate (not Yama-ate), Mountain as location reference to verify the reefs and half-sunken rocks, the mountain saddle of Mt.Nakadake has been used for references for sailing direction.¹¹

The Location Relation between Castle and Tomb

As noted in *Ethnical History of Murakami Region, II*, “Mt.Sankyo may be the places for public tombs” In fact, the place that was used as burying ground was called “Sanmai”¹²(a word in Zen, synonymous with Nehan: Nirvana, or Gedatsu: emancipation) in the history of Murakami, and the fact that temple and communities were formed around the foothill of Mt. Sankyo, and the story that Naito Nobuteru, the feudal Lord, was cremated in Ushizawa, the east point of Mt. Sankyo, were all written in the history of Murakami and became clear in this research.¹³

Also, the Getogashima Castle, the sister castle of Murakami Castle in Mt.Geto, was built in the middle age; it was written in the painting “*Senami Gun Ezu*” and became clear.¹⁴

Conclusion

This research concerns itself with the actual conditions of Yama-ate – and with the interrelation between these issues and the issues of Road and Moat; this research, employing the mathematical analyses of GIS in field inspection for unbiased, objective results, tries to make the actual conditions of these issues become manifest.

In doing so, this research pinpoints Yama-ate as the major theme and tries to classify different Object Roads into six categories from their differences in feature and shape, bringing up 1) the Main Town Roads built in Straight Line, 2) the Waterways built in Straight Line, 3) the Town Roads build as Side Street in Straight Line, 4) the Key-typed Road, 5) the Key-shaped Waterways, 6) the Sando in Shrine as Worshipping Path.

Yet, basing on the results obtained from analyzing the numerical data and the types of Object Roads, the Yama-ate of Murakami has three characters: 1) as the major framework of Object Road, it holds a specific Visual Axis, 2) as the right-angle intersection of the periphery roads get twisted, the Vision Axis is adjusted to face the Mountaintop, and 3) as the Vision Axis slides sharply, the appearance of Mountaintop become vague and unpredictable.

Lastly, this research, concerning the Object Mountains verified by Yama-ate, believe in, also, the necessity to make these Object Mountains manifest by searching their historical literature, poetically. Thus, there are four points worth of our attention: 1) the belief of Water God in terms of Animism in Miomote River, 2) Compass Direction of belief: the design motivation of the Yama-ate that faces Mt. Kokuzo, in particular, is of Buddhist consciousness – defending against the evil spirits coming from the Ghost Gate in the Northeast compass direction. 3) The location and boundary as seen from the sea, and 4) the distribution of ancient tombs and castle.

These four points are culturally relevant to Mountains and Murakami as a whole; and the historical, cultural and religious aspects of their environments are inseparable from their life on a day-to-day base.

Notes

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Measuring Urban Canyons with real-time light based Sky View Factor Modelling

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Abstract. *Many Australian cities are currently experiencing rapid urbanisation and densification with the unintended consequence of creating dense city fabric with deep urban canyons. Dense urban areas have a profound impact on the local atmospheric conditions in particular, the urban heat island (UHI) which can increase temperatures within urban centres considerably when compared to surrounding rural areas. As Australian cities are presently experience record heat waves with temperatures in excess of 40 degrees Celsius for five consecutive days, there is a critical need to better understand urban form and heat retention in city centres – urban heat island effect (UHI) and the associated heat related morbidity. This paper describes the development of a new three-dimensional analysis approach based on a modified daylight modelling system to improve an established method of UHI prediction – sky view factor (SVF). A rapid SVF is calculated in a digital modelling and visualisation environment allowing iterative design decision making informed by UHI and SVF impacts on an urban design scale. The new technique provides ‘real-time’ SVF feedback for of complex three-dimensional urban scenarios enabling city designers to have a greater understanding of existing and proposed urban forms and identifying potential UHI problem areas; improve decision making, community engagement and design advocacy; potentially have an impact on city’s temperature – reducing cooling energy load costs; and more importantly, potentially reduce heat related mortality.*

Key Words: Sky view factor, urban heat island, urban canyon, urban modelling, liveability.

Introduction

Densification / urbanisation

Many Australian cities are experiencing rapid urbanisation densification (DOI 2012). Though there is a greater understanding of the relationship between densification, transport, and sustainability (Beatley et al. 2009; Newman & Kenworthy 1999), there is also great pressure to accommodate higher population densities in established, well serviced, inner urban areas (Dodson & Sipe 2008) often in the form of high-rise developments. These forms of development may be more sustainable environmentally (Newman 2006) and financially (O’Hara 1997) but may also have the unintended consequence of creating a denser urban fabric with deep, heat retaining urban canyons.

Heat waves and heat related mortality

Dense urban areas have a profound impact on the local atmospheric conditions in particular, the urban heat island (UHI) which can increase temperatures within urban centres considerably when compared to surrounding rural areas (Basara et al. 2010; Mills 2004; Oke 1988; Oke 1981). This heat retention in urban centres has been understood and documented since the late 1960s (Bornstein 1968).

Heatwaves are among the deadliest of natural disaster types (Li & Bou-Zeid 2013). The 2003 death toll in the European heat wave of summer 2003, probably the hottest in Europe since AD 1500, resulted in around 70,000 heat related mortalities (Lass et al. 2013).

Australian cities are particularly susceptible to impacts of climate change with increasing extreme weather events such as heat waves (Patz et al. 2005). Heat waves are likely to increase in frequency, intensity and duration as a consequence of climate change (Akompab et al. 2013). According to Victoria's Chief Health Officer Dr John Carnie, the 2009 January heatwave resulted in around double the number of fatalities than attributed to the tragic Black Saturday bushfires (Victoria 2010).

As Australian cities are presently experiencing record heat waves with temperatures in excess of 40 degrees Celsius for five consecutive days this year; last year being the hottest on record (BOM 2013), there is a critical need to better understand urban form and heat retention in city centres – urban heat island effect (UHI) and the associated heat related morbidity. The level of seriousness with which this issue is now taken is evidenced by the City of Melbourne's Urban Forestry Strategy document (Melbourne 2012).

The urban heat island (UHI)

Urban and suburban areas experience elevated temperatures compared to their outlying rural surroundings; this difference in temperature is what constitutes an UHI (Wong & Hogen 2011). Temperature differences between central urban areas and nearby rural areas can range from 2°C to as much as 12°C on a clear and calm night (Wong & Hogen 2011).

The UHI effect can intensify extreme climatic events (Patz et al. 2005) and has been found to be a major contributing factor to heat-related mortality in urban regions, acting to worsen the adverse health effects from exposure to extreme thermal conditions (Luber & McGeehin 2008; Tan et al. 2010). For this reason, along expected extreme weather conditions of climate change, UHI is a key consideration in the design for the growth of cities in the future.

The UHI and urban canyon modelling using sky view factor (SVF)

The modelling of UHI is extremely complex (Shao et al. 2011) with a great number of variables such as wind, material colour, street orientation, tree coverage, permeability of ground surfaces and building heights in relation to street width or "urban canyon" (Oke 1988).

The urban canyon, considered by some to be the most important contributing factor (Ibrahim et al. 2011) to the UHI effect, is the focus of this paper. The urban canyon is where, in dense urban environments, buildings on each side of a street enclose a space obscuring the sky and therefore restricting the amount of long-wave radiation that can escape, a phenomenon particularly acute at night (Wong & Hogen 2011). The measure of the degree to which the sky is obscured at a given point is commonly calculated as either Height to Width ratio (H/W) or as Sky View Factor (SVF) (Watson and Johnson, 1987). SVF has been found to be a more effective measure as it can take into account the complexity of real streets in which buildings are irregularly aligned and which vary in height and length (Johnson & Watson 1984).

SVF is a dimensionless measurement of openness between 0 and 1, representing totally obscured $\Psi_{\text{sky}}=0$ and totally open spaces $\Psi_{\text{sky}}=1$ where the sky is completely unobstructed by obstacles allowing all outgoing radiation to radiate freely to the sky (Figure) (Brown et al. 2001).

SVF as a method for modelling has been shown to have a strong correlation with UHI (Brandsma & Wolters 2012; Ewenz et al. n.d.; Kakon & Nobuo 2009; Unger 2009) and is critical to understanding the impact of densification and urban form.

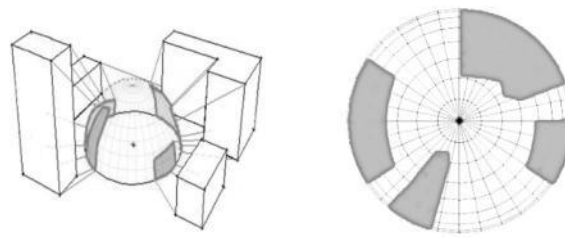


Figure 1. “Urban canyon” or sky view factor calculated for a single point using projected rays through the single point and surrounding building form, intersecting with a hemisphere to assess level of ‘openness to the sky’.

Modelling SVF

SVF has traditionally been very difficult to measure (Grimmond et al. 2001). There are however several methods for modelling and assessing SVF. Unger (2009) lists five common modelling methods as:

1. scale model (Oke 1981);
2. analytical method (angle measurements, H/W),(Bottyan & Unger 2003; Johnson 1985; Johnson & Watson 1984);
3. manual and computer evaluation of fisheye photos (Blankenstein & Kuttler 2004; Bradley et al. 2001; Holmer et al. 2001);
4. evaluation using GPS signals (Chapman & Thornes 2004);
5. and computationally evaluation using digital elevation database describing surface geometric elements (Brown et al. 2001; Lindberg 2005; Souza et al. 2003). There are also developments on this method of generating SVF with the use of Lidar aerial mapping with raster based three-dimensionalisation of two-dimensional data using Digital Elevation Models in GIS (Kokalj et al. 2011).

In addition to these methods, tools used in forestry to measure leaf area index such as the *LAI 2000* have been suggested (Grimmond et al. 2001). There are also relatively recent microclimatic modellers such as SOLWEIG and Envi-Met which can be used to analyse a low detail street canyon to a resolution of 0.5 m (Levermore & Cheung 2012).

Each of these methods has been shown to have a reasonable level of accuracy, but vary greatly in speed of application and ability to test and assess complex three dimensional ‘what if’ scenarios.

Scale models involve a lot of manual labour in assembly and fish-eye photography, though very accurate, are extremely time consuming to acquire and process even with greatly improved software (Brown et al. 2001) and is limited to assessing specific points of interest in an existing urban context.

The “analytical measurement” angle measurement or “height/width” method of assessment is problematic as described above, as it is a purely two dimensional sectional method, not taking into account the complexities of a real street where a section may change dramatically along its length.

Other digital modelling methods such as those described by Brown, Grimmond and Ratti (2001) can be applied and computed more rapidly to a resolution of a 2x2 metre grid, though restricted to using Digital Elevation Models which are essentially two dimensional with a height attribute (2.5D), meaning that they cannot assess more complex three dimensional urban forms such as where a street has weather protecting canopies at lower levels or has elements of buildings that may cantilever or protrude from a building at an upper level.

Where fully three dimensional GIS models have been assessed using hundreds of rays projected from a series of points (Chen et al. 2012; Kastendeuch 2013; Kidd & Chapman 2012) it has been computationally intensive – requiring powerful hardware taking up to 10 hours to assess a precinct (Gal et al. 2009; Unger 2009).

Aim

The aim of this investigation is to develop and test a new three-dimensional analysis approach for SVF that provides rapid visual and numeric feedback in a 3D modelling and visualisation environment. The method is required to allow iterative urban design decision making informed by UHI and SVF impacts on an urban design scale.

Method

The method we have used to develop and test this rapid three-dimensional SVF analysis technique involved four parts. Firstly we ‘hacked’ common animation and visualisation software’s daylight modelling system to create a ‘sky dome light’; secondly we reconfigured a 3D software based lux level light meter grid so that the maximum light level value was equal to 1 and the minimum value equal to 0 to match the SVF metric; thirdly we verified the readings of the SVF modelling against a simple mesh area mathematical based model; and finally, we tested the tool’s applicability at a large urban scale – applying the tool to the Melbourne central activity district using relatively low-end computer hardware.

Results

‘Hacked’ photometric daylight system modelling - sky-dome light

Instead of starting with the point of interest and projecting rays outwards to intersect with surrounding geometry and then a hemisphere beyond (Unger 2009), the logic was reversed – rays start on the surface of a hemisphere and are projected inward to the point of interest. To achieve this model, we use a hemispherical light source – a “sky-dome” or “Skylight Illumination” which projects and traces photons (light) from the globe towards the point of interest. Where no obstacles are present (eg. in a desert), 100% of light of the sky-dome illuminates the point of interest – the equivalent of $\Psi_{sky}=0$. Where photons are blocked by obstacles (buildings), shadowing occurs and SVF is reduced to <1 . This process was done using the render engine within common modelling, animation and visualisation software (in this case we used Mental Ray render engine within Autodesk 3dsMax™) which is able to trace millions of photons (Grosch 2005), a process normally used to produce photo-realistic rendering of digital 3D objects and scenes.

To achieve the sky-dome as light source to model SVF, we reconfigured the standard photometric daylight modelling system. The standard day lighting system would normally consist of a direct light source from the sun, global illumination from the sky (intensity derived from weather data) and indirect/ambient light bounced from other objects in the scene. Our method modified the settings to set the intensity of the sun to zero (no direct light from the sun as though the sun was turned off), set an artificial uniform low intensity light from the sky (dome), and set the number of bounces of photons possible to zero (light is not reflected by any object within the scene). With this ‘hacked’ sun system setup, surface areas of the model that received full global illumination (full 180deg of light from the hemisphere) appeared white ($\Psi_{sky}=1$) when rendered. Where the surface is in shadow it appeared as a shade of grey depending on the amount of shadowing of the sky-light by other objects or black where it receives no light ($\Psi_{sky}=0$) when rendered.

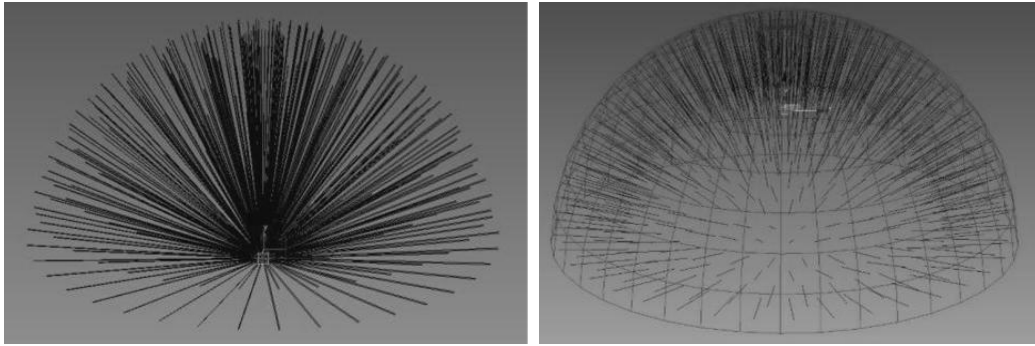


Figure 2. LHS diagram showing common method for calculating SVF using rays from a central point. RHS diagram showing reversal of logic, rays starting at surface of dome projecting inwards towards central point.

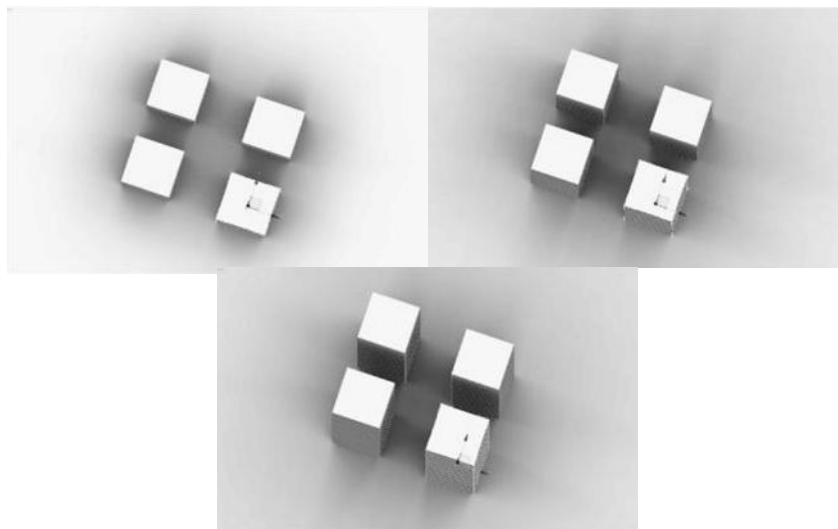


Figure 3. Sequence of test screen grabs of four boxes (buildings) with height parameter changed – the higher the boxes, the darker the shadowing and lower the SVF level.

‘Real time feedback’ with interactive geometry

This method of testing SVF has had rapid results using the built in Mental Ray™ render engine. SVF for complex urban scenes including buildings, streets, street furniture, canopies etc. were rendered in as little as a few seconds depending on the size and complexity of the geometry. Relatively recent improvements in quality of viewport previews of materials, lighting and shadows within the view ports with the Nitrous™ viewport drivers (Murdock 2012) meant that this SVF modelling method was able to be employed in the modelling environment with real-time visual feedback (or close to real time depending on the quality of computer’s graphics card). Viewport display modes could also be configured in such a way as to display a model’s SVF ‘shadows’ as a kind of ‘heat map’ meaning that as an urban modelling parameter such as height limit is changed in the model, the impact can be instantly assessed visually.

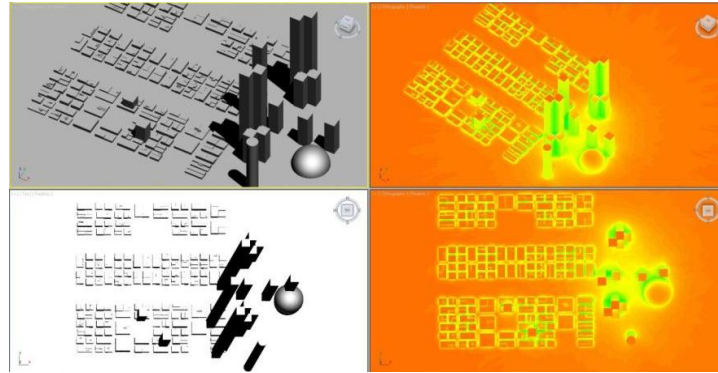


Figure 4. Test screen grab 1 showing an indicative area of tower development with adjacent low level urban form with levels of SVF on the RHS. Note: tops of buildings and open areas are red/orange (high SVF) and areas between towers are green (low SVF).

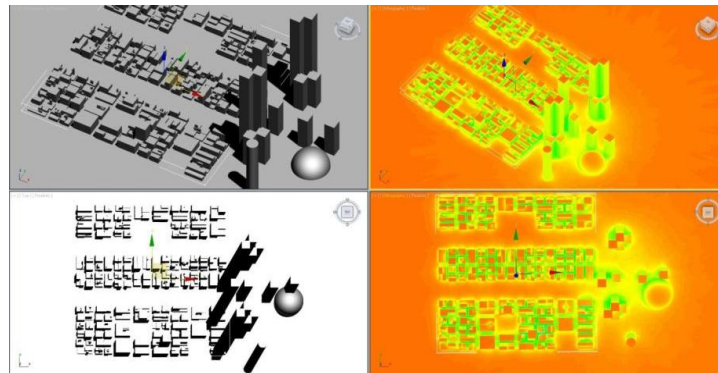


Figure 5. Test screen grab 2 showing an indicative area of tower development with adjacent medium level urban form with levels of SVF on the RHS. Note: slight increase in areas of green (low SVF).

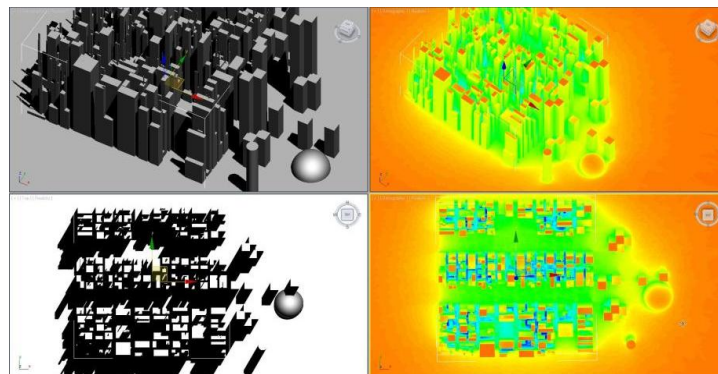


Figure 6. Test screen grab 3 showing an indicative area of tower development with adjacent high level urban form with levels of SVF on the RHS. Note: High coverage of green colour equating to very low levels of SVF.

Lux metre reconfigured so maximum = 1, minimum = 0

In addition to on screen visual feedback and being able to render to a high resolution raster image file (.jpg, .tif, .tga etc.), we also set up the model to use an adapted light meter grid utilising the program's advanced light meter calculation system (Reinhart & Breton 2009). The

Verification using mesh dome % test

To verify the accuracy of the sky view factor metres (reconfigured lux meters), we modelled a series of large mesh domes, each with a 300m radius. Each of these domes was then altered to remove portions of the polygon mesh to a known area percentage – beginning with 50% (Figur). We activated the SVF meter and the resulting SVF readings were each within ± 0.01 of the expected 0.50Ψ reading (0.51, 0.50 and 0.51 shown in Figur).

We performed the final test with a more complex 3D mesh with a simulated skyline to either retain or remove the dome's polygons. The area of the full dome was measured and compared with the modified skyline dome area. The area comparison showed that 34% of the polygons of the mesh dome retained, thus that the SVF meter should result in a $SVF=0.66\Psi$. In this case the reading was within ± 0.03 . This was seen as an acceptable range of error for urban scaled modelling and though a higher degree of accuracy would be possible by increasing the number of photons or the quality of the rendering by increasing the density of light photons, we believed this was not worth the potential sacrifice in speed of feedback.

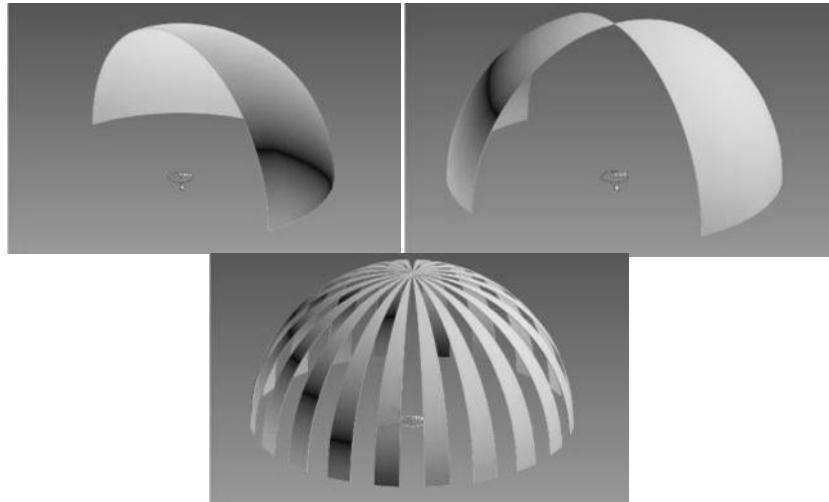


Figure 10. 3D mesh dome with 50% of the polygon mesh removed. Each of these domes should block 50% of the sky and thus result in a $SVF=0.5\Psi$. The SVF reading for these three tests were within ± 0.01 .

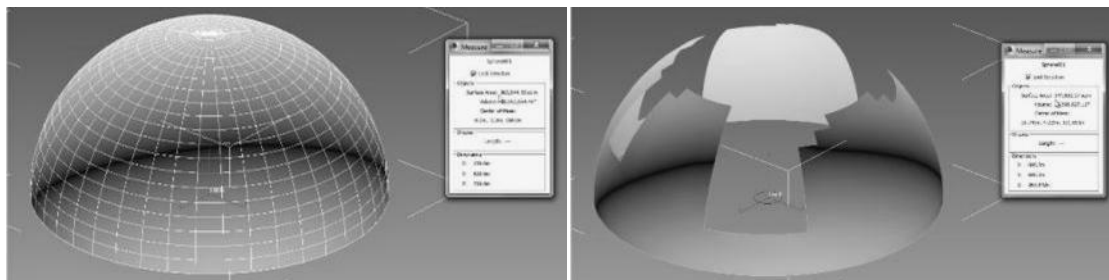


Figure 11. LHS showing full dome with surface area calculation. RHS shows simulated skyline with area measured for comparison to full dome, then compared with SVF meter (in the central point of the dome) resulting in a reading within ± 0.03 .

Validation – testing on Melbourne central activity district

To test the applicability of the tool at a large scale, we conducted a quick test using a 3D model of Melbourne's central activity district. The 3D model was a mix of modelling done in Trimble's Sketchup™ Autodesk's AutoCAD™ and 3DS Max™. The application of the tool was relatively straight forward requiring the different components of the central activity district 3D model to be imported/merged into the preconfigured SVF scene. We then activated the SVF viewport and within 15 seconds a comparative SVF was visible.

The resulting viewport display gave a clear indication of the levels of SVF in different areas of the city at street level with areas that experience low levels of SVF displayed. The other aspect that was interesting is the 3D aerial view the model not only showed what the SVF was at ground level, but also gave an indication of the SVF for sides of buildings indicating where walls were visually shadowed by other tall buildings. This means that areas of building façade could also be assessed for SVF.

The analysis shown in Figure 12 and Figure 13 was performed on a relatively low-end, two year old HP Pavilion dv6-6138TX laptop with a 2 GHz Intel Core i7-2630QM processor, 8 GB Ram and an ATI Radeon HD 6770M (2 GB GDDR5) graphics card. We then tested the same model on a 2013 model Metabox (Clevo) laptop with an Intel Haswell 4 i7-4940MX 3.10GHz 32GB 1600MHZ DDR3 Memory NVIDIA GeForce Go GTX 880M 8GB (higher performance graphics card and more ram) which resulted in instantaneous visual feedback – essentially 'real-time' as changes in the geometry were reflected in the SVF display within one or two seconds.



Figure 12. Aerial view of SVF tool applied to 3D mesh model of Melbourne CBD – plan view. Note the areas in green have low levels of SVF.

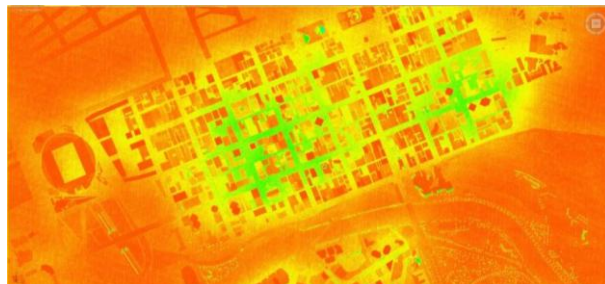


Figure 13. Plan view of SVF tool applied to 3D mesh model of Melbourne CBD. Note the areas in green have low levels of SVF.

Discussion

Speed and accuracy

The speed of feedback for this method was exceptionally fast. Though the visual feedback was dependent on the quality of the computer's graphics card and ram. A relatively low end laptop could produce visual feedback within a few seconds even for fairly large complex areas of city. The lux meter readings were also calculated in less than 30 seconds. The more powerful hardware yielded even more impressive results.

The level of accuracy was found to be very good when assessing a series of known SVF area of a 'sliced dome' with a maximum error of ± 0.03 . This level of comparison with the Brown et al study mentioned earlier (2001) which, when comparing the digital model to photographic analysis where results were 'very satisfactory, with average values of 0.63 and 0.70 respectively'.

3D Complexity and feedback

The method described has the potential benefits of being truly three-dimensional, allowing SVF analysis of complex urban scenarios allowing urban designers to have a greater understanding of existing city forms and identifying potential UHI problem areas. The method also has the potential of providing almost real-time feedback allowing the SVF analysis to be integrated into a design process as well as have a role in design advocacy used in community engagement. Using this analysis method, urban designers can test the potential impacts of urban additions or subtractions as well as the impact of complex forms of urbanism including cantilevering buildings, stepped building forms, buildings with holes or 'cut outs'.

The rapid SVF feedback also potentially has application beyond UHI modelling. Because of the three dimensional nature of the model – the SVF for building façades can also be assessed. There is potential to investigate the relationship building façade SVF and quality of views from buildings – how much sky can I see from each apartment?

Potential impact

We have shown this research to be potentially useful in Melbourne, Australia, but the method also has great potential for application in many other cities around the world, particular rapidly developing cities in Asia where UHI effect is believed to have an even greater impact on heat wave related mortality rates (Tan et al. 2010).

Conclusion

The new technique provides 'real-time' SVF feedback for of complex three-dimensional urban scenarios enabling city designers to have a greater understanding of existing and proposed urban forms and identifying potential UHI problem areas; improve decision making, community engagement and design advocacy; potentially have an impact on city's temperature – reducing cooling energy load costs; and more importantly, potentially reduce heat related mortality.

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An approach on describing the street skyline: a framework for identifying streets spatial significant lines

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Abstract. *In urban morphology, researchers have developed many methods on describing the characteristics of urban street patterns. However, a simplified representation of urban texture in just two-dimensions, which does not take into account the dimensional property of streets elevation (later referred to as 'metric'), therefore, the topological representation of cities discards precious metric information and is rather limiting. Some researchers have attempted to add the information about the street skyline to study the street configuration. However, when preparing a street skyline for this method, several critical decisions must be made about which street skyline features should be included in the representation and why. Therefore, the present paper draws on postpositivist reasoning to propose a framework for deciding which lines in a street representation are significant for a study and why. The framework contains several levels of representation that are defined and mapped against comparable research agendas. These levels are described and demonstrated using a street skyline from 6 blocks which contains 2 resident blocks, 2 public blocks and 2 mix-use blocks in urban area of Nanjing, China.*

At last, the research chooses the Shape index Compactness Ratio (CR) as the indicator for analysis. The results of the Compactness Ratio (CR) analysis of different representations of the street skyline are used to demonstrate how decisions about significant lines have a direct impact on measures derived from CR analysis. By using different layers to express the spatial significant lines, we can interpret the average and properties of block.

KeyWords: *Street skyline, framework, compactness ratio, segment.*

Introduction

Spatial orientation is a pervasive facet of our everyday life and in spite of over a hundred years of systematic work on space perception researchers could say little about how we knew where in the world we are. (Robert Cohen, 2006)

Since 1960s, researchers have been paying their attention to the feelings and attending to identifying the significant features in streetscape (Kevin Lynch 1960, Jane Jacobs 1961, Arthur and Stamps III 1997, 1999, 2005, Sergio Porta 2005). There have been various methods presented to identify the skyline or the features of streetscape (Jon copper 2003, Michael J. Ostwald 2005, Stephan K. Chalup 2009). However, each of them did not give a reasonable way that the features can be applied to the urban design.

How to apply the study of urban cognition to urban morphology is a critical issue that urban planners and architects both concern about. Most of the urban cognition researchers focus their interest on the sense of space or the significant elements of physical construct. These researches give us some advice that which factor it's delighted or significant to be paying attention to. However, without an indicator indeed which can instruct the urban design actually, although architects have the image of space in their mind while working through drawings but it's difficult to be practice without regard to the indicator.

Different properties of blocks have distinct images in our city which is mechanism by the different demands of form and plane patterns (figure 1), which can be highlighted in the public block and resident block. Indicator is an essential factor of block patterns, and the number of the index has a direct impact on shapes of buildings (figure 2).



Figure 1. (a)Public block (b)Mix used block (c) resident block.

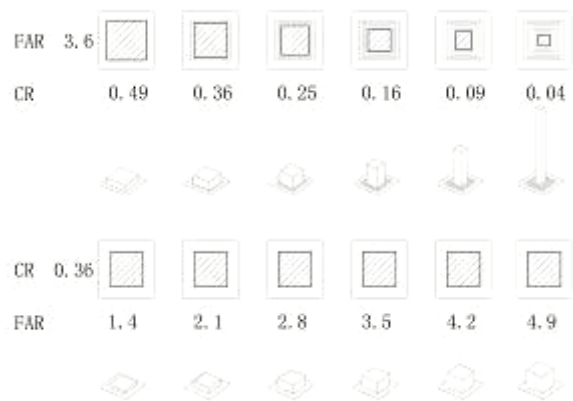


Figure 2. The relationship of the height and Floor Area Ratio and Coverage Ratio.

On the other hand, different views and scale of people analysis the streetscape, different visual features been presented (Ding 2007). At ordinary times, we observe the block by identifying the streetscape which give us deep impression when it looks delighted, when we set our point in urban we may be concern more about the skyline of blocks instead, and we maybe more care about the material and shapes when we live in (figure 3).Even in the same block, the change of the observe position will also bring different visual features.



Figure 3. (a)View from urban; (b) View from street; (c) view when we live in.

Compactness ratio as an indicator

How to define the shape of skyline is very important, some research has calculated the shapes by calculate the fractal dimension (FD) of skyline for quantifying the visual character of the built environment. The version of the box-counting approach that has been used in almost all

architectural and urban analysis is known colloquially by scientists and mathematicians as the “naïve version” (Huang et al, 1994: 339). However, there also have some investigated the question of whether people actually do perceive the fractal properties of fractals or some other properties (AE Stamps, 2002: 6). In actually it has some defect that it cannot identify the shape clustering that means if the shape is very complexity but the fractal dimension (FD) is same to the one is simple (figure 4).



Figure 4. Fractal dimension.

A simple measure of the degree of clustering among sites in a reserve system is the total boundary length of the reserve divided by the area. This is a measure of length per unit area. A more suitable dimensionless measure is the ratio of the boundary length of the reserve system to the circumference of a circle with the same area as the reserve, since a circle is the shape having smallest length for a given area, and is hence the “ideal” boundary length. The formula for this measure is

$$\text{compactness ratio} = \frac{\text{boundary length}}{2\sqrt{\pi \times \text{area}}}.$$

We use this measure of Compactness Ratio to show that the clustering of block skyline, we can define that the higher Compactness Ratio (CR) and the much clustering shape has (figure 5).

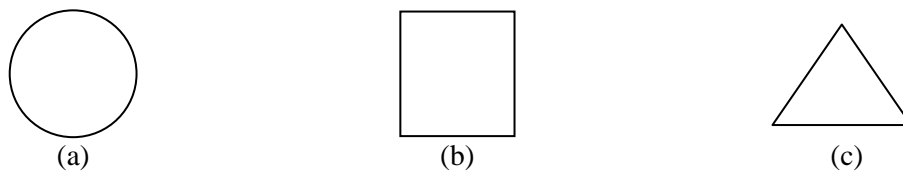


Figure 5. (a) circle; (b) rectangle; (c) triangle.

Treatises

A framework

Under the postpositivist paradigm, a legitimate system of inquiry for investigating a research hypothesis must be one for which the key hypothesis can be tested using the data collected for that purpose. Thus, the block buildings features that are represented and measured must be ones which are appropriate to answer the research question. (M.J. Ostwald and J. Vaughan .In order to accommodate this central principle, a framework is proposed where four cumulative levels of representation are defined and mapped against comparable research purposes (Table1) at, for example, a study of the effect of a illegal building on a streetscape is not undertaken by representation the silhouette. Conversely, if the impact of silhouette design such as the turns of wall it will be considered as the properties.

Each of the four levels of representation are described in the following sections and illustrate using variations of an elevation of the same blocks, which are presented alongside the different Compactness ratio measures derived from each. Both silhouette and pattern indicators are used in the analysis, As a silhouette can be considered to provide a measure of the visual complexity

of the blocks as measured from the exterior and the indicator provides a description of the planning as it is inhabited.

Table 1. Levels of representation mapped against research purposes

Level	Representation	Research focus
1	streetscape silhouette	Properties To consider properties and Indicator has the influence on streetscape image
2	interior silhouette	Shape changes To consider the CR changes of silhouette which can distinguish shape changes of interior and External
3	block silhouette	Planning index To consider the relationship of planning Control index and shapes of skyline
4	silhouette overlay	Shapes overlay To consider the background and overlay indifferent blocks the background which enriched our field of visual

Segments

The research choose six typical block (figure 7) which edges is sequential and orthogonal. The properties of block is 2 public use only, 2 mix_used only and two resident use only. For analysis the other properties related there have 2 mix_used blocks appendix in the end. We define the block is the region surrounded by street one is used for pedestrians and automobile .Each of case has been used a few years and located one and the same district. The previous study has confirmed that the coverage of block may have an influence on shape of skyline, so the typical block elected the coverage around 0.4 for analysis which caculated by ArcGis.

Stephan K. Chalup has given the method that simplify the information of streetscape by eliminated the elements of municipal administration(Stephan K. Chalup,2009).The strongest influence on preference, arousal, and pleasure was the degree of silhouette complexity, with higher silhouette complexity associated with higher levels of perceived complexity and preference and higher(Tom Heath,2000).When all three factors were varied simultaneously, the most important factor for visual preference turned out to be the surface complexity. Silhouette complexity was less important, and facade articulation was least important (Arthur E. Stamps III,1999). The findings have direct implications for both practice and research and confirmed that the texture of facade is insignificant in streetscape analysis, and the silhouette is significant for analysis. The results suggest that a very simple physical measurement (percentage of pixels covered by small elements) predicts subjective impressions of architectural detail very well. Other results were that trim was the most influential design component, and texture.(Arthur E. Stamps III,1998) was the least influential design component .We acknowledge that others attributes of buildings such as details at the pedestrian level ,may have greater importance for pedestrians(Arthur E. Stamps III,2005).So, the research choose the silhuate lines as the methods for analysis. The silhuate lines contains the turns of buildings and dimension of buildings .An the other hand, eliminate the elements that design by subjectivity such as texture, ornament. etc. The data of the building is come from the institution of Planning, Nanjing. (figure 6)

At every instant, there is more than the eye can see, more than the ear can hear, a setting or a view waiting to be explored (Kevin Lynch 1960). By the pattern more complexity if we want to describe the information more clearly of buildings which located in blocks internal (figure 8),we need to make more segments that like a gridding so we can cover them all(fig.9). So, how to describe the internal information of blocks it's very significant for the reseach. In this, we take the method of segment for analysis. Each of segment is been cutted aequilate . The first segment is on behalf of the streetscape, so we defined the width of segment is the longest distance between the building and street (figure 6) .And the width of other segment is decisioned by the

first one that because that the most important skyline is the first one is been perception by directly. the number of segment is decided by the shortest street one is used for pedestrians and automobile.

The formula for the number is(L is the shortest street)

$$N = \frac{\text{length of shortes street} / 2}{x1}$$

X1 = the longest distance between the frontage and street

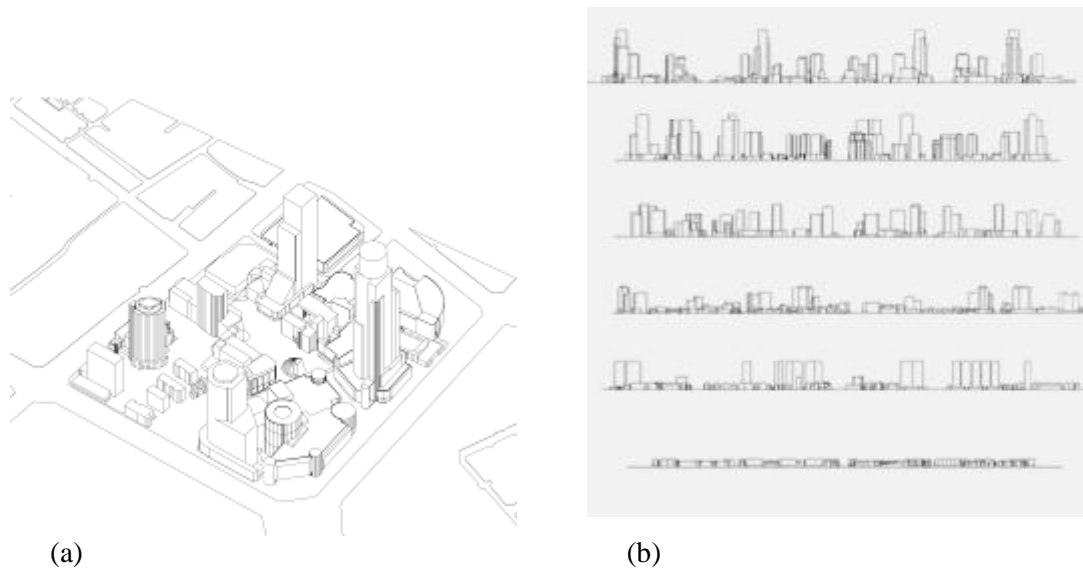


Figure 6. (a) The model of blocks; (b) Orient information of height.

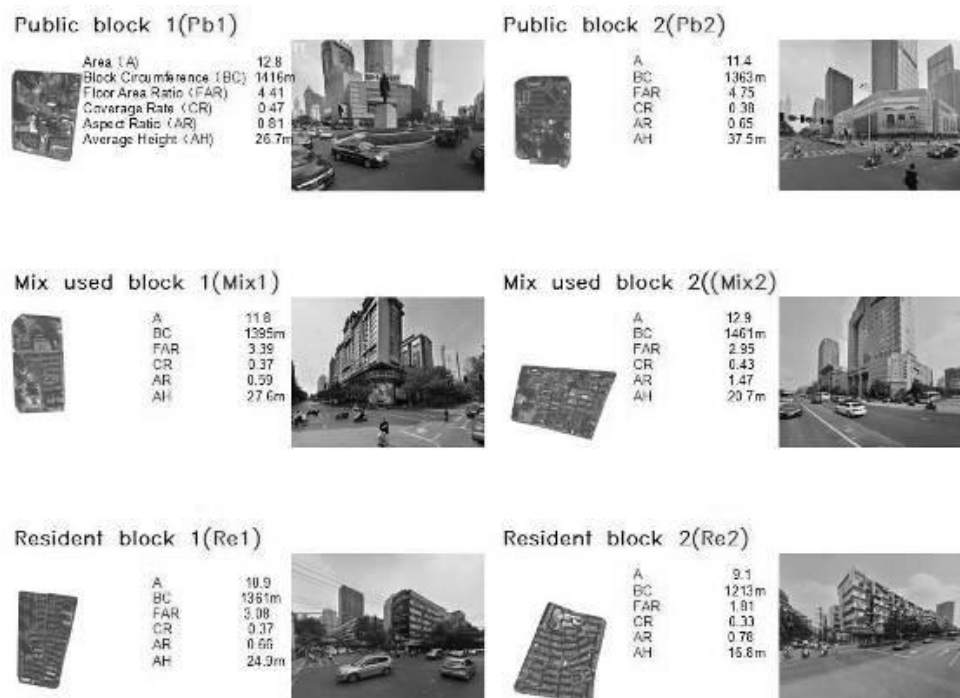


Figure 7. Six typical blocks.

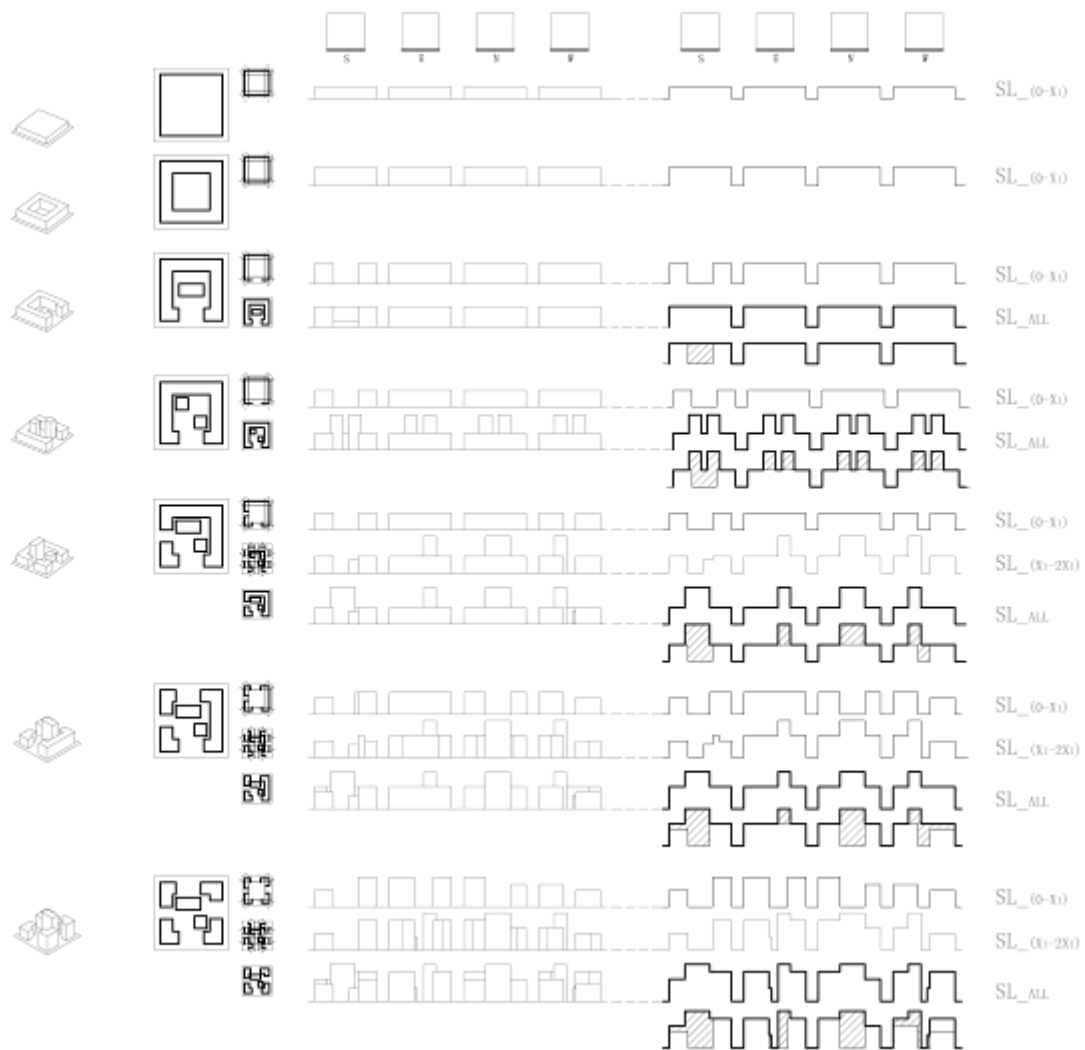


Figure 8. Pattern more complexity more segments be required.

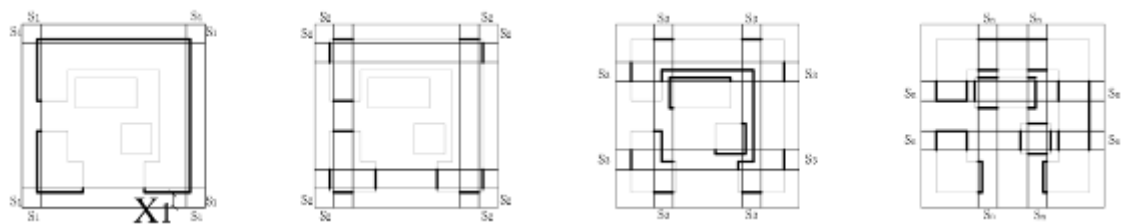


Figure 9. Define the X1 and segments be maked.

Level 1 streetscape silhouette (x1)

This level is supposed to analysis the streetscape that influence the peoples life most directly. It is this variation within a theme that designers are seeking to replicate and to which people seem to respond positively (Jon Copper 2003). So it is significant that the designers have the knowledge of how the properties and indicator has the impacted. We calculate the distance

between the frontage and street for identify the X1 is about 30m which can cover the most of buildings facade people can observed. And the shape information is been calculate in Table 2.

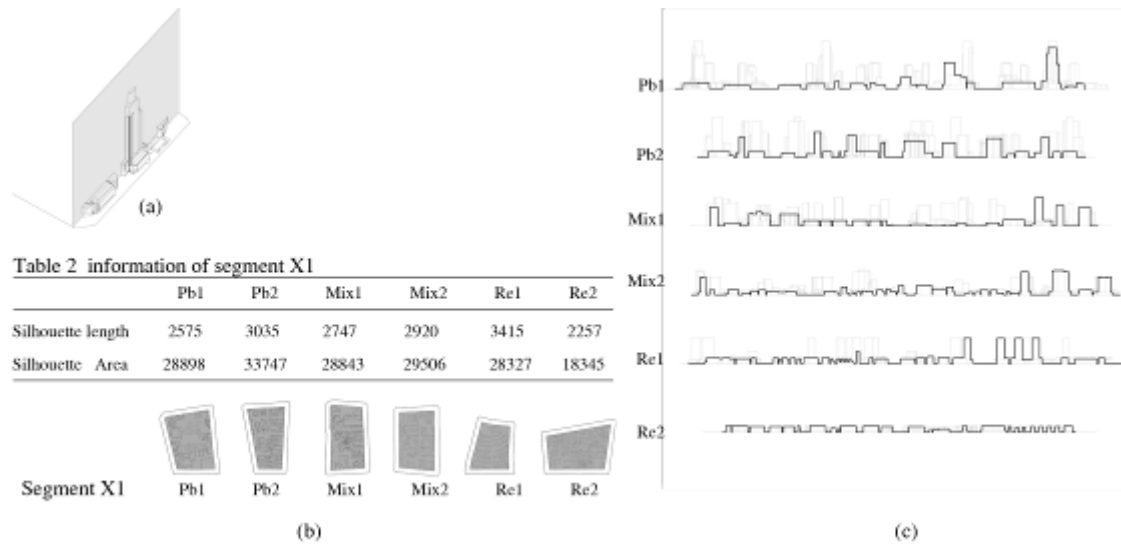


Figure 10 (a) the theoretical model that how the segmentX1 is been maked; (b)the patterns that the segment(area of grey is null); (c)The silhouette of X1.

Level 2 silhouette of different segments

To consider the CR changes of silhouette which can distinguish shape changes of interior and External. In our experience that public blocks has more shake in streetscape, it's to be concern that whether the shake is presented by the streetscape or by the changes of silhouette which located different, researching this appearance can give the planner and architecture where we choose the building located that can form the silhouette or image we hope to.

Using the formula that define the numbers of segment we calculated the N is about 5.(figure 11, figure 12, figure 13 and figure14) Then, we make five segment and statistics the length of silhouette and the area of each one.(table 3, table 4, table 5 and table6).

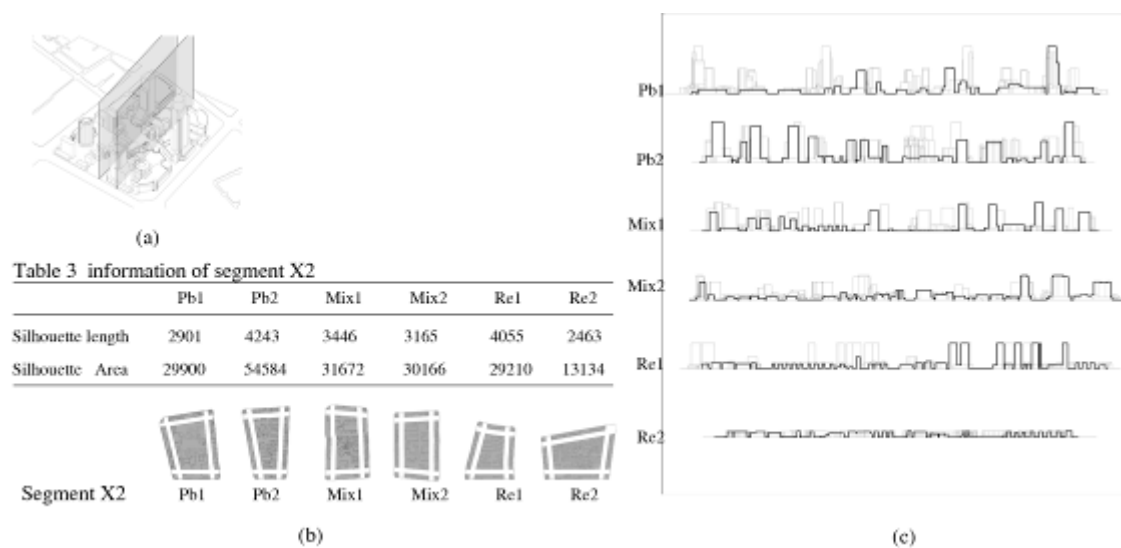


Figure 11 (a) The theoretical model that how the segmentX2 is been maked; (b) The patterns that the segment(area of grey is null); (c)The silhouette of X2.

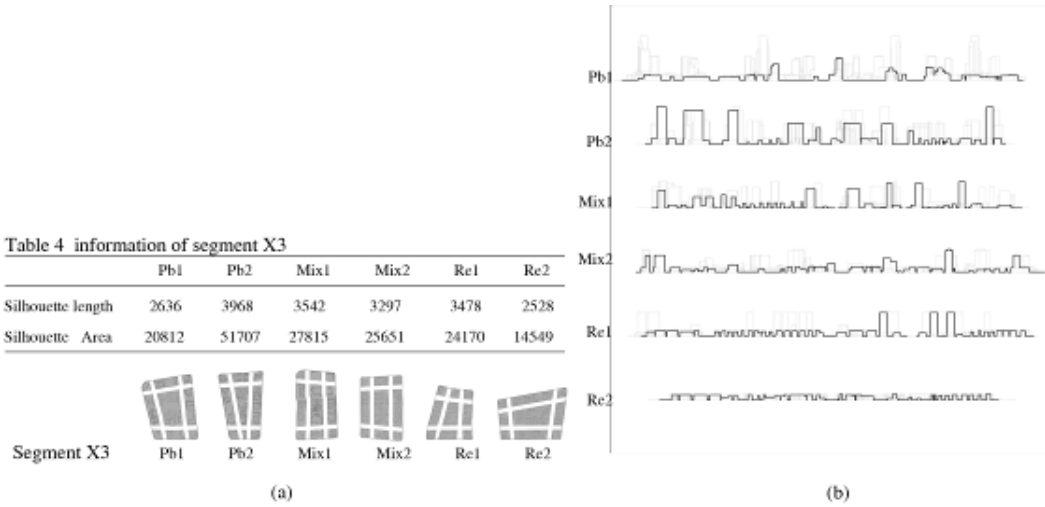


Figure 12 (a) The patterns that the segment (area of grey is null); (b) The silhouette.

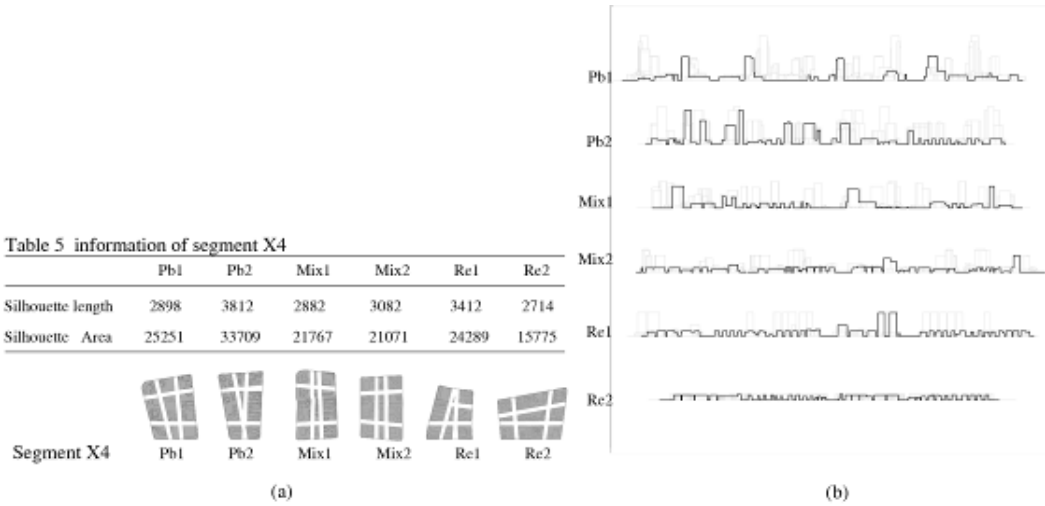


Figure 13 (a) The patterns that the segment (area of grey is null); (b) The silhouette.

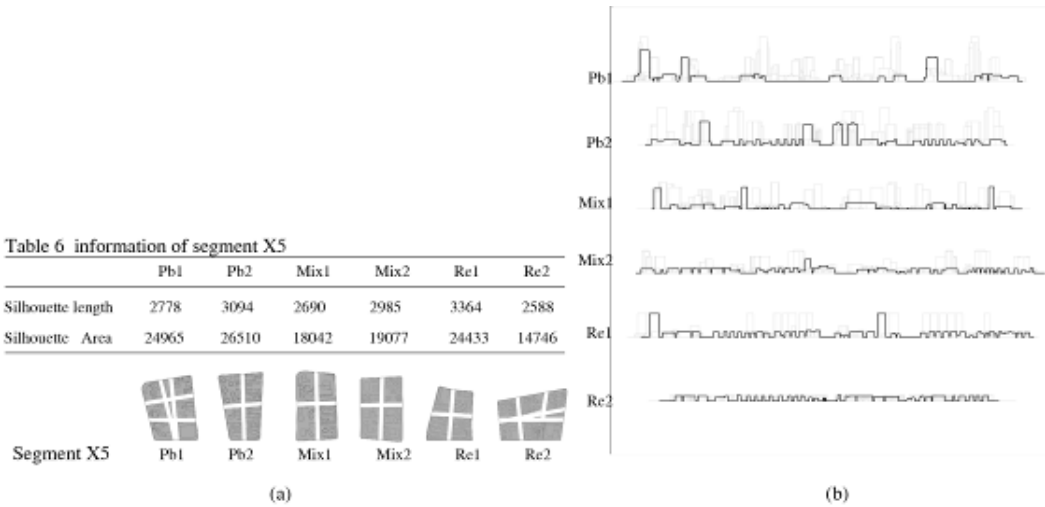


Figure 14 (a) The patterns that the segment (area of grey is null); (b)The silhouette.

Level3 silhouette of whole block

To consider the relationship of planning control index and shapes of skyline. The skyline is the contour of the sky segment in an image and its fractal dimension is regarded as an important feature which may be used to estimate natural scenes (Stephan K. C 2008). Although we didn't calculate the fractal dimension as the indicator, we can confirm that the shape of skyline has important influence on the blocks appearance.

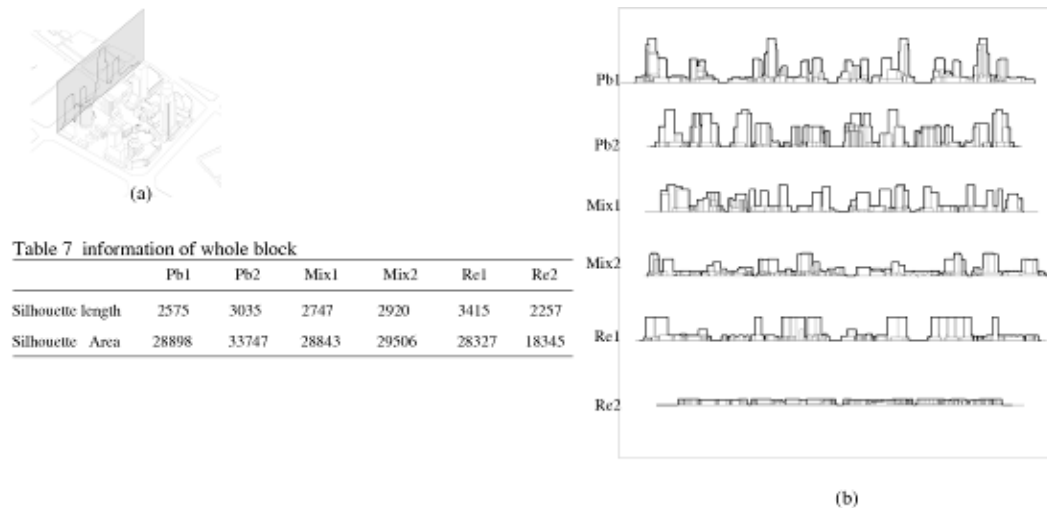


Figure 15 (a) The theoretical model that how the skyline is been described; (b) The silhouette of whole block.

Level 4 percentage of background

The Superposition Ratio (SR) of the streetscape silhouette and block skyline reflect the scope that block internal and external. By calculate the percentage of the bareness which means the whole area except superposition part we can infer to the extent of changes. We define the indicator the percentage of background (PB).

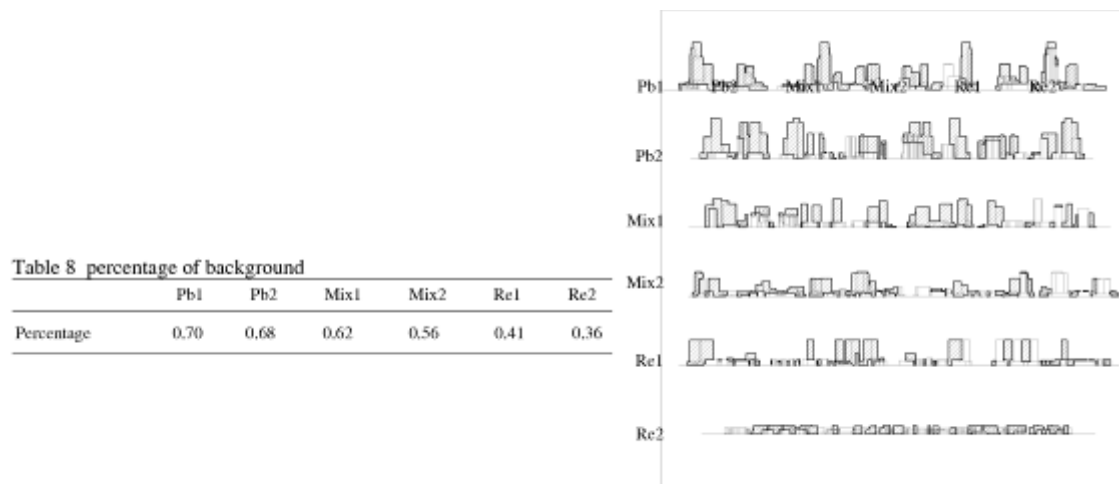


Figure 16. Percentage of background that be enclosed by the streetscape and skyline.

Discussion

Properties has influence to form

By analysis the length of silhouette & floor area ratio (FAR) (fig.17a), we found that the Resident block (Rb) has the longer length by transformation the FAR, the reason why we could calculated by that is because that the pre research have confirmed that when the coverage ratio of blocks is equal the height of silhouette in a linear fashion. The reason for that is because the plan of public buildings is bigger than resident so the equal acreage the more buildings in resident. Another reason for that may be the resident buildings a more close to the street than public buildings (buildings have to give some space close to street for enter in).

The compactness ratio of Resident blocks is lower than public buildings (figure17b) when the segment is close to the street. which can be explain that though the buildings close to the street few but each of them has big acreage so it looks more compactness, but the resident buildings has individual.

However, when we research the skyline of block we found that the president has higher compactness ratio than public one (fig.17c). It can be explain that the height of resident is almostly so we describe the skyline more smooth has the lower CR. The public one looks sharp by reason of the discrepancy of different buildings.

The percentage of background of blocks confirm that the public block has more facade bareness (figure17d), the reason is same to the compactness ratio of skyline.

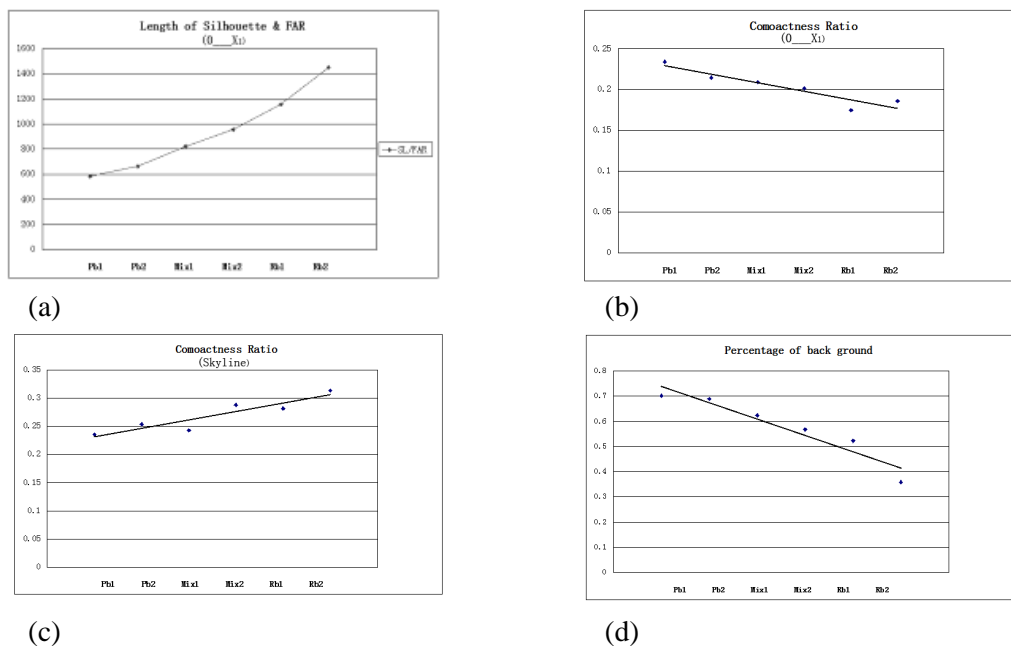


Figure 17. Relationship between silhouette shapes and properties: (a) length of silhouette & floor area ratio (FAR) _segment X1; (b) compactness ratio of silhouette and properties _ segment X1; (c) compactness ratio of silhouette and properties _ skyline; (d) percentage of background and properties.

How the silhouette shapes varichange

No matter the public blocks or the resident blocks the deeper with the area the lower compactness ratio it will be. The rate of change indicates that the public block changes more acute. The decline of CR has confirm that it's more smooth inexternal whatever the public block and resident block. But whether all the changes the public block has higher compactness ratio in the

same segment, means the public block more concentrated in external and internal.

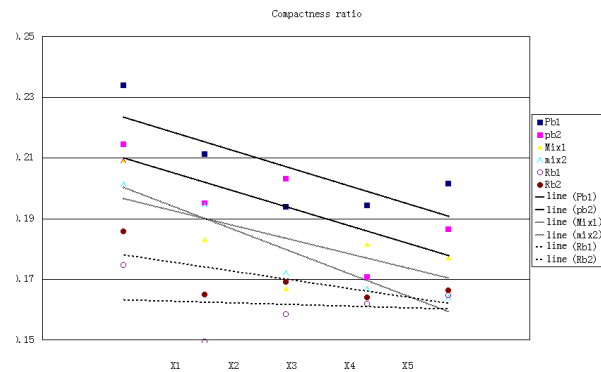


Figure 18. The varichange of silhouette shaped in different located.

The relationship of Compactness ratio and indicator

By compare the data of Compactness Ratio (CR) and indicate, the research found some rules, and define which indicator has the direct impact the form of skylines. The previous study has confirmed that the properties of block may have an influence on shape of skyline, the research calculate the percentage of public buildings (means the area) in different blocks. The statistical results show that there has a break point when the proportion is 0.6, it means that the more public buildings the less compactness ratio the skyline has.(fig.19a) The Length/Width Ratio has the influence on pattern (MJ Barnsley,2003).

By compare the date of Compactness ratio (CR) and Length/Width Ratio the graphical representation that by the increase in Length/Width the Compactness ratio (CR) is much (figure 19b). Means that if the block shape is more pointed the skyline is more concentrate on. In our experience, if buildings are taller so the shape and the length of skyline is easier to be identify, By compare the Average Height (AH).

The figure 19c, figure 19d make clear that Compactness ratio (CR) of skyline has no clear link to the average height and the floor area ratio (FAR).

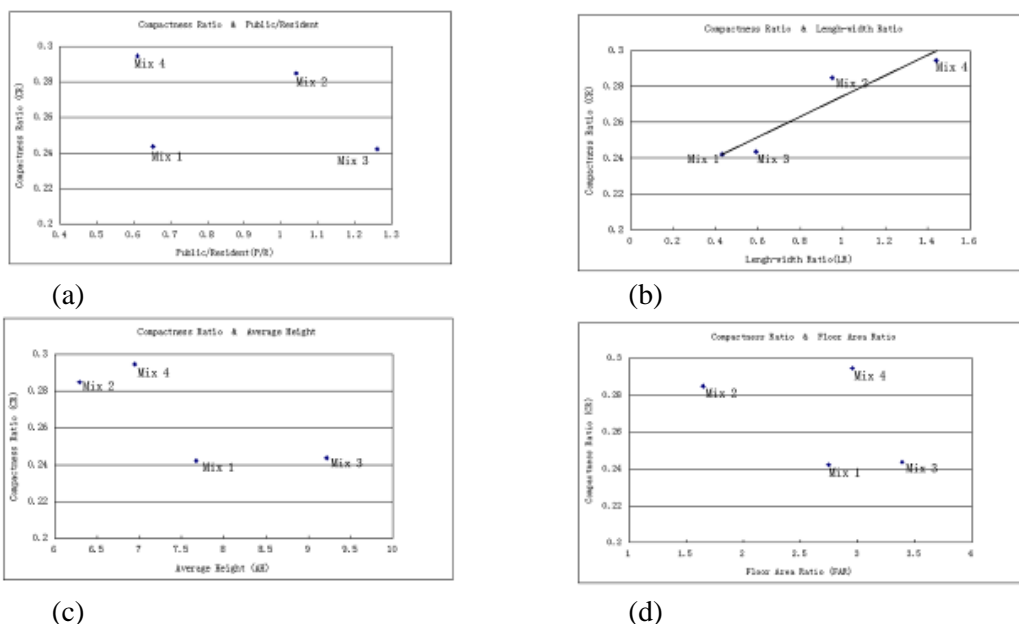


Figure 19. Relationship between silhouette shapes and indicator: (a) CR & percentage of public buildings; (b) CR & Length/width of blocks; (c) CR & AH; (d) CR & FAR.

Conclusion

The former quantitative approaches have clarified the importance of research in blocks silhouette. Then analysis the indicator for distinguish the different properties and give the main points of research .By summarize the pre research about skyline, the research discriminate some important features. Based that features research present a framework in a reasonable way .And define the rules for describe the silhouette by segment. Through compare the data which come from the segment there has some conclusion:

- i) resident block (Rb) has the longer length than Public blocks;
- ii) the compactness ratio of Resident blocks is lower than public buildings in streetscape;
- iii) the president has higher compactness ratio than public one on skyline;
- iv) the public block has more facade bareness;
- v) no matter the public blocks or the resident blocks the deeper with the area the lower compactness ratio it will be;
- vi) compactness Ratio(CR) is related to the length/width ratio of blocks.

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Urban form and accessibility to rail transit stations: a case study of Auckland

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Abstract. *Rail transport is an environmentally friendly alternative to the use of the car. People are more likely to walk to a Rail transit stations or RTS for a commuting trip than to take a car. Providing RTSs with quality pedestrian access improves urban rail ridership. However, little research has been done to explore how the characteristics of urban form along these routes that provide pedestrian access to a RTS can influence urban rail travel demand. Urban morphology in general, and the idea of urban fringe belts in particular, have been recognised as a powerful means of understanding the physical form. This study examines how urban forms in different morphological periods affect a person's decision to walk to a RTS. All 38 RTSs in Auckland, New Zealand have been grouped into three categories, based on their location and the corresponding morphological period that relates to the development of Auckland. Using GIS, a multiple regression model has been applied to each of the three categories of stations to analyse the relationship between the ridership and three planning factors of population density, land-use diversity, and pedestrian oriented design. The results show that the transit ridership in different morphological period are differently influenced by the characteristics of their urban form. The results provide policy implications for a city to improve its walkability and increase urban rail ridership. More specifically, the results will help to inform the evaluation, design and development of more walkable surroundings near RTSs. Despite the fact that the findings will be validated in Auckland, the methodological framework is expected to be applicable in different contexts.*

Key Words: *Urban form, pedestrian accessibility, rail transit station (RTS), Auckland.*

Background

Many cities around the world have concluded that roads cannot be built fast enough to keep up with rising travel demand. Different policies are being adopted to encourage drivers to use public transport and rein in automobile use. Among different modes of transit, there is a renewed interest in rail travel and rail investment. Existing literature shows that rail transport is an environmentally friendly alternative to the use of the car. People are more likely to walk to a train station for a commuting trip (Dittmar & Ohland, 2003) than to take a car.

Most transportation-focused policies that were previously effective, such as establishing new transit services or restricting the use of cars, have encountered limitations. Planners and urban managers are turning to alternative policies with more integrated planning and design that aim to provide people with better access to transit by changing urban morphology. These efforts include new urbanism, the compact city, smart-growth, transit-oriented development and urban village movements (Bean, Kearns, & Collins, 2008). However, these attempts have seen limited success. According to Dimmar (2003), “the review of the projects that are emerging reveals that many ‘transit towns’ fail to meet their objectives. Many projects end up becoming fairly traditional suburbs that are simply transit adjacent” (Dittmar & Ohland, 2003, pp. 2-3). A recent study (Chatman, 2013) of residents currently living in the proximity of train stations shows that rail access has no statistically significant effect on people's travel behaviour. Can rail really increase the transit and walk-mode share with such behaviour? Or are urban planners promising too much? An often unspoken but key component of these alternative proposals is the morphology of the urban form along access routes to a train stop.

Urban morphology can be defined as the study of the physical characteristics of towns and cities, resulting from an evolutionary process of urban activities and planning action (Gu, 2002, p. 1). Urban morphology deals with objects and their parts, their relationships and arrangements, classification, variation, formation and historical change, with reference to the built environment (Osmond, 2008, p. 41). One of most powerful theories in urban morphology to study urban form is the fringe belt concept. Put simply, studying such belts provides a comprehensive view of the spatial process of urban outward growth and internal change (Gu, 2010). A rail transit station or RTS can be studied and grouped with regards to its morphological period context. Then planning factors will be studied in each group to find out their relative effectiveness to promote rail transit system. This compound approach to the research can open a new field for application of urban morphological methods and techniques.

The City of Auckland, which is a representative of an Australasian metropolis, has the strong urban planning objective of being a more transit friendly city. Previously characterised by the successful advocacy of motorways at the expense of rail (Gunder, 2002; Mees & Dodson, 2001), Auckland is now heavily investing in improving its rail transit system by moving from diesel to electric trains (Auckland Transport, 2014a), implementing new ticketing systems (Dearnaley, 2013), and adding new lines (Dickey, 2013). The purpose of this paper is to analyse the relationship between the ridership of a RTS and morphological characteristics of its catchment area. The outcome of the research can first, provides the basis for a more integrated transport and planning policies for Auckland and other cities with an objective to consistently promote transit ridership. And second, it introduces a new methodological framework for application of the fringe belt concept.

Theories and model

The fringe belt concept

The fringe belt concept reflects the marks on the ground from the different periods of buildings cycles (Whitehand, 1988) where mostly undeveloped lands have come into being at the edge of urban areas during periods of minimal outward residential growth. These lands are heterogeneous in plan, building forms and land and building use (Gu, 2010). In this research the fringe belt concept is adopted to classify the RTS area, which determines its position in the historical development process of Auckland city.

The Planning factors of urban form

In regards to the physical characteristics of urban form that affects transit commute shares, various policies has been suggested to promote a transit town. Many scholars have indicated that the planning factors of urban form that influence transit commute share are density, land-use diversity and pedestrian oriented design of neighbourhoods around RTSs (Cervero & Kockelman, 1997; Lee & Moudon, 2006). This study does not repeat the previous studies mentioned above but instead investigates the differences in the magnitude of the impact of each of these factors based on the morphological context of a RTS catchment.

Defining the catchment area of a station or the pedshed is very important to study planning factors. A real pedshed based on the actual street network around a RTS provides more realistic results than a simple as-the-crow-flies radial buffer. There is no exact number for the walking catchment radius of a RTS, however, some literature suggest it is between 400 to 800 metres (Bernick & Cervero, 1997, p. xii and 387; Calthorpe, 1993, p. 175; Halden, McGuigan, Nisbet, & McKinnon, 2000; Kuby, Barranda, & Upchurch, 2004). In this research the pedestrian catchment was defined as 500 metre or approximately 10 minute walking distance.

Many studies have found that density affects rail ridership significantly (Kamruzzaman, Baker, Washington, & Turrell, 2014; Ratner & Goetz, 2013; Sung & Oh, 2011). The total density which is the combination of population density and jobs density can incorporate both densities in one variable. Total density represents the ratio of the total of jobs and residents to the ground area in the pedshed (Eq. 1).

$$Density_i = \sum_j \left(\sum_k \left(\left(\frac{MBPop_k}{MBRes_k} \right) \times TotalRes_{jk} \right) \right) / Area_i$$

Eq. 1

Where:

$MBPop_k$ is the population in the mesh block number k.

$MBRes_k$ is the number of residential units in the mesh block number k.

$TotalRes_{jk}$ is the number of residential units in the mesh block number k and station pedshed number j.

$Area_i$ is the area of station pedshed i.

The mixed-use index developed by Gibbs (1962) can ranges the RTSs between 0 to 1 based on their diversity of land use pattern (Eq. 2).

$$Diversity_i = 1 - \sum_j \left(\frac{LUCnt_{ij}}{TotalLUCnt_i} \right)$$

Eq. 2

Where:

$LUCnt_j$ is the count of land use type j in station pedshed number i.

$TotalLUCnt_i$ is the total number of all land use types in the station pedshed number i.

The design quality of a RTS area is a subjective matter and difficult to quantified. The space syntax's depth score provides a good measure to calculate the integration of a RTS with its surrounding environment. The depth of one space from another can be directly measured by counting the intervening number of spaces between two spaces (Bafna, 2003). In this research the design of a RTS is measured by its depth calculated by Depthmap program (Space Syntax Network, 2014).

The number of rail transit riders in a station area comes from the latest census data (Statistics New Zealand, 2013). The same proportion of residential units of each meshblock that falls in a pedshed has been selected from the total number of rail transit riders. Here the assumption is that people will walk or cycle to the nearest station (Bernick & Cervero, 1997, pp. 253-267; Dittmar & Ohland, 2003; Krizek, 2003).

$$Rider_i = \sum_j \sum_k \left(\left(\frac{MBRes_{ijk}}{TotalRes_k} \right) \times TotalRider_k \right)$$

Eq. 3

Where:

$MBRes_{ijk}$ is the number of residential units in the mesh block number k and station pedshed part number ij.

$TotalRes_j$ is the total number of residential units in the mesh block number k.

$TotalRider_k$ is the total number of people who use rail tranist in the mesh block number k.

To investigate this relationship, as multi regression model is proposed below:

$$Rider_i = a_1 Density + a_2 Diversity + a_3 Design + b$$

Eq. 4

Application and analysis

The main feature of human settlement in the Auckland region has been the development of a substantial urban area (the largest in New Zealand) in which approximately 90% of the regional population lives. This metropolitan area is located on and around the central isthmus and occupies around 10% of the regional land mass. Home to over 1.4 million people, Auckland is a vibrant centre for trade, commerce, culture and employment (Auckland Regional Council, 2010).

Data collection

Data on population density and ridership was collected from the 2013 New Zealand census (Statistics New Zealand, 2013). The data on land-use diversity was collected from the Auckland council GIS viewer website (Auckland City Council, 2013). The data for parcel area is collected from the university library GeoDataHub (University of Auckland library, 2013). Other data used in this paper are meshblock boundaries (Statistics New Zealand, 2013), street network (Open Street Map, 2014), rail station location and rail transit network (Auckland Transport, 2014b) (Figure 1).

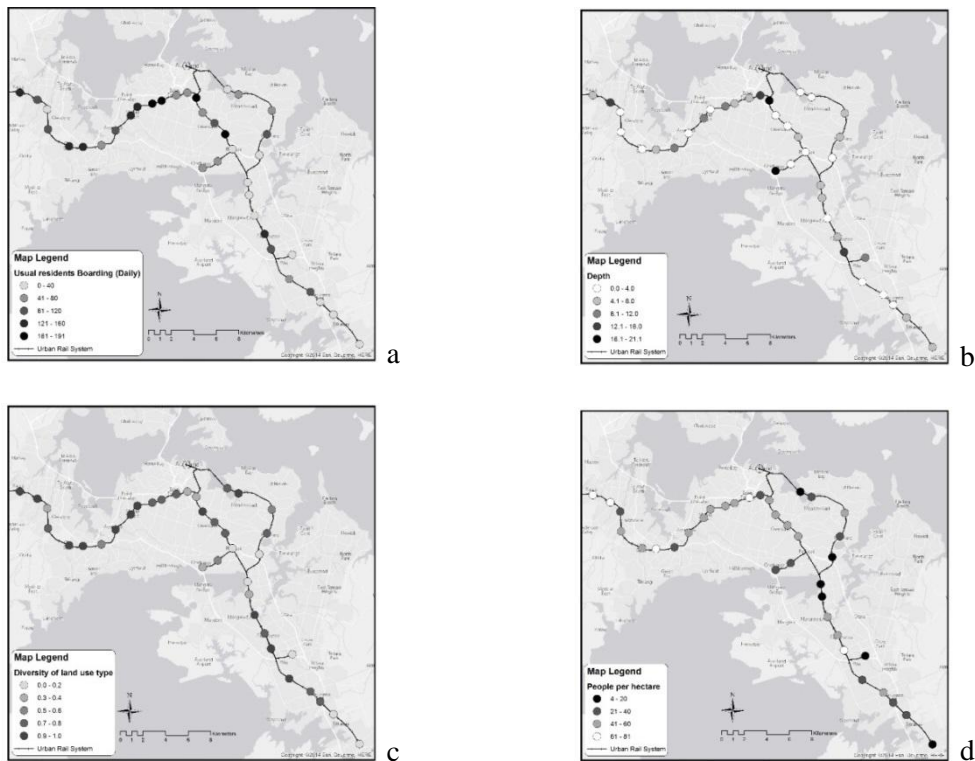


Figure 1. Daily riders (a), the planning factors of the station areas (b–d).

Catchment

Open street map or OSM is a free knowledge collective that provides user-generated street maps. In this research, the ArcGIS 10.2 was used to download and model street network from Open Street Map website (Open Street Map, 2014). ArcGIS Network Analyst is a powerful tool that can generate a realistic walk mode service area for a location based on a street network. Using the Network Analyst, the transit station pedsheds was drawn based on OSM data (Figure 2).

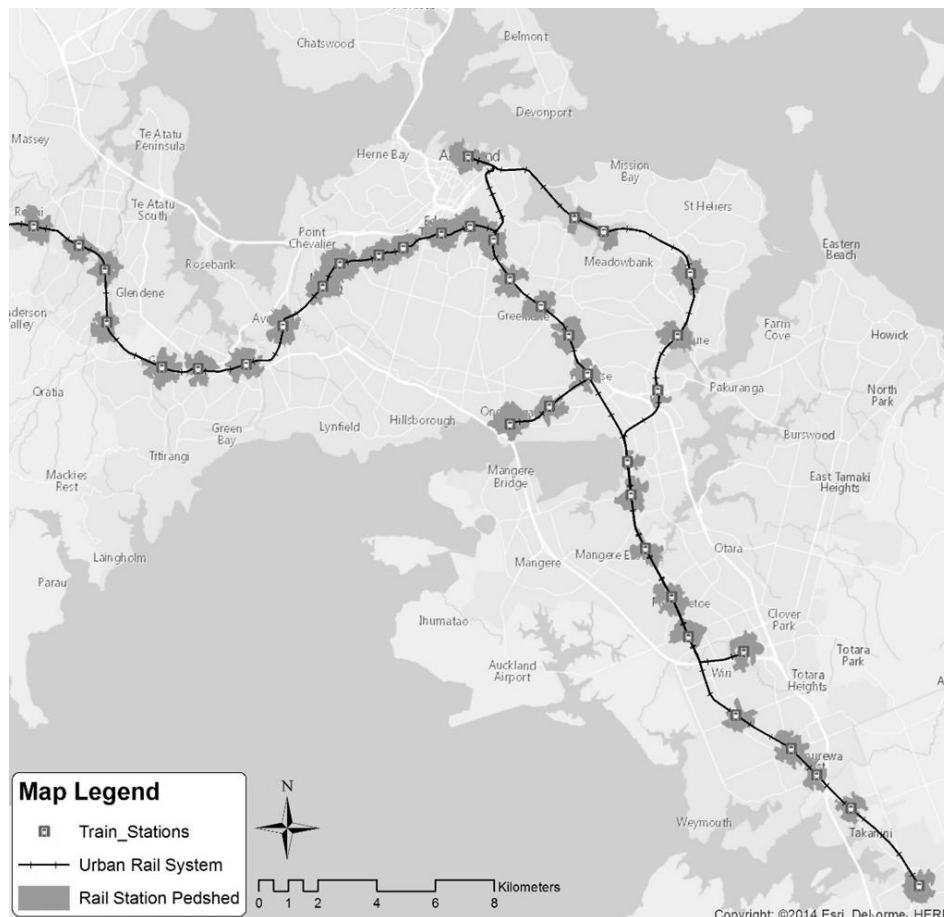


Figure 2. The rail transit station pedsheds of Auckland metropolitan area.

Clustering the station areas and the fringe belt concept

The morphological periods of Auckland investigated by Gu (2010) have been used as the basis for clustering rail transit stations based on their morphological context. Gu (2010) has determined four morphological periods of expansion of Auckland isthmus: pioneer development (1840-1880), Late Victorian and Edwardian (1890s-1900s), The interwar (1920s-1938s) and early post-war (1950s-1960s). Characterised by “distinctive planning ideologies that have left observable material residues”. These characteristics are summarized in Figure 4.

A series of concentric fringe belts can be recognized at the edge of each morphological period. The inner fringe belt surround the kernel of the city. A discontinuous middle fringe belt marks the edge of the late Victorian and Edwardian growth, and an outer fringe belt marks the edge of the interwar development (Gu, 2010) (Figures 3 and 4).

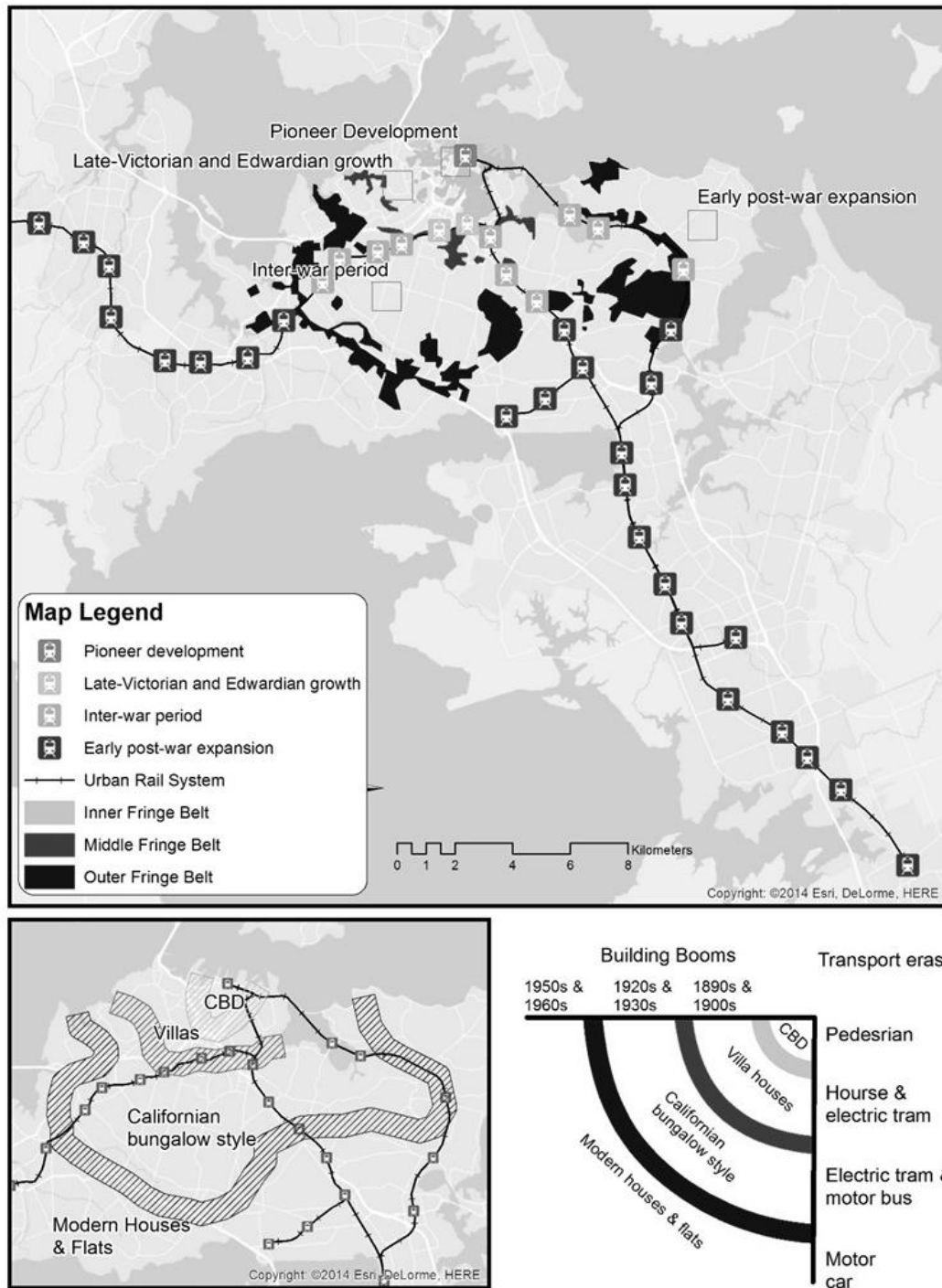


Figure 3. Auckland fringe belts and clusters of rail transit stations (Gu, 2010).

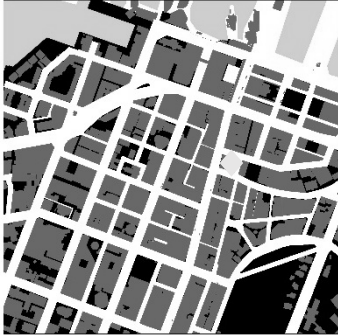





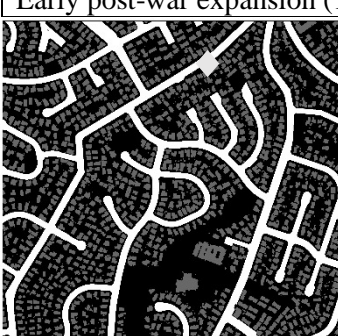

Pioneer development		
		<ul style="list-style-type: none"> -The kernel of the city, now the CBD -geometrical pattern Winding streets mainly follow the coastline
Late-Victorian and Edwardian growth (1890s-1900s)		
		<ul style="list-style-type: none"> -Characterised by the construction of streets meeting at right angles. -Back-to-back plot pattern relatively high-density built environment -Single-storey-detached villas
Inter-war period (1920s-1930s)		
		<ul style="list-style-type: none"> -A grid street pattern reflecting the influence of garden suburb ideas -Californian bungalow and mission styles
Early post-war expansion (1950s-1960s)		
		<ul style="list-style-type: none"> -Loop roads, crescents, culs-de-sac and irregular shapes -Building types of this era were characterised by rectangular shapes, concrete block walls, split levels and flat roofs

Figure 4. Ground plans and building types representing the morphological periods (Gu, 2010).

Results and discussion

Multiple ordinary least squares regressions has been employed to analyse the effects of the hypothesized independent variable on RTS's ridership. Multiple regressions is very flexible to use and easy to understand, however, similar to all statistical tools the results is highly dependent on the sample size. The pioneer development of Auckland city host only the Britomart station and there are only two stations between inner and middle fringe belts (Figure 3). Thus, these stations has been excluded from the analysis.

The research focuses only on inter-war and post war developments and compares the results to the whole city. For this purpose three different regression model for inter-war area RTSs, post-war area RTSs and the whole city RTSs calculated to indicate the magnitude of the coefficients of planning factors in each of these areas. All regression models were statistically significant and had an appropriate goodness of fit. The results of the model estimation are summarized in figure 5.

Application	N	Parameter	Standardized Coefficients	R ²	Adj. R ²	F-Value (sig.)
The whole city	36	b	-43.04	.500	.453	10.668(.000)
		Total Density	.319			
		LU Diversity	.566			
		Depth	.275			
Inter-war development	10	b	-120.00	.627	.441	3.368(0.096)
		Total Density	.626			
		LU Diversity	.511			
		Depth	.420			
Post-war development	26	b	-16.03	.481	.410	6.786(0.002)
		Total Density	.174			
		LU Diversity	.650			
		Depth	.099			

Figure 5. Summary of regression analysis.

The comparison between results of regressions indicates verifies this assumption that planning factors are highly contextual and they vary depending on characterises of each morphological period of development. The regression analysis of boarding and planning factors on the whole city (Eq. 5) indicates the coefficient of land-use diversity was largest and that of density was larger than that of design. Same pattern could be seen post-war developments (Eq. 6) however with larger difference between diversity and the other two factors. This trend changes over the inter-war period area of development as the density is more important than diversity and design (Eq. 7).

$$\text{Eq. 5} \quad \text{The whole city : } \text{Rider}_i = .319\text{Density} + .566\text{Diversity} + .275\text{Design} + b$$

$$\text{Eq. 6} \quad \text{The post – war: } \text{Rider}_i = .099\text{Density} + .650\text{Diversity} + .099\text{Design} + b$$

$$\text{Eq. 7} \quad \text{The inter – war: } \text{Rider}_i = .626\text{Density} + .511\text{Diversity} + .420\text{Design} + b$$

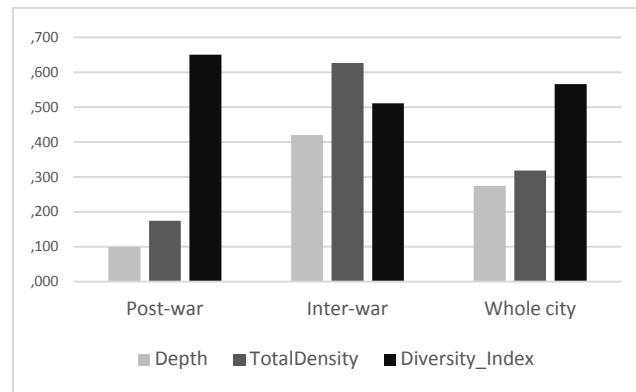


Figure 6. Standard coefficients.

The interest toward public transport have recently developed in many cities around the world. The general idea of developing a dense, pedestrian friendly, mixed use urban fabric around rail stations is common in strategic growth plans for cities. This research assumed, even though the planning factors are influencing the ridership, this influence is different based on the characteristics of urban fabric.

Urban morphology provides a powerful conceptual frame work to identify homogenous urban fabrics based on the ideology that produced it. Urban morphology has been successfully developed in several areas of planning and design practice, notably urban conservation, urban design, and urban coding and planning (Gu, 2013) but it has not been incorporated in integrated planning and transportation policies yet. The purpose of this research was to analyse the relationship between ridership and the aforementioned planning factors to verify that morphological study of urban fabric can play an important role in new trends in transportation policies.

The results indicate that each morphological periods of development have different priorities to make a city more transit friendly. The periphery areas of post-war development are influenced mostly by diversity, whereas riders in the inter-war development areas are affected mainly by density. Consequently clustering RTSs based on their morphological characteristics is a useful way to establish proper land-use plan and increase their ridership. These findings support the research assumption that each RTS pedshed should be planned differently based on its morphological characteristics.

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Systems thinking for new perspectives on urban form – a case study of active transport infrastructure in urban corridors

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Abstract. *Urban planning and design require new ways of interpreting urban form that allows for the understanding of multidisciplinary approaches and cooperative outcomes. This innovative study brings together the disciplines of Human Factors with Urban Design to investigate the form and design of active transport infrastructure (ATI) in urban transport corridors (Stevens and Buksh, 2013). These connectors of people and place go beyond the roadway and consider the dynamics of adjacent urban form. They are defined by the disparate demands of engineering, urban planning, urban design, property development and community expectation. Using Cognitive Work Analysis (CWA) this study investigates and identifies the interdependencies and ability of these urban corridors to operationalize ATI which permits best practice road user hierarchies that give highest priority to walking and cycling. CWA (Vicente, 1999) is a systems analysis and design framework that identifies the constraints imposed on activities and designs new systems that better support the activities of interest. CWA has been used in a variety of design activities in several domains, including defence, disaster management, process control, and road safety (Salmon et al., 2010). This research is the first to apply CWA as a tool to interpret the interdependencies of urban form and its component elements. The application and extension of sociotechnical systems theory in an urban setting has allowed for unique insights. A key aspect of the framework is that it is formative in nature describing what could happen if design modifications are undertaken, rather than provide normative analyses of what should happen. The results of this study allow for a clearer interpretation of the relationships between all of the physical elements of ATI and its intended functional purposes. Through the analysis of ATI this research provides a means to understand the multidisciplinary requirements for establishing urban form which supports safe and accessible use by pedestrians and cyclists.*

Key Words: *Cognitive Work Analysis; Urban Corridors; Systems Analysis; Multidisciplinary Design Framework, Active Transport Infrastructure*

Introduction

This paper proposes that the urban form of our cities needs to be underpinned by a better understanding and prioritisation of community access. This paper seeks to offer insights into the design of streets which are prioritised as key community conduits and destinations in their own right. It outlines a systems approach which enables multi-disciplinary responses to the establishment of active transport infrastructure (ATI) which supports and encourages pedestrians and cyclists within the urban corridor.

Public space within cities is a dwindling resource, yet though appropriate design, or indeed redesign, our footpaths and roadways have the capacity to host community life. They offer the greatest opportunity and potential for our neighbourhoods and urban environments to act as social places. The role that streets and footpaths should play in contributing to quality of life is firmly entrenched in urban design and urban planning theory (Lynch, 1960; Jacobs, 1961; Appleyard, 1980; Gehl, 2011).

There is a range of literature, plans and strategies that outline the known benefits of active transport, including, reducing vehicular congestion, greenhouse gas emissions and supporting

individual and community health (Woodcock et al., 2007; Frank et al., 2010; SCRC, 2011b; Millward et al., 2013). This research instead focuses on the design and form of active transport infrastructure. Specifically it is concerned with the provision of pedestrian footpaths and on-road cycling facilities within existing urban roadway contexts. Many of these roadways were never designed or intended to provide for active modes of transport and subsequently often do not support safe interactions between different road user groups.

This 'systems thinking' approach to road design is a key requirement for future road systems (Salmon et al., 2012). It is able to consider the relationships between the ideal functional purposes of active transport infrastructure and highlight the system relationships. While the urban form and roadway contexts are key inputs into the system, the approach specifically identifies the range of interdependencies between functions, purposes, and objects within a typical active transport infrastructure configuration.

The literature on active transport emerges from a range of discipline areas including health promotion and preventative medicine (Frank et al., 2010; Hamer and Chida, 2008); transport geography (Kelly et al. 2011, Millward et al., 2013); and urban planning and design (Forsyth et al., 2007; 2008; Ewing and Cervero, 2010). This research provides new knowledge through the convergence of the Human Factors and Urban Design disciplines.

Significance and research challenges

The potential of roadways and more specifically existing urban corridors to act as community and neighbourhood places support by active mobility is recognised in literature, planning and policy (IPWEA, 2010; SCRC, 2011b; Stevens and Buksh, 2013). Additionally, there are a variety of evaluative techniques that seek to establish and reprioritise active transport, and the amenity to support it, through principles of urban design and health promotion (Cerin et al., 2007; Clifton et al., 2007; Ewing and Handy, 2009; Millward et al., 2013). While much has been done to better understand and evaluate the contributions of built form and community life which encourages active transport there is also a continued acknowledgement that implementation of appropriate strategies needs to be improved (Stevens and Buksh 2013). This research recognises three main challenges that have inhibited the ability of urban corridors to be significant locations of active mobility.

First, is that past and present design standards for roadway corridors prioritise motor vehicles over all other uses (P and NJ, 2008; TMR, 2013). The engineering based standards are largely not concerned with the delivery of quality urban design or form, but the efficient and safe movement of motorised traffic. As transport agencies increasingly seek to enable active mobility, the supplied active transport infrastructures are required to be established within an existing roadway context. Footpaths and on-road cycleways are required to 'fit' within the roadway corridor without specific consideration of the needs of active mobility. This post hoc delivery of painted on-road cycle markings and standard concrete footpaths may fulfil departmental and agency policy for implementation, but they are not fit for purpose.

Second, is that the engineering or urban design guidance which does seek to enable walkable and cyclable neighbourhoods is very rarely considered in an integrated manner. The engineering standards are not interested in ensuring visual amenity and sense of place, and the normative principles of urban design are often difficult to apply in practice. That is, much of the urban design guidance for active transport infrastructure is often descriptive or illustrative (ITE, 2010; IPWEA, 2010). The provision of key principles and listed objectives of primary considerations; supported by illustrations and elevations of what should be done, may be argued to limit the in-practice uptake of such advice (Stevens and Buksh, 2012).

Third, current active transport 'solutions' rarely seek to exemplify safe, efficient or best practice sustainable transport, nor do they support a high quality active transport user experience. As such, despite implementation of ATI, increases in activity are often limited (Alfonzo, 2005; Paige Willis et al., 2013). Further, there is very little evidence that such

infrastructure considers the implications or interactions between active transport modes which are often also incompatible - pedestrians and cyclists.

The safety of active transport users continues to represent a significant issue, both in Australia and worldwide. Of the 1303 crash-related fatalities occurring in Australia during 2012, 174 were pedestrians and 33 were cyclists (BITRE, 2013). The challenge is how to retrofit urban corridors which are safely engineered for active transport and establish urban form which encourages use through contributions such as amenity and sense of place. The identification of design frameworks that can support the development of appropriate active transport infrastructures which prioritise walking and cycling is critical.

The application of systems analysis and design approaches for roadway configuration and evaluation is gaining momentum (Salmon et al., 2014; Cornelissen et al., 2013). This research argues that the Cognitive Work Analysis framework (CWA; Vicente, 1999) provides a suitable design approach for active transport infrastructure within the urban corridor. The aim is to show how CWA can contribute to the design of safe and efficient active transport environments which provide a high quality user experience. This paper outlines an approach whereby it is possible to better understand the role and interactions of active transport infrastructure within the urban corridor. The aim is to provide a single analysis with the potential to consider both the engineering and technical standards of safe active transport infrastructure with the urban design opportunities and experiential contributions as high quality places for walking and cycling. Much of the current literature and policy seeks to deal with these issues independently, or in turn, here they are considered as interdependent.

The study described uses the first phase of the CWA framework, Work Domain Analysis (WDA) to model the 'ideal' active transport infrastructure configuration, considering the current practices of retrofitting existing urban corridors.

Urban corridors

The idea of the urban corridor is not new and has historically been used to describe the growth and development between key activity centres (Sargeant et al., 2009). Indeed the concept of the urban corridor has been used as a spatial planning unit of analysis in several national and international investigations (OA, 2010; Aust. Gov, 2007; Government of South Australia, 2011).

These transport focussed corridors, within an urban environment, are naturally complex as they transverse across different scales and are influenced by a collection of economic, environmental and social relationships connecting people and place. Hale (2011) and Arrington and Cevero (2008) identify the need to carry out corridor analysis at different scales to better understand how a particular transport initiative, corridor upgrade, or Transport Orientated Development (TOD) proposal relates to the broader urban setting.

Hale (2011) argues that this is a practical step forward and must be carried through the development of analytical tools, ultimately leading towards better outcomes for projects at different spatial scales over time. Urban corridors of any scale or function and their surrounding urban catchment have reciprocal latent and explicit impacts which require further investigation, understanding and management (Stevens and Buksh, 2013).

For the purposes of this paper the *urban corridor* represents a 400m buffer along road based transport corridors, often containing public transport (Adams, 2009). These urban corridors are key development areas and community conduits which respond to and consider adjacent site, local and corridor urban context.

Cognitive Work Analysis and Work Domain Analysis

The CWA framework is concerned with constraints rather than goals, and is based on the notion that making constraints explicit can potentially enhance human performance. To identify and understand these constraints the CWA framework comprises five interrelated phases, this research involved applying the first phase, Work Domain Analysis (WDA).

WDA is used to describe or model the system of focus by describing the purposive and physical constraints imposed on activity within a particular system. This involves constructing an Abstraction Hierarchy (AH) of the system in question. The AH represents the system across the following five levels of abstraction (Naikar et al., 2005):

Functional purpose – The overall purpose(s) of the system and the external constraints on its operation;

Values and priority measures – The criteria that the system uses for measuring progress towards its functional purpose;

Generalised functions – The general functions of the work system that are necessary for achieving the functional purposes;

Physical functions – The functional capabilities and limitations of the physical objects within the system that enable the generalised functions; and

Physical objects – the physical objects within the system that afford the physical functions.

The output provides a constraints-based model of the system which describes the purposes, values and priorities of the system, the functions that are performed within the system and the physical resources that are used to perform the required functions. WDA addresses what activities can be performed within a particular system, but also how and why they are performed and with what. This paper asserts that these characteristics make it highly suited to inform the design of active transport infrastructure that both incorporates safety and sense of place, since it is capable of describing what design features are required, and what values and priorities should be met through the design.

The CWA framework has been applied in various areas for systems analysis and design applications (Bisantz et al., 2003; Cornelissen et al., 2013; Jenkins et al., 2009; 2010; Naikar et al., 2003; Naikar and Sanderson, 2001; Watson and Sanderson, 2007); however, it has had only limited application in the consideration of urban design contexts (Stevens and Salmon, 2014). In this study, the WDA was used to create a model of an ‘ideal’ active transport infrastructure configuration, which considers the need to retrofit existing urban corridors.

Methodology

Work domain analysis (WDA)

The development of the WDA was based on key design guidelines and standards, best practice documentation and the literature on urban design, active transport, and on-road cycleway and footpath engineering (See Table 1). This data represents national standards for footpath, pathway and cycleway design; national and international engineering design guidance; and governmental active transport and urban design policy and protocol. It is indicative of the range of active transport design guidance from across the often disparate disciplines of engineering, transport planning and urban design. Based on these inputs the WDA was developed by one Human Factors analyst and one Urban Planning practitioner.

Active transport and urban design literature

The WDA has also drawn on a range of urban design and active transport literature to allow for the establishment of high quality active transport user experiences. It is important to note that the concepts described here also emerge across a range of practice and academic literatures and

are by no means exhaustive on the topic of active transport infrastructures or the operationalization of urban design principles or subjective qualities. Concepts within this study represent those which respond largely to the context of policy and practice in South East Queensland and Australia more generally (Aust Gov, 2011; SCRC, 2011; PIA, 2010). Additionally there has been the inclusion of key elements and considerations that have emerged within the literature, planning and policy relating to: walkability and active transport (Purciel and Marrone, 2006; Ewing and Handy, 2009; Ewing and Cervero, 2010; Millward et al., 2013); urban thoroughfares and corridors (Premius and Zonneveld, 2003; ITE, 2010; Stevens and Buksh, 2012); pathway and cycleway design guidelines (Austroads, 2009; WSDoT, 2011); user orientated spaces (Yücel, 2013); and quality human environments (Gehl, 2011).

Table 1. Inputs of the Work Domain Analysis.

Australian and Queensland Design Standards
Austroads (2009) <i>'Guide to Road Design – Part 6A: Pedestrian and Cyclist Paths'</i> , Austroads Incorporated, Sydney, Australia.
Queensland Department of Transport and Main Roads (2014) <i>Transport Operations (Road Use Management – Road Rules) Regulation 2009</i> . Queensland Government, Brisbane.
Queensland Department of Transport and Main Roads (2013) <i>Road Planning and Design Manual (2nd Ed)</i> . Integrated Transport Planning Branch, Brisbane, Queensland.
Queensland Department of Transport and Main Roads (2013b) <i>Queensland Manual of Uniform Traffic Control Devices Part 9 Bicycle Facilities</i> . Queensland Government, Brisbane.
National and International Engineering Guidelines for Active Transport Infrastructure
Institute of Public Works Engineering Australia (Qld) (2011) <i>'Complete Streets: Guidelines for Urban Street Design'</i> , Queensland Division Inc, Fortitude Valley, Queensland.
Institute of Transportation Engineers (ITE) (2010) <i>'Designing Walkable Urban Thoroughfares: A Context Sensitive Approach'</i> . Institute of Transportation Engineers, Washington, DC.
USDoT, 2010, 'International Technology Scanning Program: Pedestrian and Bicyclist Safety and Mobility in Europe', US Department of Transportation, National Cooperative Highway Research Program, February 2010, viewed 28th March 2014.
WSDoT (2011) Roadway Bicycle Facilities Design Manual M 22.01.08, Washington State Department of Transport, 1520-1, July 2011
National and International Urban Design and Active Transport Policy and Literature
Australian Government (2011) <i>'Creating Places for People: An Urban Design Protocol for Australian Cities.'</i> Canberra.
Australian Government (2009) 'Healthy spaces and places. A national guide to designing places for healthy living' Australian Government Department of Health and Aging, Kingston, Canberra.
Davies, L. (2000). <i>'Urban design compendium.'</i> London: English Partnerships.
Dixon, K., Liebler, M., Zhu, H. (2008) <i>'NCHRP Report 612 Safe and Aesthetic Design of Urban Roadside Treatments.</i> Transportation Research Board, Washington: DC.
Planning Institute of Australia (2010) <i>'Urban Design Unit Manual. Planning Institute of Australia.'</i> AKH Consulting.
Stevens, N. and Buksh, B. (2012). <i>A Leading Practice Framework for Sustainable Transport Corridors: Sustainable Transport Corridor Research.</i> Final Report to Queensland Department of Transport and Main Roads. University of the Sunshine Coast.
Sunshine Coast Regional Council (2011), <i>'Sunshine Coast Active Transport Plan 2011-2031'</i> . Regional Strategy and Planning Department, Queensland.

Urban context of the active transport infrastructure WDA

When considering the urban design and the engineering requirements of active transport infrastructure within urban corridors it is necessary to acknowledge and understand the context within which they occur (Premius and Zonneveld, 2003; Stevens and Buksh, 2012). First, it is important to identify the transport task and roadway context (for example, highway, arterial

road, local road etc.). Second, is understanding the type of neighbourhood within which they occur (rural, sub-urban, urban centre, CBD, etc.) and third, is the context of the adjacent built environment within the corridor (residential, commercial, retail, open space, etc.).

Active transport infrastructure may be found in many urban roadway, neighbourhood and built environment circumstances. However the interdependency and influence of these three contexts has significant implications for both their physical design and also the quality of the user experience. For example pedestrians and cyclists have no role to play in the context of major highways, but may be expected to be key contributors to the success and vibrancy of inner city streets.

It is important to note that the WDA is actor independent and does not explore the behaviour of different users of the system. As such the WDA includes all objects that may be important to some users and of no consequence to others, for example tactile surface indicators or bike racks. The system view as represented by the WDA considers that the constraints within it are the same for all users.

Roadway context for active transport infrastructure

This research is principally interested in urban corridors that contain higher order roads that are administered and managed by state governments. As such it has utilised the urban corridor and roadway context established by Stevens and Salmon (2014) which considered the influence of 'multi-modal urban arterial roads' and 'community boulevards'. These roadway types are two of the categories established under the functional hierarchy of strategic roads as defined by the Queensland Department of Transport and Main Roads (TMR, 2009). This functional hierarchy of strategic roads identifies four (4) categories (p66):

1. high capacity, high speed motorways and highways to move large volumes of traffic, including freight traffic, over longer distances;
2. multi-modal urban arterial roads to provide connections within communities and cater for a range of road users, including pedestrians, cyclists, public transport, private vehicles, as well as commercial delivery vehicles ('first and last mile' freight);
3. bypass and ring roads to remove traffic from activity centres; and
4. community boulevards to provide amenity through activity and town centres, designed to cater for low volumes of traffic, with priority given to pedestrians, cyclists and public transport.

Neighbourhood context for active transport infrastructure

This study utilises the *South East Queensland Place Model* for the classification of the physical form and character of the neighbourhood context (CM-SEQ, 2011; Stevens and Salmon (2014). This model suggests that settlements in South East Queensland (SEQ) can be understood as a series of place types, each with common characteristics, similar land use mixes and intensities of development. The model represents what may traditionally be recognised as transect planning (Duany and Talen, 2002). The SEQ Place Model (CM-SEQ, 2011 p 62) identifies seven (7) categories of overlapping place type (Figure 1):

- P1. Natural Places – Areas dominated by the natural environment.
- P2. Rural Places – Rural production and landscapes, rural living.
- P3. Rural Townships – The range of smaller rural townships in SEQ.
- P4. Next Generations Suburban Neighbourhoods – Walkable local areas, which are people (rather than car) focussed and contain a choice of housing types and some other local uses in a mixed use setting.
- P5. Urban Neighbourhoods – Walkable, high density local areas, which are people focussed and contain a wider choice of other housing types more mixed use than suburban neighbourhoods.

P6. Centres of Activity – Vibrant and intense mixed use centres including housing, retail, employment, education and entertainment facilities. Some taller buildings are part of the built form character.

P7. CBDs – Central business districts – centres of production as well as consumption.

For this research the place types within which the active transport infrastructure WDA have been established as P5 Urban Neighbourhoods and P6 Centres of Activity.

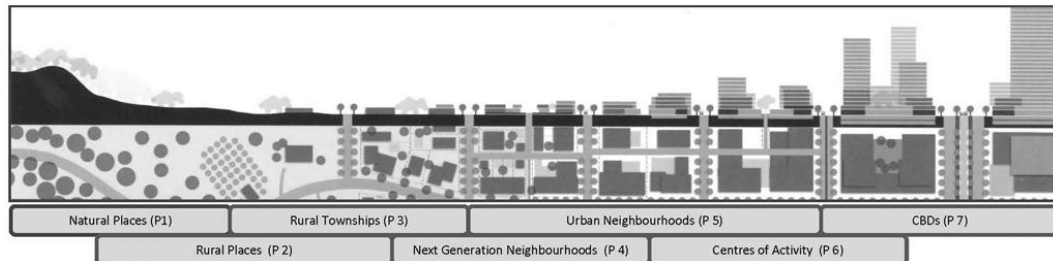


Figure 1. SEQ Place Model (CM-SEQ 2011 p62).

WDA active transport infrastructure context

The formative model developed through the WDA represents active transport infrastructure located on an urban arterial or community boulevard within an urban neighbourhood or centre of activity which has an adjacent built form context comprised of mixed use commercial, retail and residential uses. The unit of analysis is an urban block, corner to corner of approximately 150 metres in length, and 10 metres in width, begins at the building line and traverses the footpath and on-road cycleway to the roadway (Figure 2). The configuration for on-road cycling is described as a ‘wide parking lane with bicycle provision’ as it is the most commonly delivered by state agencies in South East Queensland (QG, 2013 p 9-17). The WDA considers the functions, purposes and objects within this system of active transport infrastructure.

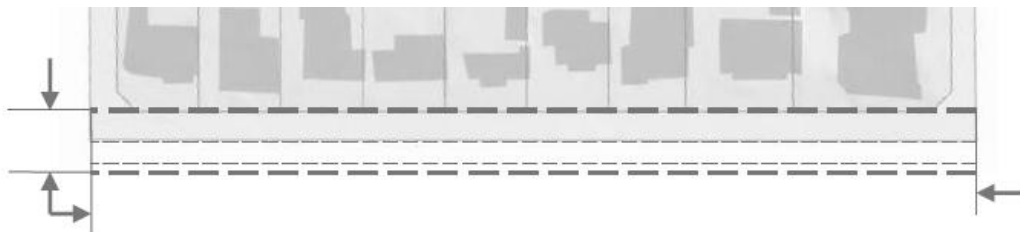


Figure 2. Active transport infrastructure WDA unit of analysis.

Active transport infrastructure zones

As an organising device this research extends the recognised zones of a footpath (Austroads, 2009; ITE, 2010) to include the on-road cycleway and the roadway edge. The amount of space allocated to these five (5) zones and the objects located within them has a significant influence on the functions of active transport infrastructure. The identified zones may be defined as:

1. On-road Cycleway Zone: This is the distance from the edge of the motorised vehicular travel way to the kerb. It often contains provision for car parking, in addition to the markings required to indicate this space as a cycleway.
2. Edge / Kerb Zone: This area is from the face of the kerb and defines the limit of the pedestrian area. It provides the minimum separation between the objects in the footpath and other vehicles in the roadway.

3. Furnishings Zone: This zone provides the major buffer between vehicles and pedestrians. It often contains signal poles, seats, landscaping, streets trees, parking meters and so forth.

4. Throughway Zone: This is the walking zone and the area through which pedestrian usually travel. It is an area that must remain clear and be free of obstructions at all times.

5. Frontage Zone: This is the distance from the throughway to the frontage of adjacent property. It is an area which should buffer pedestrians from window shoppers and private business or residential doorway traffic. This zone often contains private street and dining furniture, merchandise displays, private signage, fences and so forth.

The WDA seeks to better understand each of these distinct zones, the relationships between them and the objects they contain. To assist in the analysis of the active transport infrastructure, where appropriate, the physical objects layer within the WDA has been arranged so as to highlight their placement within the zones.

Results

The system represented by the WDA has been summarised in Figure 3. While the *Functional Purposes* and the *Value and Priority Measures* levels of the WDA are presented in their entirety, for efficiency the nodes contained within the *Purpose Related Functions*, *Object Related Processes*, and the *Physical Objects* levels have been grouped into representative categories.

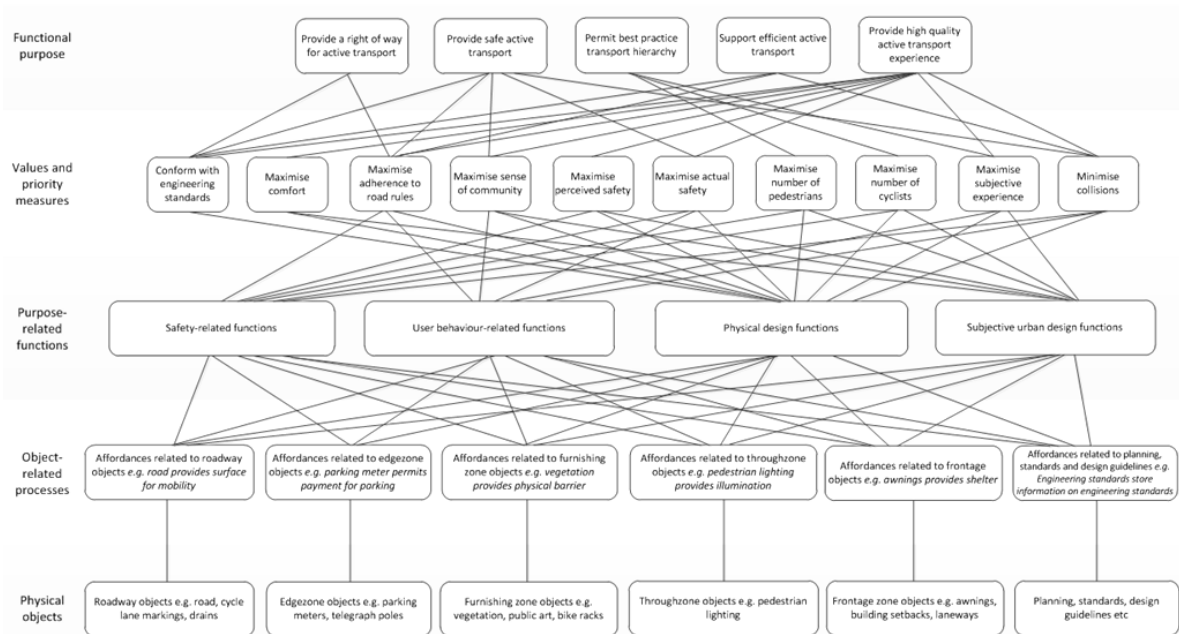


Figure 3. Summarised Work Domain Analysis.

The following discussion does not endeavour to outline all of the relationships; rather we provide an overview of the interactions between the levels of the abstraction hierarchy to demonstrate the applicability and usefulness of this method.

Functional purpose

This highest level of the abstraction hierarchy contains the reasons for the existence of the system. When considering ATI, the WDA was required to include both objective and subjective functional purposes. For example the objective purposes of the ATI to 'provide a right of way

for active transport', 'provide safe active transport', and 'support efficient active transport', in balance with the best practice and user orientated functions of 'permit best practice transport hierarchy' and 'provide high quality active transport experience'.

If the analysis had been undertaken simply by considering the function of ATI as 'provide a right of way for active transport' and 'support efficient active transport', the WDA would have yielded a systems view of how ATI is currently implemented – to accommodate these functions within the roadway corridor. Through the inclusion and analysis of the potential functions of ATI, in line with best practice, safety and user experience, the research brings together a means to understand the interfaces and possible outcomes for achieving sustainable active transport.

The important and complex relationships and interdependencies between these functional purposes are established when considering the below levels of values and priority measures; purpose related functions; physical affordances; and physical objects. It is interesting to note that the five functional purposes described at this level may not necessarily be compatible; that is, it is questionable whether ATI designs can fulfil these purposes without some trade-offs.

Values and priority measures

Values and priority measures are positioned on the second level of the WDA and outlines the criteria against which to evaluate the achievement of the systems functional purposes. That is, do these inclusions provide an indication of how the functional purposes are being achieved? For example, in this ATI system 'maximise comfort' is an important value and priority measure for the delivery of 'high quality active transport experience'. In turn, 'maximise wayfinding' is one of ten purpose related functions (next level down) which are required in the system to maximise comfort. Further 'maximise wayfinding' is achieved through six object related processes that are enabled by a variety of physical objects within the footpath. In the WDA system described here the object related processes and their associated physical objects (in brackets) to 'maximise wayfinding' include: 'provide stop/go information' (traffic signals, regulatory signage); 'landmarks' (public art, trees, building setbacks, community archive and knowledge); 'footpath illumination' (pedestrian lighting); and 'provides wayfinding information' (road markings, cycle lane markings, regulatory signage, street name signage, information signage, tactile surface markers, building number signage) – all necessary processes and objects for maximising wayfinding.

For another example, when considering the value and priority measure of 'maximise actual safety' it is important in this systems approach to be able to offers means by which it may be achieved. It makes sense then that 'maximising actual safety' has connections with purpose related functions such as: provide protection for the travel-way; maximise lighting; minimise obstacles and debris; minimise changes in grade; maintain separation of pedestrians, cyclists and motor vehicles; maximise through zone clearances; minimise crime; provide warnings; design in consideration of the traffic context; maximise quality of the design; and corridor maintenance. These are all sound and adequate indicators of the level of actual safety, in turn supported by object related processes and the objects themselves.

Purpose-related functions

The purpose related functions sit at the middle level of the abstraction hierarchy. This level may be considered to represent the functions that need to be achieved for the system to fulfil its purpose. It is the crucial link between the independent objects and their related processes at the bottom of the hierarchy with the more purpose orientated concepts above. As such the use of the 'means ends' relationships are of significant value here for identifying the interfaces within the system. In the design context, this level represents design and end-user requirements in that they describe what functions need to be supported through design.

For example if it is considered that the purpose related function (minimise obstacles and debris) is the question '*what*', and the values and priority measures (maximise perceived safety,

maximise actual safety, and maximise subjective experience) are the question ‘*why*’, then the object related processes provide ‘*how*’ – prevents roadway water entering footpath, provide bike storage, protects and contains vegetation, stores litter and debris, provide surface for objects, provide access, store information on maintenance procedures.

Object related processes (physical affordances)

The physical affordances of the objects within the system relate to the ability of them to enable or aid a function. The description of these object related processes are such that they are generic and not a reflection of the active transport infrastructure system purposes. When linking the objects to their affordances it is evident that the object related purposes are often afforded by multiple objects. For example ‘provide shelter’ is an affordance of ‘trees’, ‘awnings’, and ‘public transit stop’. While objects which offer the affordance of a ‘landmark’ may also include ‘trees’ the affordance is also offered by ‘public art’ and ‘building setbacks’ in this WDA.

Physical objects

At the base of the AH the physical objects that comprise the active transport infrastructure system are detailed. At this level the objects, where possible, have been represented within the footpath zone in which they occur, and in Figure 3 are summarised as such. This is useful when considering the urban form and socio-spatial aspect of the system and the relationships between physical objects and the interface to the built form and (transport task) roadway contexts. Within the summary WDA there is an addition grouping of objects, which are important components of the ATI system that are not physically located within it. For example road rules; planning regulations; budget and engineering standards are crucial objects within the system, yet physically exist elsewhere. Key to this systems understanding is the recognition that many physical objects fulfil multiple affordances and so contribute to various purpose-related functions. For example a ‘planter boxes’ not only relates to the affordance ‘protect and contain vegetation’, but may also act as ‘physical buffers or barriers’ and ‘psychological buffer between the travel way and pedestrians’.

Discussion

The aim of this article was to demonstrate how CWA may provide a design template that will contribute to the design of more appropriate; safer and user orientated active transport infrastructure. It details a unique approach whereby it is possible to better understand the contributions that active transport infrastructure may make in operationalising hierarchy of best practice sustainable transport in existing urban corridors.

The analysis presented demonstrates the possibilities for the design of ATI that is context sensitive, well-engineered and that also contributes to the subjective experience of pedestrians and cyclists, possibly allowing for greater participation. Through constructing a generic WDA for ATI, this paper has provided a novel design template that may be used to inform the establishment of ATI. Additionally it is also useful to evaluate the extent to which existing ATI within urban corridors achieves anticipated and essential functional requirements.

A key contribution of this method, is that because the overall ATI ‘system’ is considered, it is possible to introduce different design features and then evaluate them in the context of their interactions with other parts of the corridor and thus their impact on the overall system itself. For example, in future design efforts one could introduce new objects in the AH and examine the means-ends links with functions, values and priorities, and the systems functional purpose. The analysis presented also reveals the significant influence of the many objects that are not physically contained within the actual footpath environment, such as planning regulation,

maintenance and design standards, and significantly for urban form and design the community archive and knowledge.

This study has allowed a clearer understanding of the contributions that physical objects, both within and beyond the urban corridor, make to the establishment of a leading practice ATI. Further it highlights the interdependency of many issues that have historically been managed in isolation and within discipline areas. For example, the engineering aspects of ATI are largely not expected to contribute to subjective user experience, and the urban design guidance on active transport and public urban environments has often relied on outlining principles without practical direction. This whole of system approach to ATI will enable consideration of this interdependency in future design efforts.

This paper identifies the usefulness of a systems approach in accessing disparate concepts. This system allows for an understanding of the interdependencies of intertwined functional purposes. It allows for multiple disciplines and indeed stakeholders to recognise their place within the system, and the impacts and influences of design decision-making. It makes sense that a systems approach allows for greater insights into the development of urban form. While this method has been applied to the socio-technical system of ATI, it is envisaged as a useful tool for a range of urban environments. Urban planning needs new ways to interpret built environments and urban form as not only technical systems, but often poorly understood (and designed) socio-spatial systems. Further research in which CWA is applied in urban design applications is therefore recommended.

Future Research

The application of the additional phases of CWA will assist in understanding how to best accommodate a variety of uses and users in ATI. Phases 2, 3, 4, and 5 of the framework consider important aspects of performance such as decision making, strategies, and allocation of functions and are important in determining how specific active transport infrastructure designs might shape pedestrian, cyclist, and motor vehicle behaviour. These stages will detail the types of activity permitted in different ATI designs and local considerations and contexts that impact on placement of physical objects and overall active transport infrastructure capacity. Further, allocation of functions across different physical objects will also be examined (for example, whether warnings should be provided to users via road and footpath markings or by signage).

As a preliminary study, this research will now be further extended in an application to an actual circumstance of ATI and assess the extent to which the current design fits the characteristics identified in the WDA model.

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The Evolution of Urban Form

Analysing urban forms almost always involves a time dimension since human societies are not static. There were dramatic changes in town plans in the 12th and 13th centuries in European cities. Architects rediscovered geometrical techniques that had been lost since Roman times and applied them to both buildings and town plans. At the same time, and on a different scale, more stable building materials came into use (timber-framing and brick) which enabled buildings to survive for much longer time periods so that it was economically sensible to adapt them rather than rebuild. With the industrial revolution of the 18th and 19th centuries European cities grew rapidly and new house forms were developed to provide cheap housing for industrial workers. City centres were re-planned, adapted and rebuilt to provide greater functional utility. At the same time a multiplicity of new building types were developed to cater for new functions: from banks to prisons and shopping arcades to city halls. From the 17th to the 19th centuries European economies were extending their reach to new colonial territories and 'exporting' urban layouts to provide the necessary central-place and military functions, and the entrepôt economic functions, necessary in these colonial territories. Most of these new urban places were based on grid street patterns and common plot sizes and growth was demarcated by grid extensions, not always in congruence with their predecessors, based on underlying land-ownership patterns. The end of the 19th century saw a new morphological period develop in many parts of the world with low-density housing layouts characterising much of the Anglophone world and much higher density apartment blocks in other parts of the world. In city centres technological innovations led to taller office towers and the pace of morphological change at all scales became more rapid. In many city centres the life of buildings from new-built to demolition and redevelopment could be as short as 25 years, whilst concentration of capital resources has meant that huge developments can wipe out a thousand years of an intricate town plan and replace it with layouts lacking any historicity. Urban morphologists are still struggling to get to grips with the scale of some of these modern changes and integrate them into their models of townscape change.

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Polish city from Conzenian perspective – fringe belt phenomenon in Toruń

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Abstract. *The fringe belt idea is one of the most important concepts of urban morphology originating from Conzenian tradition. Being developed through over half a century it significantly evolved becoming not only an integral part of detailed town plan analysis but also a tool for synthetic comparisons of towns and cities of different regions and cultural contexts. In current literature on the subject a great attention is paid, among the others, on the influence of various processes, especially those resulting from different political and economic systems and ideologies, on patterns of fringe belt development. An often raised question is also the role of fortification systems in the process of fringe belt formation. The analysis of fringe belt phenomenon in the city of Toruń makes it possible to take an attitude towards above-mentioned issues in relation to Polish conditions. As an important political and administrative urban centre of medieval genesis Toruń experienced turbulent history, which was not indifferent to its urban structure. This paper seeks to outline how the following morphological periods, especially partitions of Poland, when Toruń was transformed into an important Prussian stronghold with double fortification zone, but also socialism period with associating it industrialization and controlled urbanization, influenced the specificity of fringe belt in Toruń.*

Key Words: fringe belt, fixation lines, historical development, Toruń, Poland

The fringe belt concept is the subject of numerous studies on urban form around the world. Examinations of fringe belts undertaken in many foreign research centers contribute to the dissemination of the idea and confirm its validity in relation to cities developing in different social and political conditions and different urban culture, irrespective of their size, genesis and function. At the same time they present how different developmental conditions influence the diversity of fringe belts in terms of their number, scale, structure and distribution in urban space. In Poland however, despite of a large interest of *Conzen's school of thought*, fringe belt concept has not, by now, been undertaken in native morphological studies. The only attempt of fringe belt analysis was the one of Terry Slater who in 1989 presented the town plan analysis of Lublin and characterized its inner and outer fringe belt for the year of 1762. Present study is therefore the second attempt to present the fringe belt phenomenon in Polish conditions, however the attention is drawn on its specificity resulting mainly from historically unstable political situation of Poland as a consequence of wars, Poland partitions and domination of communism system in post-war period. This conditions had direct influence on Polish cities which were mostly developed in isolation from the classical mechanisms of market economy, bid rent theory and decision processes that shaped the cities in the states of capitalist system. Therefore the main research purpose of the study is to present the specificity of fringe belt in the Polish city Toruń which has developed in a different cultural context and political, social and economic conditions, but most of all experienced the disturbed historical continuity of its spatial development.

Toruń

The detailed fringe belt examination requires a thorough analysis of the city, recognition of the stages of its historical development, its morphogenetic and functional structure, and understanding the processes underlying the changes of its spatial layout.

Toruń, which is now an important academic, cultural and economic center in Poland, with population over 204 thousands people and area of about 116 km², is a historical riverside port city situated on both sites of Vistula river, on contact point of two historical regions: Pomerania (right-bank part of the city) and Kujawy (left-bank part of the city). It is the one of the oldest cities of contemporary Poland and the first one founded by Teutonic Knights. Civic rights Toruń received in 1233. Being situated on the cross-point of main trade routes from Silesia, Wielkopolska, and Mazovia, in the place of passage through Vistula river, Toruń developed quickly as a main intermediary in trade with Eastern Europe, and became a well known Hanzeatic city. The choice of Toruń for the study of fringe belt was driven by a number of factors, both favorable and unfavorable for fringe belt formation, namely:

1. Toruń is a medieval city with distinct fixation lines (both anthropogenic and natural), which over the centuries experienced alternating periods of unusual dynamics of economic development as well as economic stagnation, what according to classic view of concept creates favorable conditions for fringe belts formation;
2. Since its beginnings Toruń played a significant defending role, which increased mainly during the time of Poland's partitions when Toruń became a part of Prussia. Prussian invader transformed the city into an important fortress on the border with Russia. The spatial reflection of this new function was the characteristic double fortification system: inner (surrounding the old core) and outer (located in a distance of 3-4 km from the old town) (Figure 1), but also a large scale of military development, which consequently restrained spatial development of the city;



Figure 1. Toruń fortress in 1889 with double (inner and outer) fortification system (Biskup, 2003).

3. Toruń during its history experienced multiple and severe destructions of its suburbs, starting from Swedish wars and construction of modern fortification system in 17th century, and ending with the construction of the Prussian fortress in 19th century which finally put the end to any traces of the former layout and buildings of the historic suburbs and obliterated the readability of its morphogenesis. Through over 800 years of its existence it also experienced the changes of its political membership – 223 years under Teutonic rule (1231-1454), 339 years within Polish state (1454-1793), 127 years under Prussian rule (1793-1920), and 88 years under Polish rules (1920-1939, 1945-2013). This lack of continuity of its historical development differentiates Toruń from most of cities subjected to fringe belt examination.

4. Moreover, unlike cities of western Europe, Toruń for a long period of its history has experienced controlled development, especially in the time of Prussian jurisdiction in 19th century, when Toruń was transformed into stronghold, but also in postwar period when Poland become a communist country subordinated to Soviet Russia authority and Toruń, as well as other Polish cities, experienced the functionalization of space as a result of socialism spatial planning, controlled urbanization and accelerated industrialization, which significantly increased the gap between Polish cities and Western European cities subjected to fringe belt examination.

It is also worthy to emphasize some characteristic elements of Toruń's spatial layout, namely: 1) the clear isolation of medieval core from extramural, relatively young suburbs, mainly from 19th and 20th century and 2) chronologically disturbed sequence of subsequent residential accretions – in the immediate vicinity of the old core one can find the residential buildings of the youngest genesis, mainly from 20th century, whereas further away occur the oldest 19th century residential buildings. The lack of hierarchical system of following residential zones and the lack of significant density of 19th century buildings around the medieval core are the result of, mentioned before, numerous and severe suburbs destructions. Moreover in 1813, in the place of former suburbs, the Prussian building restrictions were imposed, which until the end of 19th century prevented the spatial development of the city, at the same time favored the expansion of military land use types.

Similarly the essential communication network system of the city began to form relatively late – in second half of the 19th century. The contemporary road network has developed on the trace of the historical system of medieval exit roads as well as Prussian fortress roads – access roads and detours – which with time became a public roads joining suburbs. During the interwar period the steps in the construction of new roads were continued by Polish planners, and their main aim was to connect spatially isolated suburbs. Those actions resulted in formation of a road system which for subsequent years determined the trends in development of the suburbs, residential areas, squares, etc.

The construction of railway connections brought the qualitative change to the communication network system. The first rail connection (between Berlin and Warsaw) Toruń received in 1862. Until the beginning of the 20th century the city was already connected with Grudziądz, Malbork nad Lubicz. The construction of railway system has played a significant role in shaping the spatial and functional structure of the city. The railway station was located on the left-bank site of the city, what stimulated the further formation of the junction in this area, intensified the construction works and transformed the character of this part of the city from rural into suburb of workers and offices. On the other hand the course of the traction in the eastern part of the right-bank site of the city formed a barrier which spatially isolated the urbanized area from adjoining rural lands and, in the postwar period, determined the construction of a huge industry sector.

Having in mind a historic-geographical development of Toruń so distinctive from most of the cities subjected to fringe belts research studies, Toruń seems to be an appropriate case study for analysis of this type.

Sources

The examination of fringe belt in Toruń was based on town plans analysis and included reconstruction of historical development of the city based on comparison and analysis of sequence of historical plans supplemented by information from archive sources and research literature. The oldest preserved cartographic sources for Toruń originate from 1620s – the time of first Swedish war, however they only present a project of fortification system and do not give any information about the spatial layout of an old town or its suburbs. The value for fringe belt studies in Toruń have only plans starting from the end of the 18th and beginning of the 19th century, especially Douglas plan from 1793, Staudie and Gruetzmacher plan from 1816, and latter plans from 1873, 1903, 1907, 1921, 1939, up to postwar plans from 1973, 1983, 1999 and 2012. Most of the 19th century plans and interwar plans are small and medium scale maps, which provide the information about land utilization, sometimes block patterns, but almost no information about the plot patterns. Most of the postwar plans present the land utilization, block-plans and plot patterns. Having in mind this constrains the fringe belt examination in Toruń was carried out on block-pattern.

An useful supplement for the research were numerous studies, which reconstruct and describe the spatial development of the city in different historical periods, namely Tandecki (1995), Mikulski (1998, 1999), Biskup (1999, 2003, 2006), Gregorkiewicz (1967, 1974), Rymaszewski (1970), Tłoczek (1971), Kwiatkowska (1973), Niedzielska (1997).

Morphological periods

The historical evolution of the spatial structure of the city and the specificity of the morphological elements made it possible to distinguish five morphological periods fundamental for development of fringe belt components in Toruń, namely: 1) Middle Ages, 2) the modern times with an emphasis on period of Poland's partitions, 3) interwar period, 4) socialism period, and 5) contemporary period, started with political transformation of 1989.

The first period, referred to as initial, presents the stages of development of the Old Town and suburban areas of Toruń. During this time in the intramural and extramural part of the city the first extensive land uses occurred, namely monasteries, cemeteries, tanneries, mills and brickyards. Their peripheral location resulted mainly from limited area of the old town, but also from sanitary reasons, such as nuisance of production profile.

The second period covers the time of 'Prussian Toruń' and is considered twofold – in the context of the transformation of the city caused by the construction of the Prussian fortress (the role of double fortification system and Prussian building restrictions as a major fixation lines in fringe belts formation), and in the context of the spatial expansion of the city in the second half of the 19th century as a consequence of partial liquidation of outdated medieval and modern fortifications, gradual development of the inner fringe belt in the area of post-fortification zone, growth of the suburbs and creation of areas of tenement houses.

The interwar period was associated with further liquidation of the inner fortification system in Toruń, in place of which the new fringe belt land used occurred. At the same time further expansion of suburbs took place, where, apart from country houses and tenement houses, the single-family housing of villa character has developed. The process of suburbs connection begun (stimulated by Polish authorities), which was continued in the following years. The administrative area of the city was significantly extended (including the inclusion of left-bank suburbs into administrative boundaries of the city in 1936).

The establishment of the Polish People's Republic opens the fourth morphological period, when the spatial development of the city was subordinated to the unified spatial planning policy. It had its reflection in both: 1) transformation of the structure of existing fringe belts, as well as 2) creation of new fringe belts components dominated mainly by industrial function. In the sphere of housing construction, the development and metamorphosis of an earlier forms occurs, enriched with the elements of multi-storey socialist buildings. As a result of accelerated

industrialization, the rapid population growth, the development of the eastern suburbs and the expansion of the left bank site of the city took place. Simultaneously with the development of the technical and social infrastructure of Toruń, the process of filling with buildings of the empty spaces inside the city progressed, but also further connection of the suburbs and territorial development of Toruń occurred.

The last changes in the spatial structure of Toruń were initiated by political transformation of the 1989. The turn of the 20th and 21st century is characterized by the construction of large housing estates of single-family houses on the outskirts of the city, both right- and left-bank part of it, as well as further process of gaps filling spatial structure of Toruń. In the vicinity of the existing fringe belt, the new, specialized forms of development occurs.

Each of these morphological periods, which are in general relevant to most of Polish cities, has left in the spatial structure of Toruń a clear traces in the shape of extensive fringe belt land uses fulfilling the specialized functions. Obviously the scale and specificity of investments located in the actual fringe belt of the city were different in each morphological period. They were a consequence of functional structure of the city in different periods of urban development, the duration of each period, but also they reflected the actual socio-economic and political situation of the country. Not always therefore, the location of extensive development in fringe belt zone in subsequent morphological period, initiated the development of separate fringe belt. However it needs to be emphasized that in terms of the intensity of development and the specificity of fringe belt phenomenon formed in the spatial structure of Toruń two morphological periods are worthy special attention, namely 1) the period of partitions and 2) the period of Polish People's Republic, which at the same time emphasize the diversity of development of Polish cities with respect to their Western counterparts. Fringe belts formed in the time of partitions are characterized by relatively large spatial scope conditioned by the policy of the invader's authorities and the long time in which Poland was deprived of sovereignty. This period, in accordance with M.R.G. Conzen terminology, can be considered as formation phase. Fringe belts developed at that time formed the relatively sustainable basis attracting further specialized land uses of an equally extensive character, but younger genesis. Similarly, the analysis of the development of the spatial structure of Toruń in the communism period, allows to draw a conclusion, that through the establishment of functionalization of spatial development, it was a time conducive to growth of fringe belt components in the urban peripheries. Political changes and soviet ideology has found its reflection in spatial planning of Toruń, expressed in following plans of spatial development. Gradually a huge residential zones of blocks of flats, but also industrial and storage complexes, have dominated its landscape. As a result of individual, micro- and macro-scale decisions, accelerated industrialization and a tendency to zoning of the urban space, the new investments have been located on the outskirts of the city, in the former Prussian isolation wedges and fallow lands, and created new, or replaced an old fringe belt land uses. A great example is the peripheral localization of a huge plants of synthetic fibers, situated outside the city, however in close proximity to the outer bastion fortification system. It is also worthy to emphasize, that fringe belt components formed in communism time in Toruń, are creating a specific functional zones in the spatial structure of the city and are characterized by a number of developmental and structural differences comparing to classic model of fringe belt. However in the urban space they mark the lands of lower building density and indicate the former outskirts of the city.

Fringe belts in Toruń

Conducted research, based on town plan analysis of Toruń and reconstruction of its historical development, made it possible to identify two fringe belts in its spatial structure. The result of the research present three maps: first one, showing the general view of fringe belts in Toruń (Figure 2), second map presenting the genesis of preserved fringe belt components (Figure 3) and third one, indicating the actual land use types within fringe belts (Figure 4).

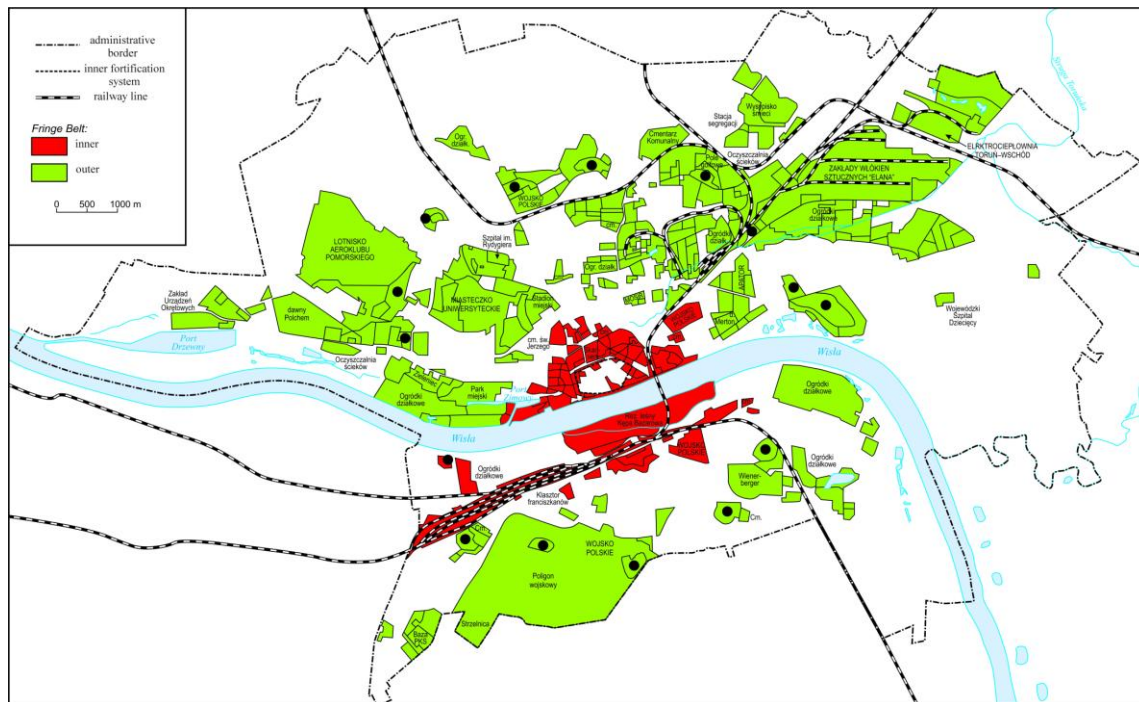


Figure 2. Fringe belts in Toruń, 2012.

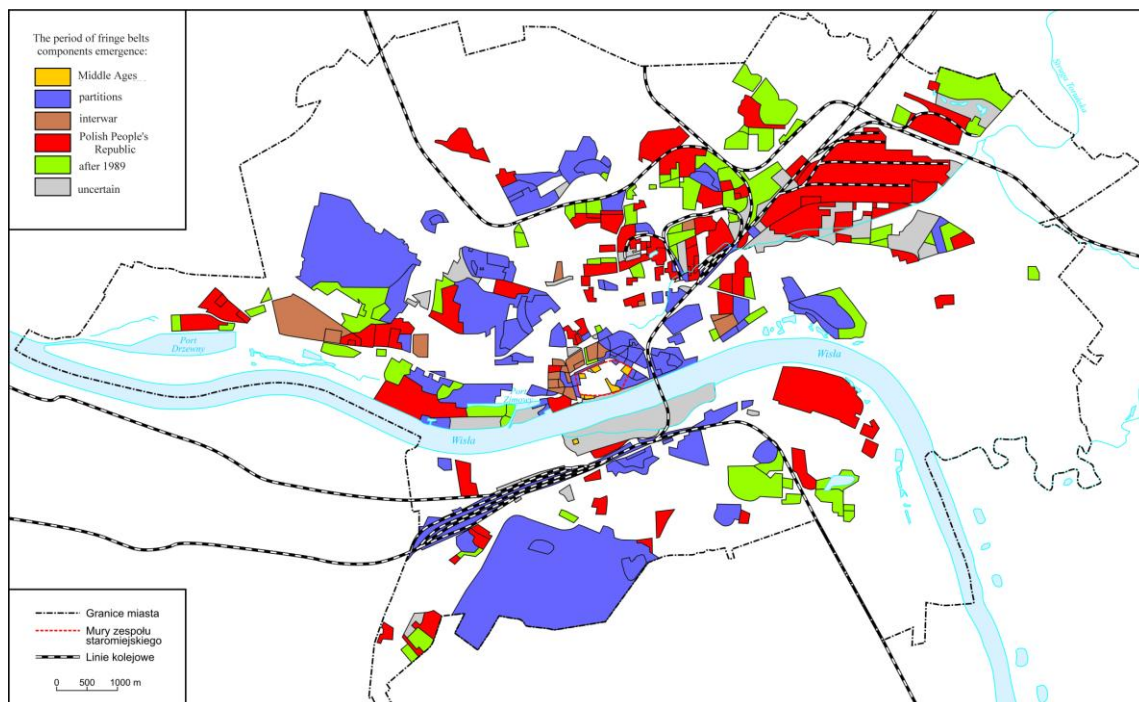


Figure 3. Genesis of preserved fringe belt components in Toruń.

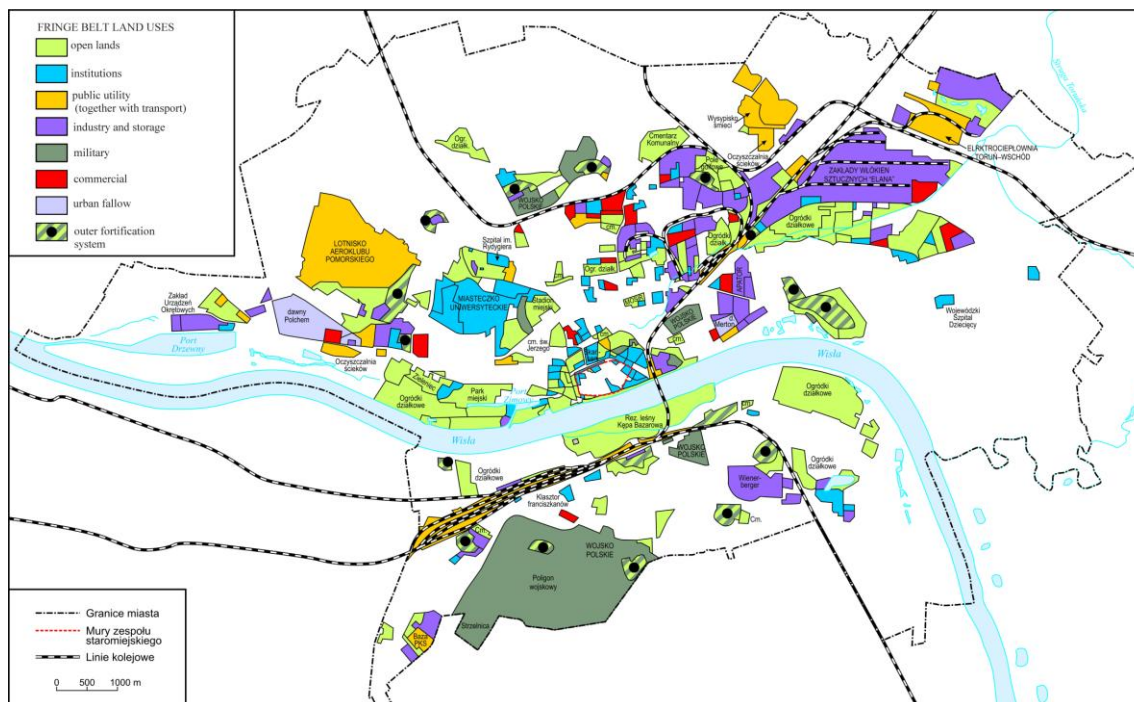


Figure 4. Fringe belts land uses in Toruń.

As a starting point for discussion on the number and size of fringe belt in Toruń the thesis of Michael Conzen was adopted where he states that the number and size of fringe belts appear to be related to the size and growth history of towns and cities (Conzen, 2009, p. 42). The detailed analysis of spatial development of Toruń seems to confirm this thesis only partially. Toruń, despite of its size has developed only two fringe belts, which is not too many comparing to case studies subjected to fringe belt analysis so far (e.g. Alnwick). At the same time the total size of fringe belts in Toruń is quite significant (together the inner and outer fringe belts cover about 35 km²). However this apparently disturbed proportions can be easily explained by recalling of historical events, that decided about the paths of spatial development of Toruń.

Inner fringe belt

The inner fringe belt of Toruń has started to form in medieval times together with peripheral location of specialized, extensive and heterogeneous land uses, like monasteries, cemeteries, hospitals, tanneries and others. However due to suburb's demolitions in different historical periods, all of the extramural fringe belt land uses were razed to the ground. The only medieval fringe belt components have survived in the intramural part of the city and are represented by the sites of the castle and its surrounding, and also former monasteries (Franciscans, Dominicans and Cistercians). An important role in inner fringe belt formation in Toruń has played the inner fortification system which has survived in the spatial structure of the city until the turn of the 19th and 20th century. The post-fortification zone was occupied by specialized fringe belt land uses, mainly of institutional and open character, which together with the intramural fringe belt components formed an inner fringe belt. Besides the role of the fortification system in the formation of inner fringe belt, also the influence of the decision making processes should be mentioned, among which the essential influence had the introduction of the Prussian building restrictions in the foreground of the fortress. As a result of that, the extramural part of the city was colonized by the military land uses, in shape of military barracks, military exercises fields and associated infrastructure. These land uses only partially have survived in the city landscape, however it influenced the extensive character of the contemporary inner fringe belt.

Moreover the inner fringe belt formation, was also influenced by the 19th century planning innovation together with the construction of so called 'ring' with dominant institutional development, and continued in the interwar period under a new name *pląty*.

The inner fringe belt of Toruń has many features reminding of the classic inner fringe belt in Conzenian meaning of the concept. It is characterized by a concentric, compact composition, large spatial coverage and diversified types of land use, mainly open lands, public utility and institutions. It forms a distinct pause in the spatial structure of the city, emphasizes the specificity of former fortification zone and separates residential zones of different genesis.

Outer fringe belt

However the specificity of Toruń emphasizes its outer fringe belt. It has started to form in the second half of 19th century along the fixation line in the shape of 19th century outer bastion fortification system, which is an example of military innovation designed in a large distance not only from the old town, but also from 19th century suburbs. Along this axis, starting from 19th century, and with intensification in after-war period, during the time of Polish People's Republic, the specialized, extensive fringe belt land uses accreted, contributing to spatial expansion of fringe belt and strengthening its distinctness towards surrounding lands. Therefore it needs to be emphasized that fringe belt components from socialism period did not form a separate fringe belt, but only enhanced the existing one. From most of the case studies subjected to research of this type Toruń outer fringe belt is distinguished by its large spatial scope of about 30 km², but also its general concentric composition with simultaneous occurrence of wedge futures, which are the consequence of Prussian authorities policy (e.g. Prussian isolation wedges) either the socialist power (e.g. eastern industrial district). What is characteristic, the process of outer fringe belt formation, which has started during times of Prussian annexation, still continues, what can explain its large spatial scope and diverse morphogenetic structure of its components. This fringe belt has not, by now, been surrounded by dense residential zone, which would cut it off from adjoining rural lands and forests, enabling fringe belt from further expansion. This is not however the result of a slow dynamics of spatial development of the city, but its mostly centripetal development, caused by the existence of large open lands reserve released from former military development. This specificity of spatial development of the city created the situation where outer fringe belt of Toruń does reflect the pause in the spatial development of the city, but in the same time it does not separate the residential zones of different genesis in the classical meaning of the fringe belt concept. It surrounds the extensive residential zone, that creates a morphogenetic mosaic, distorted in terms of chronology of following accretions.

Conclusions

The conducted research has proved the existence of fringe belts in Toruń despite of disturbed historical continuity of its spatial development. At the same time it indicated some similarities and differences between fringe belts formed in Toruń and fringe belts in classic model of phenomenon. Similarities concern the types of land uses and its specificity. Fringe belts in Toruń include mainly open lands, institutions, industry storage and public utility lands (together with transport), which are characterized by extensive kinds of development, relatively large plots and low permeability for vehicular traffic (Figure 5). Their common feature is a tendency to peripheral location on different historical stages of city's spatial development, therefore the fringe belts of Toruń reflect former and contemporary outskirts of the city. They are characterized by considerable degree of sustainability and reveal the strong spatial relation with fixation lines among which the long-term anthropogenic fixation lines, in a shape of fortification system, played the major role. Being an important barrier for free spatial expansion of the city

those two fortification systems have attracted extensive land uses originally mainly of military function which become a foundation for further fringe belt formation in following morphological periods.

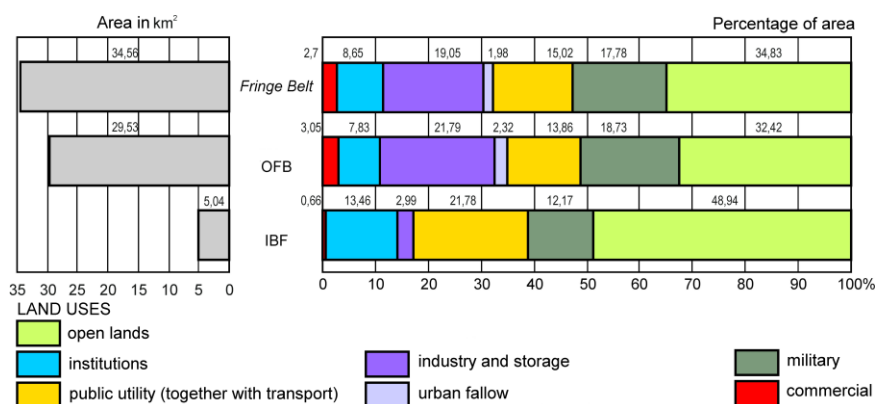


Figure 5. Percentage of specialized land uses of fringe belts in Toruń.

However, despite of many similarities with classic model of concept fringe belt in Toruń differ from most of case studies subjected to researches of that type. Those differences refer mainly to the general arrangement of the phenomenon, the number of fringe belts and its spatial scope, and result mainly from different history, cultural traditions, political and socio-economic conditions. At the same time fringe belts of Toruń reflect its individual character, specificity functional structure of the city and influence of the various threshold conditions (fixation lines). Cities are in fact units of such a complexity that even strong similarities occurring between them, in terms of specificity and arrangement of fringe belt components reflecting successive morphological periods, do not obliterate their individual character.

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Urban Evolution analysis as a means to confirm an outstanding example of a traditional human settlement in Rabat

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Abstract. *Rabat, capital of Morocco, received in 2012 a UNESCO World Heritage title for representing a modern urban planning model that incorporates the country's culture as it integrates its historical nucleus. Nonetheless, criterion (v) - to be an outstanding example of a traditional human settlement, land-use or sea-use which is representative of a culture (or cultures), or human interaction with the environment - has not been justified because the group presented seemed to be fragmented and showed lack of relationship between property and environment. This study considers to be an outstanding example of a traditional human settlement, the kasbah of Oudayas alone instead of the group presented in 2012. The aim of this study is to investigate the evolution of urban Rabat according to the morphological periods of developments, in order to reveal the historic areas in which the city has evolved over time, and ascertain whether or not it can confirm the kasbah as the most representative Islamic nucleus. The paper is useful for practitioners and academics in the fields of urban morphology and heritage, as much as for States Parties interested on applying to becoming part of the UNESCO's World Heritage list. The research provides some initial insight into how to investigate outstanding traditional human settlements and reveal their values. The approach adopted in this work demonstrates how the application and dissemination of a methodology may open new perspectives for studies on the subject.*

Key Words: English school of urban morphology; urban evolution; UNESCO world heritage; Rabat.

Introduction

The Kingdom of Morocco holds nine cultural properties protected as World Heritage by UNESCO. The newest is Rabat (capital), for its symbolism and diversity of traditions related to cultural property of populations.

Rabat is located in the northwest part of the country. It stands at the northeastern Atlantic Ocean coast at the Bouregreg River outfall, facing Salé, considered its "twin" city. The following maps present the geographical situation of Rabat.

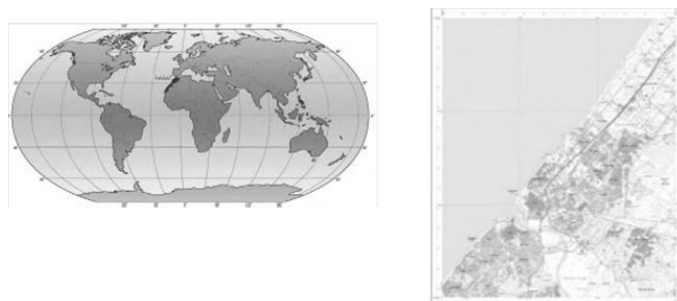


Figure 1. Geographical situation of Rabat (source: Rabat's Culture Ministry -UNESCO's complete report: Rabat, Modern Capital and Historic City: a Shared Heritage. January, 2011 & Etude du schema d'organisation fonctionnelle et d'aménagement Casablanca-Rabat, 2005).

In order to be included in the World Heritage List, the sites must present outstanding universal value and fulfill at least one of the ten selection criteria established by UNESCO³⁷. Information hereby presented is part of the report produced by Kingdom of Morocco and delivered to UNESCO in 2011 to have its patrimony enrolled and evaluated. Rabat fulfilled criteria (ii) and (iv), according to ICOMOS³⁸ 1401 report: criterion (ii): to exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design; criterion (iv): to be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history. Those criteria were justified by the fact that Rabat has been considered an unique example of a modernist capital in the 20th century, a legacy of diverse and successive cultures. Such occupation shows evidence of continuity by its traces from various periods of time and also for the presence of monuments which reflects African, Mediterranean, Eastern and European cultures. As a result from European and Moroccan elements, the site acquired distinct character. Its capacity to demonstrate the lasting historical, cultural and social co-existence on the urban landscape shows the site *Genius Loci*.

Criterion (v) - be an outstanding example of a traditional human settlement, land-use or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible - was not considered justified, as indicated by the 1401 ICOMOS evaluation. The presented ensemble - the Roman city of Sala, the royal necropolis of Chellah, the Hassan Mosque, the Kasbah of Oudayas, the medina of Rabat and the modern city - bears insufficient testimony to its relationship with a territory in which they operate, according to the evaluation. It was also considered fragmented, sometimes on a very small scale, which showed privileged relationship with a particular environment.

This paper proposes the kasbah of Oudayas as being the most traditional Islamic urban core in Rabat, Morocco. It investigates the urban morphological process in order to confirm this site as a World Heritage fifth criterion (v) candidate.

The Kasbah of Oudayas presents occupation by a majority of lower-middle class. Several interventions without authorization, lack of maintenance, examples of degradation and some abandoned buildings reflect on the built space in 2014. The kasbah's administration is made by the Bouregreg Agency since 2007, which is still elaborating solid instruments to manage this site. Being able to rely on an estimated budget for the conservation of this heritage, combined with strategies for heritage education with community involvement are possibilities that expand with the indication of such individual site as a world heritage.

Urban evolution study is the method proposed by the English School of Urban Morphology, which is used to investigate the urban process of Rabat. It seeks to demonstrate the relationship of the cultural property with its territory by detecting the morphological periods of urban development.

Morphological periods were identified based on historical references and on the Dr. Es-Semmar (director of patrimony of Bouregreg Agency) research about the urban evolution of Rabat-Salé over the past twenty-five centuries. Maps from the Rabat Master Plan were also used for better comprehension of the contemporary urban structure. Following the study of the urban evolution of Rabat.

³⁷ The list which holds the ten criterions can be found at UNESCO's website: <http://whc.unesco.org/en/criteria/> and they are explained at Operational Guidelines for the Implementation of the World Heritage Convention.

³⁸ International Council on Monuments and Sites.

The urban evolution of Rabat

The morphological study is based on historical and evolutionary periods, that should be differentiated according to Conzen (2004). Pereira Costa and Gimmler Netto (2013) define historical periods as those demarcated by facts, in which it is possible to settle dates like reigns, empires, and republican periods among others. In addition, evolutionary periods represent the synthesis between historical facts and materialized innovations into the urban landscape, defining formal characteristics. Such innovation could represent a start or an ending of an economical, social, political or/and cultural aspects, and are identified by specific formal characteristics.

In 2013, the same methodology was adopted in the city of Ouro Preto, Minas Gerais, by Staël de Alvarenga Pereira Costa et al, at landscape Laboratory EA/UFGM and it is a reference for this article. Based on this understanding, we have made the analysis to define the morphological periods in Rabat.

In Morocco, the historical periods considered relevant are: A - the period before the islamization (C5th b.C to C3rd); B - the Berbers influence (681 to 1554) and C - the Arabian influence (1554 to 2014).

Each era possesses political administration that forced changes within social life. In Rabat-Salé, during period A, three occupations were present: the Phoenicians, the Carthaginians and the Romans. Period B started with the Almoravids Empire (1100-1150), in sequence follows the Almohads (C11th to C12th) and the Merinids dynasty (C13th century to C16th). During period C, there were two major dynasties in power: the Saadian (1554 to 1650) and the Alaouite (1636 to 2014).

HISTORICAL AND EVOLUTIONARY PERIODS			MORPHOLOGICAL PERIODS
Before Islamization (5th century b.C – 3rd century)	Phoenicians, Carthaginians and Romans Periods	5th century b.C – 3rd century	Classic Period (C1st – C3rd)
Berbers – The Islamisation of the Kingdom of Morocco (681 - C 16th)	Almoravid Empire C10th to C12th	C12th 1100-1150	Ribat Almoravid period (C12 th: 1100-1150)
	Almohad Empire C12th to C13th	1150-1163 1° Calif	1° Ribat Al Fath Period (C12th: 1150-1163)
		1163-1253 2° e 3° Califs	2° Ribat Al Fath Period (C12th: 1163-1253)
	Merinid Dynasty C13th to C16th	1253-1609	Aribat Al Mobarak Period (C13 th to C17 th : 1253-1609)
The Arabians (from 1554 to 2014)	The Saadian Dynasty 1554 to 1650	1609-1666	The Moors period (from 1609 to 1666)
	The Alaouite dynasty 1636 to 2014	1666 - 1727 Moulay Rachid - Moulay Ismail	Golden Age Period (from 1666 to 1727)
		Sultan Sidi Mohammed ben Abdallah - 1757- Sultan Moulay Abderrahmane Ben Hicham 1790- Sultan Moulay Slimane 1912	Expansion and Consolidation Period (from 1757 to 1912)
		1912-1956 Rabat: capital	French Protectorate Period - Prost urban plan (from 1912 to 1956)
		1956-1972 Rei Hassan II	Period of Independence: Ecochard urban plan (from 1956 to 1972)
		1972 to 1990 Rei Hassan II	Rabat-Sale urban master plan of 1971-72
		1990 to 2014 Rei Mohammed VI	Rabat-Sale urban master plan of 1991

Figure 2. Board with morphological periods of Rabat (source: Conceived by the authors based on historical bibliography. April, 2014).

Twelve evolutionary periods were detected based on innovations and evolutions on the urban landscape of Rabat-Salé:

The Phoenicians, the Carthaginians and the Roman Empire - Sala Colonia (C5th b.C - C3rd)

The Almoravid Empire (C10th to C12th)

The Almohad Empire: 1st Caliph Abdelmoumen (1150 -1163)

The Almohad Empire: 2nd Caliph Youssef (1163) and 3rd Caliph Yacoub Al Mansur (1187)

The Merinids dynasty (1253-1609)

The Saadian dynasty - the Moors period (1609-1666)

The Alaouite dynasty - Golden Age (1666-1727)

The Alaouite dynasty - Expansion and Consolidation (1757-1912)

The French Protectorate - Rabat capital (1912-1956)

The Alaouite dynasty - Independency (1956-1972)

The Alaouite dynasty - Rabat-Sale Master Plan 1971-72 (1972-1990)

The Alaouite dynasty - Rabat-Sale Master Plan 1995 (1990-2014)

The morphological periods represent the synthesis between each historical and evolutionary period. Rabat's morphological periods synthesis are presented on the table below:

Morphological periods of Rabat

The morphological periods of Rabat are presented on three methodological basis, respectively related to the historical, evolutionary and morphological periods: historical event, innovation and urban form. These periods reveal the city of Rabat.

However, along to the sequence of morphological periods, a general introduction concerning the Kingdom of Morocco will be presented together with each historical period (before islamization, berbers and arabians).

Therefore, we begin with an introduction of the first historical period, followed by the first morphological period.

A – Before “islamization” (5th century b.C – 3rd century): Phoenicians, Carthaginians and Romans

Two Phoenician colonies of the nowadays Kingdom of Morocco - Lixus (Larache), in the north, and Mogador (Essaouira), in the south - made the connection route between North Africa and Spain while Cartago had not yet the domain in the western Mediterranean bank region. However, due to navigation difficulties of the time, other supporting commercial stations were founded between the both of them, such as Sala, and also Russandir, Tamuda, Tingis, Tchemmich, Banasa and Rusibis. Some of those cities appears in the figure below, spotlighting the existence the trading-post Sala.

Phoenician and Carthaginian archaeological traces of occupations cannot be found in Rabat anymore. According to Es-Semmar, their evidence are found in ancient texts which show trading commerce among the Phoenician and the amazigh native tribe, around the 5th century b.C. Likewise, later on they describe the exploitation by the Carthaginian of the same commercial spot, during the 3rd century b.C. The only archaeological traces that can be found in this site are then from the Roman Empire and they correspond to a military fortification that was as well used for commercial purposes during the first century b.C. Around two hundred years after this period, Sala Colonial appears as the first urban settlement, on the first century.

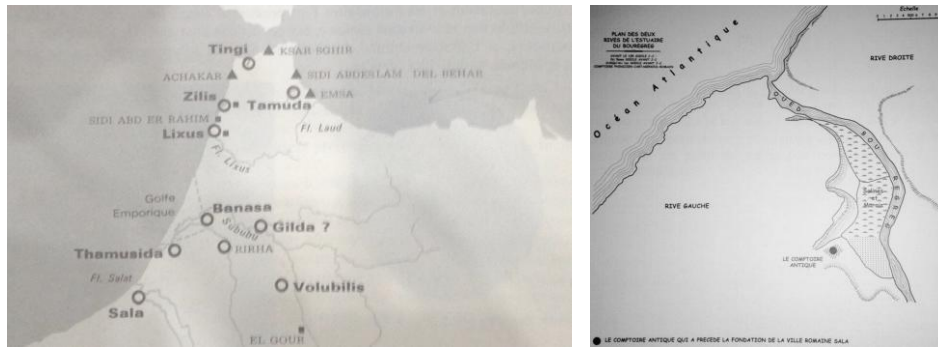


Figure 3. On the left, Kingdom of Mauritania; on the right, both Phoenician and Carthaginian trading-posts.(source: *Histoire du Maroc*).

1st morphological period: Classic Period (C1st – C3rd)

Historical event: Roman Empire (C 1st)

Innovation: trading settlement turned into a town - south capital of Mauritania Tingitane kingdom.

Urban form: urban settlement of Sala Colonia (in Rabat). The Roman city was conceived based on the existence of a protection wall, with a triumph arch, a forum, a main street, a basilica and public baths, as shown in the schematic sketch below.

Below town concept sketch and some pictures of the 2014 reminiscences.

All urban and architectural development throughout the following twenty centuries represents extension or continuity of this initial Roman settlement.

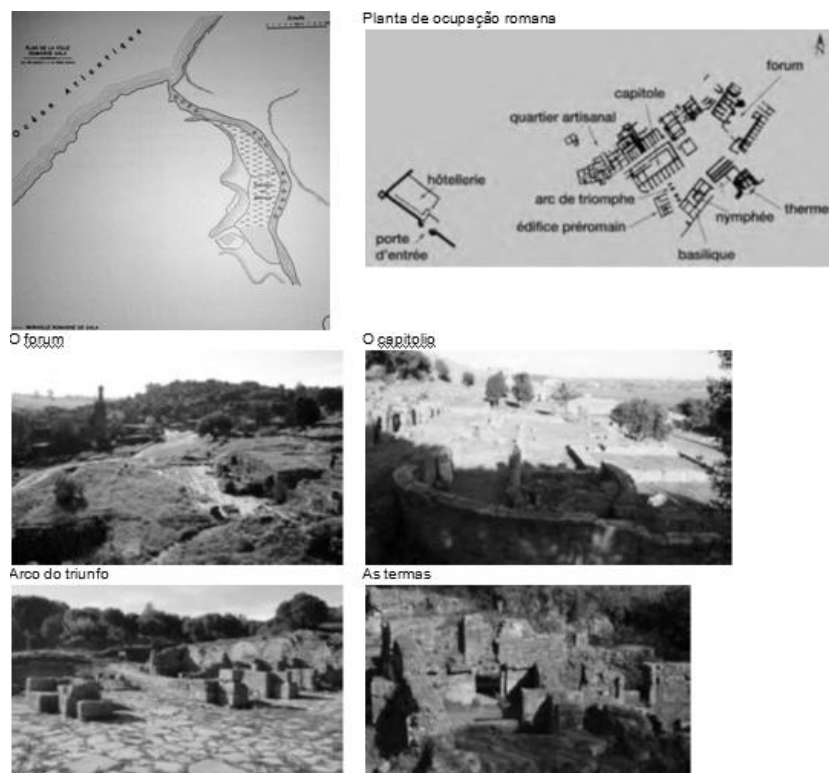


Figure 4. Sala Colonia (source: Dr. Es-Semmar, Heritage Director - Agency of Bouregreg. July, 2011 & Rabat's Culture Ministry - UNESCO's complete report: Rabat, Modern Capital and Historic City: a Shared Heritage. January, 2011).

B - Berbers – The Islamization of the Kingdom of Morocco (681 - C 16th)

The Mauretania Tingitana region was abandoned at the end of the 3rd century, but Sala (Chellah) remained under Roman domination during a less active period up to the end of the 4th century. It then entered a rather historical obscure period.

Between the C8th to C11th, the formation of muslin-Berbers enables the rise and the success of the almoravid's people, who came from the Sahara region, during a religious reform (Caillé, 2006). The Almoravid empire was founded by Youssof Ben Tachfin and lasted for about seventy five years. The conflicts between Arabs and Berbers are long and, historically, there are no literature consensus. In this article, we follow the references of Lugan (2011) and Brignon et al (1987), which say the occupation of the Maghreb is very atypical comparing to other Arabic conquers. The occupation of Egypt and Spain happened within three years. Iran's within four years and Syria's within six. Nonetheless, Maghreb's occupation took over a half century (Brignon et al, 1987). The conflict between Arabo-Muslim and Berbers was longer and during this period the region was Islamized, but not over-ruled by Arabic's. It is important to differentiate Islamization, religious concept, to arabization, ethnic-cultural concept, like Lugan (2011) says. According to the author, not every muslin is Arabic and vice-versa.

Regarding the urban content, this era holds the foundation of Fez – during the Idrissid Dynasty (789 - 808). It was the capital until the rise of the Almoravids' Empire (C 10th). The original Fez El-bali was conceived by two major fortifications separated by a valley. In the 11th century, the Almoravids connected both fortifications into a single one. Under the Almohad empire, the historical core of Fez grew up to the dimensions it presents in 2014.

During the Almoravid dynasty two other towns were founded: Meknes and Marrakesh. The last one became the capital of the empire until the rise of the merinide dynasty (13th century).

According to the report presented to UNESCO (Royame du Maroc, 2011), Arab historic sources refer to an abandoned ancient city, which however played a significant role in the Islamization of the region. A vast "ribat" is said to have existed in the 10th century, but up to now the most ancient Arabo-Muslim traces date back no earlier than the 13th century. What remained of the ancient city was abandoned for a new fortress, built by the Almoravids, in the early 12th century, to withstand growing pressure from the Almohads. The fortress was situated on the southern promontory of the estuary. The Almohad conquest took place in the mid-12th century, and it transformed the fort into a fortified palace, which today has become Kasbah of Oudayas.

2nd morphological period: Ribat Almoravid period (1100 to 1150)

Historical event: Almoravid Empire

Innovation: both Bouregreg river banks occupation - right bank, extension of Sala ancient town with Bani Ifren tribe instalation, for they were threatened by another tribe, the Bourhouatas from Tamesna. The following figure presents the location of the Bourghouatas reign and the little distance between its limits and Salé.



Figure 5. The Bourghouata's kingdom. (source: wikipedia).

On the left bank, expansion and foundation of a Ribat (military field): Ribat Tachfin, first Islamic occupation at the estuary promontory.

Urban form: city of Sala (in Salé) and military field Ribat Tachfin (in Rabat) presented below.

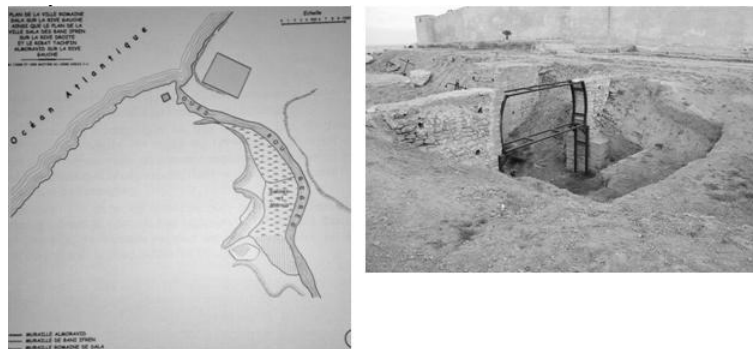


Figure 6. On the left, map with the Almoravid settlement; on the right, reminiscences of the Almoravid empire discovered in 2007.(source: Dr. Es-Semmar, Heritage Director - Agence du Bouregreg. July: 2011 & photography by Simone Safe in decembre, 2013).

3rd morphological period: 1^o Ribat Al Fath Period (1150 to 1163)

Historical event: Almohad Empire - 1st Caliph Abdelmoumen

Innovation: the rampart's pull down of the Bani Ifren's town on the right river bank and of the Almoravide's Tachfin Ribat pull down, on the left river bank.

Ribat Tachfin was replaced by the kasbah of Mehdiya, the urban core of the new planned city. In this empire, the Almohads had the intention of turning Rabat into the third empire capital, after Marrakesh and Seville.

Urban form: kasbah of Mehdiya. The following figure presents the geographic position of the kasbah of Mehdiya, featured in red.



Figure 7. First Almohad settlement - kasbah of Medhya (source: Agence Urbaine).

4th morphological period: 2nd Ribat Al Fath Period (1163 to 1253)

This period represents the first major expansion of the city.

Historical event: Almohad Empire - 2nd Caliph Youssef (1163) and 3rd Caliph Yacoub Al Mansur (1187).

Innovation: Completion of *Ribat Al Fath* town: ramparts and doors; Hassan mosque; the *kasbah of Mehdiya* river front extent and construction of the caliphate palace.

Urban form: *Ribat Al Fath*. Below, illustrative map with *Ribat Al Fath* settlement.

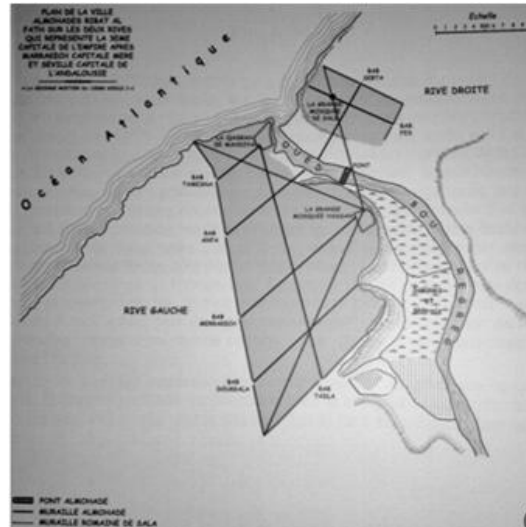


Figure 8. Ribat Al Fath town - Almohad Empire (source: Dr. Es-Semmar, Heritage Director - Agence du Bouregreg, July: 2011).

5th morphological period: Aribat Al Mobarak Period (C13th to C17th: 1253-1609)

- Historical event: Merinid Dynasty - Sultan Yacoub Youssouf e Sultan Abou Al Hassan.
- Innovation: construction of protective walls on the right bank, the region in which there was an attack by the Castilians in 1265.

The almohad urban area was mostly neglected and inaccessible (80% of 418 h were undeveloped).

The proposal of a new ribat, known as Aribat Al Mobarak, over the ancient ruins of the roman city Sala. Construction of ramparts and doors.

Apogee of Salé, on the right bank, as the main economic and urban center and port.

Urban form: fortified ribat and as the mausoleum of the dynasty. This ensemble is known as Chellah, in 1614.

Figure 9 presents illustrative a map. The Aribat Al Mobarak is colored in red and in brown, all ignored urban space. Figure ten presents pictures of Chellah.

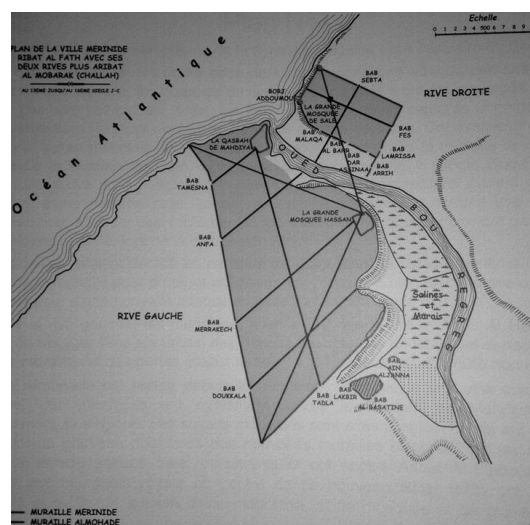


Figure 9. Merinid Dynasty - necropolis of Chellah. (source: Dr. Es-Semmar, Heritage Director - Agence du Bouregreg, July: 2011).



Figure 10. Aribat Al Mobarak (Royal necropolis reminiscences known as *Chellah*, 2014). (source: Agence Urbaine. Plan d'aménagement et sauvegarde de la medina de Rabat. Mission II - leve topographique, diagnostic et analyses thematiques et spaciales. June: 2012).

C - The Arabians (1554 to 2014)

The beginning of the sixteenth century shows crisis in Moroccan territory, due to the west Iberian conquest and the Turkish conquest in the east. The Ottomans want supremacy over the Spanish opponent and try to impose influence over Morocco. A new dynasty emerges, the Saadian, enabling a political, economic and intellectual renaissance. The Saadian were Arabs and, for the first time since the Idrissid dynasty, Morocco would not be ruled by the Berber people.

According to Lugan (2011), the word Morocco appears with Saadian, and it results from the contraction of Marrakech, the main capital of the dynasty era.

The Saadian century was a period of urban developments. Fès and Marrakesh intellectually dominate becoming cultural centers.

6th morphological period: The Moors period (1609 to 1666)

Historical event: The Saadian Dynasty. The expulsion from Spain of the Moors during the reign of Philip II (1609), by religious intolerance (Lugan, 2011). In the early 17th century, the Moorish immigrants set up a principality under the suzerainty of the Saadian sultans.

Innovation: The Moors expulsion led to a significant influx of Muslim and Jewish populations, who settled in the kasbah of Mehdiya and in the adjacent southern area. These populations of different origins built their own quarters: they founded their medina, called New Salé, protected by a wall in the south, dividing in two the large area enclosed by the earlier Almohad ramparts.

The not yet explored urban space, internal to the Almohad wall, was tapped with agricultural crops and gardens.

They also fortified the Kasbah, which became the center of their municipal power base. They engaged in port activities, making Rabat the premier port in Morocco.

Urban form: Medina of New Salé. Below map and photos with medina of Rabat and intrawalls green spaces.

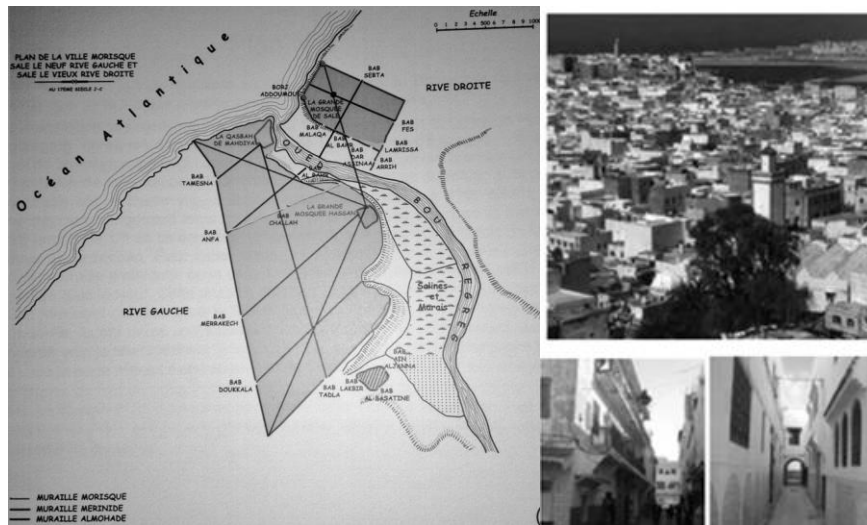


Figure 11. Saadien Urban occupation (source: Dr. Es-Semmar, Heritage Director - Agence du Bouregreg. July: 2011 & Rabat's Culture Ministry - UNESCO's complete report: Rabat, Modern Capital and Historic City: a Shared Heritage. January, 2011).

7th morphological period: Golden Age Period (from 1666 to 1727)

Historical event: The Alaouite dynasty - Sultan Moulay Rachid (1666 dC) e Sultão Moulay Ismail (1672 dC).

Innovation: Substantial construction works were carried out on a new fortress (operated as a prison during the French Protectorate and as a Military History Museum after 2010) and the Kasbah, including the prince's residence building, completed during the lengthy rule of Moulay Ismail. This palace became the second residence of the dynasty, after Meknès.

Urban form: illustrative map with emphasis in light blue representing extensions related to military and royal residence.

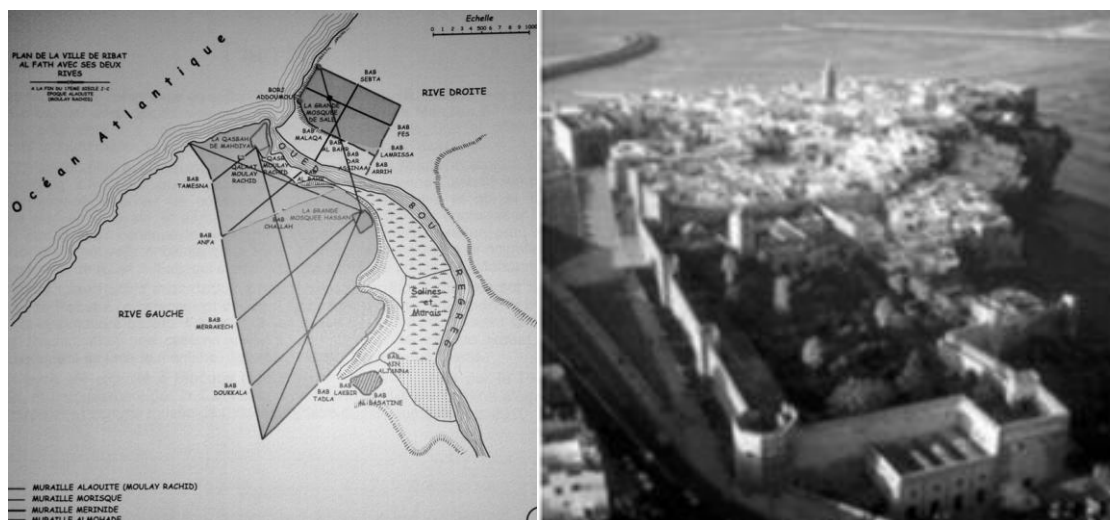


Figure 12. Moulay Rachid's expansion (light blue on the map on the left and picture with royal residence with garden on the right). (source: Agence Urbaine).

8th morphological period: Expansion and Consolidation Period (1757 to 1912)

This period represents the second great expansion in the urban context.

Historical event: Alaouite dynasty - Sultan Sidi Mohammed ben Abdallah; Sultan Moulay Abderrahmane Ben Hicham; Sultan Moulay Slimane.

Innovation: The defensive works continued on the site of the Kasbah with the construction of two *sqalas* (military surveillance towers). At that time, the *kasbah* was assigned to the warlike *Oudaia* tribe, which was the origin of the name.

The Alaouites had the intention of turning Rabat into the third empire capital, once again, after Marrakesh and Fès.

Construction of a new royal palace located intra-walls southeast (left map) with rampart for the Royal Alaouite new kasbah in the nineteenth century (right map).

Construction of three mosques in the axis connecting the palace to the medina's Bab Chellah door.

Construction of new rampart, south of the Almohad defense wall, creating protected new residential neighborhoods in the northwestern part of the urban space (left map).

In order to install gardens for the royal palace, Moulay Slimane also set limit known as "Agdal" in the southeast. (right map)

Construction of irrigation system for the new neighborhoods through the aqueduct of Ain Attiq.

Construction of secondary royal residence facing the Atlantic Ocean, at new urban space northwest (right map)

Foundation of the Jewish neighborhoods, called Mellahs, in Rabat and Salé.

Urban form: innovations are represented in the figure below, showing the changes in the urban form.

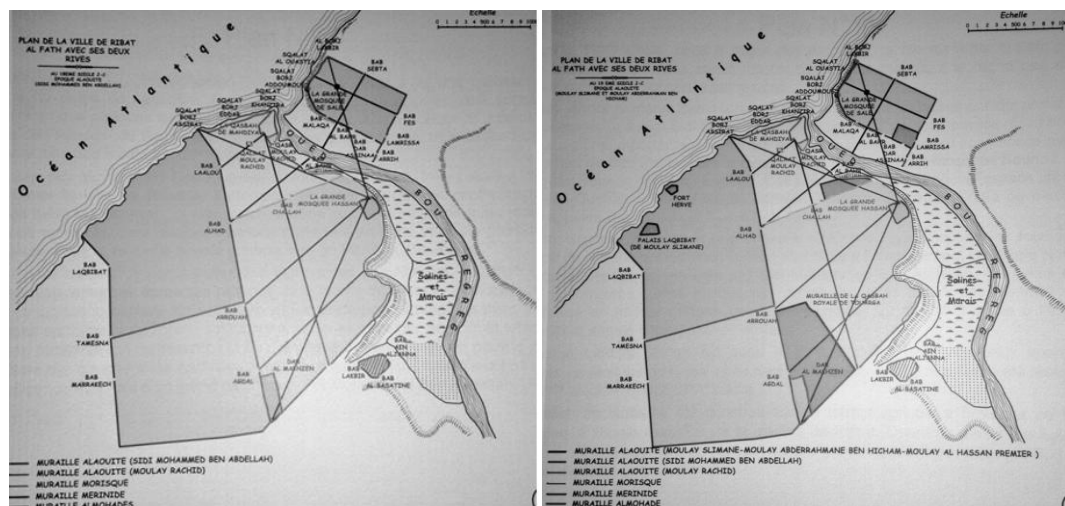


Figure 13. Alaouite dynasty urban occupation: on the left, C18th, on the right, C19th (source: Dr. Es-Semmar, Heritage Director - Agence du Bouregreg. July: 2011).

9th morphological period: the French Protectorate Period - Prost urban plan (from 1912 to 1956)

Historical event: the French Protectorate (from 1912 to 1956)

Innovation: Transformation of the city of *Ribat Al Fath* in the capital Rabat. Modernist urban plan, designed by Henri Prost, French urban planner. The project showed respect to the

traditional tissue integrity, while applying the most modern rules of urbanism. The multiple ramparts presented on the urban expansions remained.

The project represents the first urban master plan of the city, covering a total of 770 hectares. Salé was out of the master plan, because it was not considered part of the new capital.

The zoning was restricted to three sectors: residential and commercial conference center (35%), government (5.2%) and individual housing (44.2% - Medina of Rabat and 15.6% - Medina of Salé). The urban population in 1930, including Salé, was approximately seventy thousand residents. The following schematic plan shows Prost's planning.

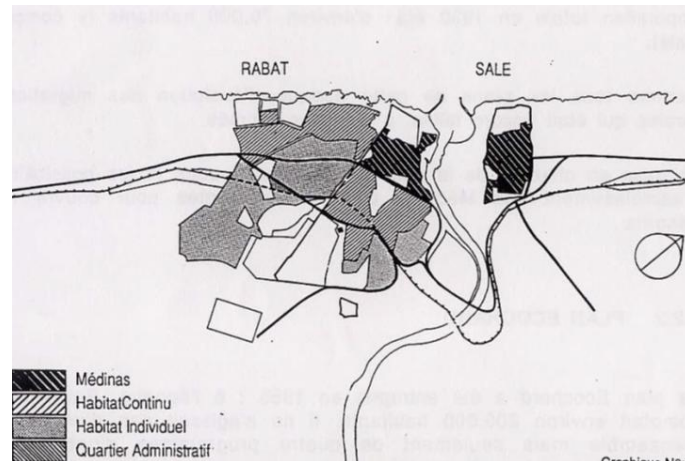


Figure 14. Modern Urban Planning by Henri Prost. (legend/up to down: medinas; multifamily houses; single house families; offices) (source: SDAU 1991).

Urban form: In the figure below, we can see the progress of urban structure during the period of the French Protectorate.

The period from 1941 to 1955 shows expansion of the residential neighborhoods at *Agdal* and *Souissi* (in lighter blue, at the bottom and left of the map)

Also, this period indicates the growth of two new neighborhoods in *Salé* (in lighter blue on the right)

It included the completion of a major public housing program, in the region of *Aviation* and western *Agdal* as well (lighter blue area at the bottom center).

Alongside these planned urban developments, others aggregates were informally and precariously installed in other parts of the capital.



Figure 15. Urban Structure evolution during the French Protectorate Period (source: Atelier parisien d'urbanisme. Plan d'Aménagement Unifié de la Ville de Rabat. Mission 2 - Diagnostic Analyses thématiques et spatiales. April: 2009).

10th morphological period: period of Independence: Ecochard urban plan (from 1956 to 1972)

Historical event: Alaouite dynasty - King Hassan II (1961-1999). End of the French Protectorate

Innovation: In 1955, a new urban planning was designed by the architect and urbanist M. Ecochard.

The project proposes four housing programs that are not intended to configure an unit.

Urban population: two hundred thousand residents.

New popular low-income housing forms to replace the existing slums. The designs were standardized around centralities that included essential equipment: mosque, *hammam*, school, market.

Construction of the express road reunites the city to the airport and other roads, allowing free access to leisure spots, such as the golf and hippodrome.

Urban form: Salé - bairros Hay Salam & Tabriquet neighborhoods, 190 he; Rabat - Yacoub El Mansur, 160 he, Youssoufia et takkadoun, 190 he and civil district at Agdal, in the west area, 106 he. Industrial districts follow the urban development of Salé and Yacoub El Mansur, respectively, 83 and 50 he (figure 15). See the master plan below with the Ecochard expansion proposal.

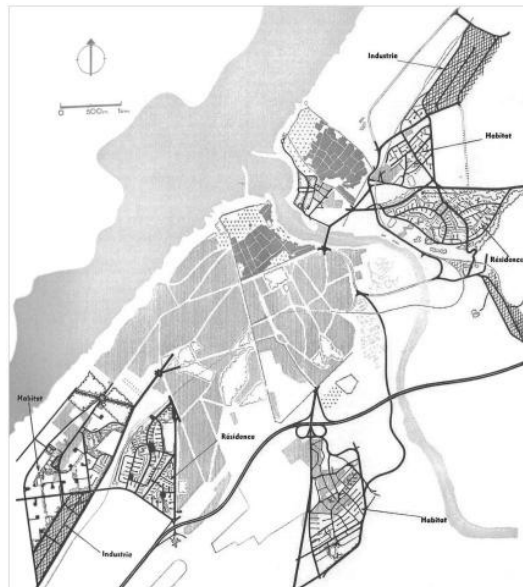


Figure 16. Ecochard Urban Planning. (source: Atelier parisien d'urbanisme).

11th morphological period: Rabat-Salé urban master plan of 1971-72

Historical event: Alaouite dynasty. King Hassan II (1961-1999). National attempted coup in 1971 and 1972, all the while Hassan II rule the reign with dictatorial powers. Unemployed and Students' dissatisfaction.

Innovation: 1971-72 Rabat-Salé's Master Plan along the objective of developing the roads and transport. The urban population in 1972 amounted up to 526 600 inhabitants, as reported by SDAU 1995.

From the Eighties, the Agdal neighborhood has become a business center, by the renewal of homes into buildings, in where some were occupied by offices and some by large upper middle class apartments, together with parking and services nearby.

Crucial program for clear and grassy spaces: a green corridor was proposed between the beach and the central area of Temara, a northern metropolitan's city. Also they've designed a green belt of 1200he between Temara and Rabat.

The figure below displays the map of the master plan 1971-72.

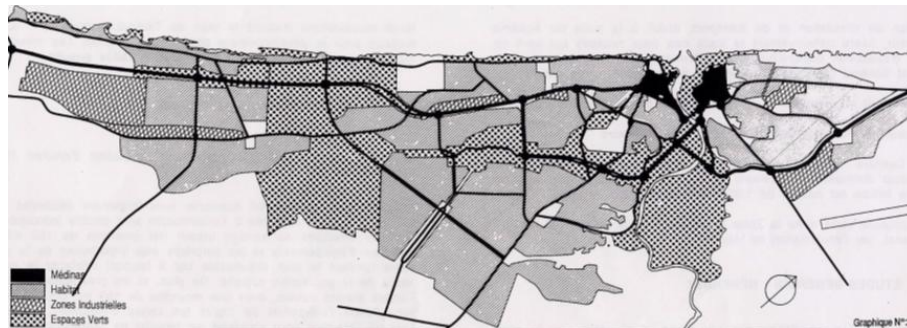


Figure 17. Urban Master Plan of Rabat-Salé 1971-72 (source: SDAU - Schema Directeur Rabat-Salé 1991).

Urban form: the Master plan was very different from that foreseen by an overestimation of population growth occupation.

More affordable institutional buildings were created at the Yacoub El Mansour and Hay Riad neighborhoods;

There were emergence of irregular housing as a consequence of underestimated calculation for Salé and Temara's regions;

Industrial areas estimated at around 1000he were overestimated. Precisely the 90he that was planned by Ecochard had been high-priced, the remainder being underutilized;

The following figure displays the urban structure' evolution at first master plan's period.

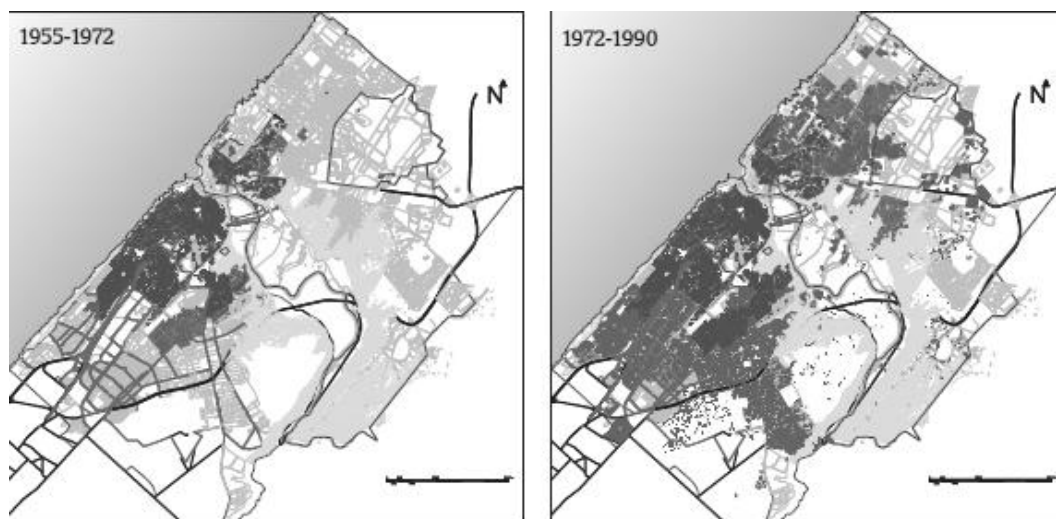


Figure 18. Urban Structure Evolution of Rabat after the first Urban Master Plan of Rabat-Salé 1971-72 (source: Atelier parisien d'urbanisme. Plan d'Aménagement Unifié de la Ville de Rabat. Mission 2 - Diagnostic Analyses thématiques et spatiales. April: 2009).

12th morphological period: Rabat-Salé urban master plan of 1991

Historical event: Alaouite dynasty - King Hassan II (1961-1999). King Mohammed VI (1999-2014).

Innovation: Rabat-Salé Master Plan 1991 is the current. Objectives: Real estate speculation control over land and the improvement of financing housing for disadvantaged populations; site, landscape and natural resources protection, particularly potable groundwater; improves running and transport.

From 1980 to the 2000s, the expansions happened along the coast and outlying areas.

Some neighborhoods have suffered greater density and growth than others. Urban Development: Riad Al Andalous neighborhood, restructuring the slum Al Kora and final stage construction of Hay Riad neighborhood.

Building of the Technopolis business area in Salé and Said Hajji and Sala Al Jadida operations.

Urban form: At that moment we find less urban expansion and major consolidation of the existing structure. The figure below represents the evolution between the two master plans, displaying by the lighter blue the urban form improvement in this period.

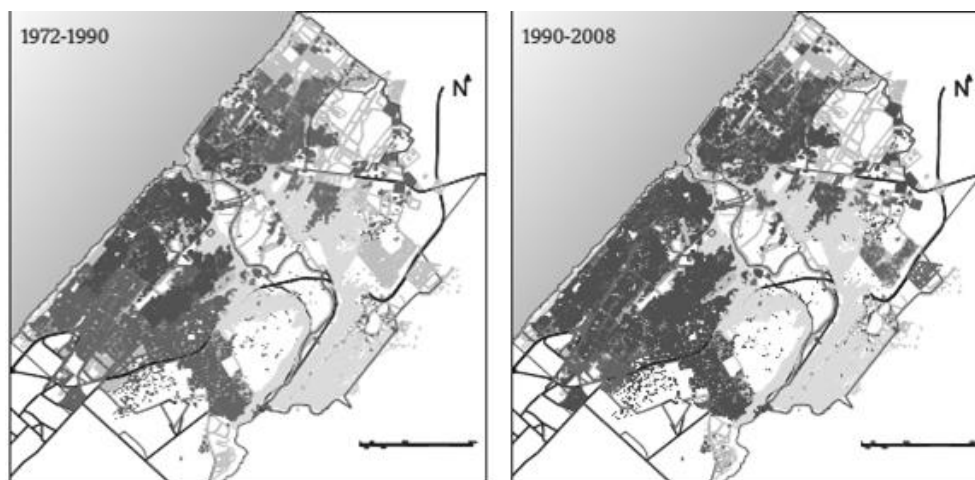


Figure 19. Urban Structure Evolution of Rabat after the second Urban Master Plan of Rabat-Salé, 1991 (source: Atelier parisien d'urbanisme).

Rabat's contemporary Urban Structure

Rabat morphological study case is an application of the method used by the English School of Urban Morphology intending to identify and analyse the historical urban landscape formation and evolution. By the example above, we recognized that the analysis focuses on the shape evolution, taking into account a range of historical and morphological periods.

The maps below show the Rabat urban structure in 2014, enclosing the transformations sequence highlighted by the morphological periods presented, through a concrete shape accumulation.

Figure 19 examples the urban structure evolutionary synthesis, showing that the period before 1913, time of French Protectorate installation, had presented in the urban structure only the traditional Islamic tissue, *kasbah* and *medina*.

Figure 20 shows the Typology Tissues in 2014, highlighting the attention for comprehending the position of the traditional urban tissue: this study's aim for proving the criterion (v).

The combination of the two maps shows that the considered traditional tissue is the oldest in terms of urban occupation, proving to be the original and so the most representative settlement of this place, and showing relation to the territory where it was installed and to the people who have ruled and printed their own culture, in every time.

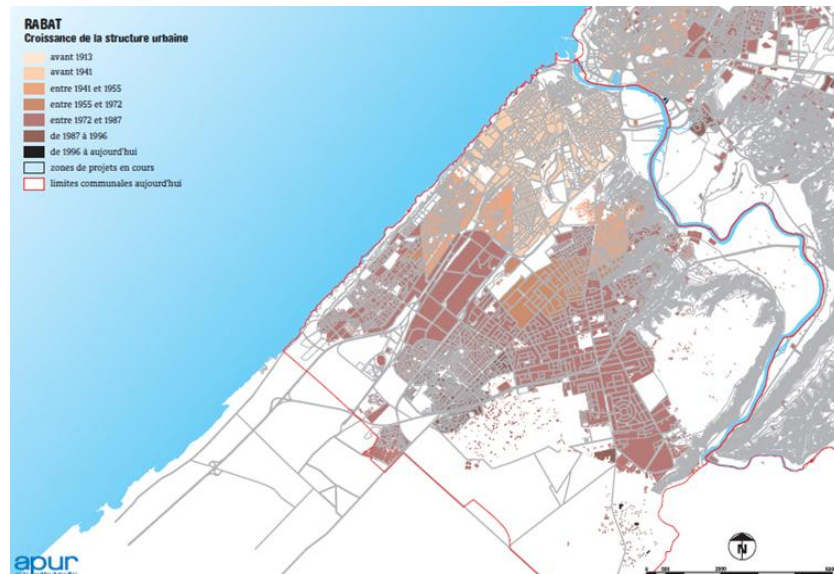


Figure 20. Rabat's Urban Structure Evolution (source: Atelier parisien d'urbanisme).

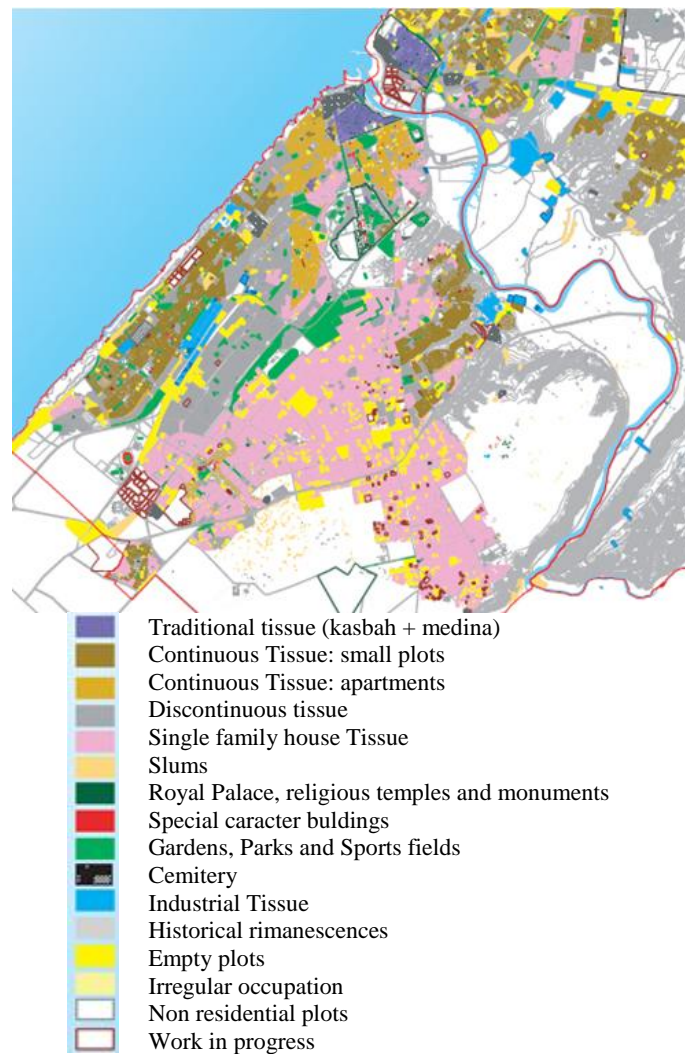


Figure 21. Typology Tissues in Rabat (source: Atelier parisien d'urbanisme).

Conclusion

The urban evolution study has proved to be a landscape interpreting method, able to understand the meanings of the shape as forces that have been influences, along the exposure of a landscape, a culture, a period values. The method as used in this article can opens the field for new applications. The urban morphology is being consolidated as a valuable tool for demonstrating originality, uniqueness and history of a place, UNESCO's valued characteristics part of more than one criterion.

The investigative method revealed the military fortification of Kasbah of Oudayas as the initial Islamic core in this region. This discovery turns the Kasbah as a potential candidate to meet the criterion (v), not justified in the dossier 2012.

The research of Rabat's fixation, expansion and consolidation phases have also demonstrated the site connection with the diversity of cultures - Berbers, Arabs and Westerners. The natural defence promontory position also points to the relationship between the original military fortification form and the operational environment, another criterion (v) desirable characteristic.

New questions have been added up to this study. What is the significance to Morocco of having an extra UNESCO cultural property and have accepted criterion (v) to the Kasbah of Udayas? It is worthwhile to ask the country's acceptance of this criterion again, after the application of this urban morphology method? What are the financial, heritage, education and management advantages that can be achieved from the UNESCO acceptance? Do the existence of historicity, valued by UNESCO in criteria (ii) and (iv) and highlighted by the morphogenesis analysis, create the possibility of men's awareness and education? Can this education be measured? Can it be awakened and encouraged?

Acknowledgements

The authors acknowledged the support received from the Fundação de Amparo à Pesquisa de Minas Gerais - FAPEMIG, from the Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES to develop this research and to present this paper.

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Transformation of the fringe belt units within the perimeter of Avenida do Contorno/Belo Horizonte/MG

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Abstract. *This article maps out the transformations that have occurred in the inner fringe belt units located within Avenida do Contorno, Belo Horizonte / MG. Fringe belts, according to the concepts of urban morphology, are low density areas, often allocated for institutional use, and have a higher amount of free space in relation to nearby residential areas. They are classified, according to M.R.G. Conzen (1960), as inner, middle and outer, depending on their development over time and location. Conzen (2004) contended that the transformation of fringe belts included growth or reduction that may occur through alienation or transference. Such phenomena have constituted a widely researched area in European and American institutions that follow the English School of urban morphology. In this article, fringe belt units are identified and their transformation is analyzed individually. An evaluation is also made of the transformation of the three elements, recommended by Conzen, that make up the urban landscape (urban plan, built fabric and land use) of each fringe belt unit. The process of transformation in fringe belt units, revealed in the study, is reported in terms of increases or decreases and indicates that, for example, 30% showed an increase, whilst the remaining 70% manifested a reduction. The study therefore concludes that there has been a substantial and detrimental reduction in fringe belt units in Belo Horizonte.*

Key Words: Fringe belts, transformation, urban form, process, Belo Horizonte.

Introduction

The urban landscape is structured by morphological elements which include blocks, plots, roads, buildings, open spaces and fringe belts. These elements are conceptualized in urban morphology as spaces for institutional, low density use, and have a greater amount of open space in relation to nearby residential areas.

More specifically, fringe belts have physical characteristics such as, vegetated open spaces, occupation of buildings for institutional use or non-residential urban landmarks and sparse road networks with a low incidence of radial roads and low penetration of vehicles. Cemeteries, parks, villages, military installations, schools, hospitals, golf courses, football fields, monasteries all constitute examples of fringe belts. These morphological elements are classified, according to Conzen (1960), as inner, middle and outer in relation to their development over time and location.

Fringe belt study provides a base for a historical and geographical framework in urban morphology, since it permits the identification of the urban form's stages of development which are in turn intimately related to the physical configuration of the contemporary city.

This work aims to identify and analyze the units of the inner fringe belt located within the perimeter of Avenida do Contorno, Belo Horizonte / MG and the transformation of the belt's urban form. It furthermore attempts to: understand and recognize the characteristics of the urban landscape of the area; carry out a literature review examining the theoretical framework on urban morphology, focusing on the concept of fringe belts.

The methodological approach consists of applying the concepts of the English school of urban morphology, and the guidelines to fringe belt studies, developed by German geographer MRG Conzen (1960), which explains urban phenomena through the changes that occur in the division of land. This area of study, based on the English school, is familiar in European and

American countries. In Brazil, the few studies that address such phenomena include, Pereira Costa et al. (2009a, 2009b) and Meneguetti (2013). The method in question was applied in field work for the identification and characterization of fringe belts and has, as its aim, the analysis of the form and evolution of the inner area of Avenida do Contorno. This paper will thus present: (1) the method of identification (2) the fringe belt units mapped out on the perimeter of Avenida do Contorno (3) an analysis of the transformation of these units (4) the final considerations.

Identification of the fringe belt within the perimeter of *Avenida do Contorno* in Belo Horizonte/MG

For the identification of fringe belts in the city of Belo Horizonte, Pereira Costa et al (2009a, 2009b), considered a combination of morphological elements from low density and wide open spaces, to institutional installations (education, health, military, recreation, religious , among others) occupying reintegrated plots or blocks, as shown in Figure 1.

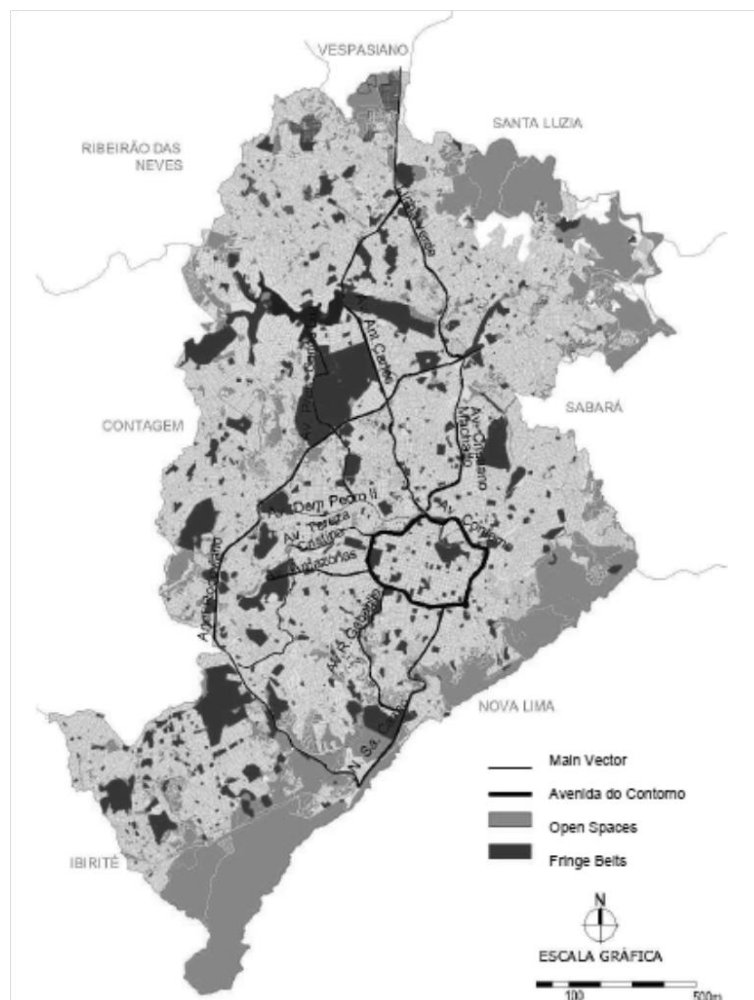


Figure 1. Open spaces and units of fringe belt identified in Belo Horizonte (source: Pereira Costa et al., 2009a; 2009b; 2010).

According to Pereira Costa et al (2009a, 2009b), the surface areas of the morphological elements that constitute the fringe belts equal 10% of the total area of the municipality. It can be observed in FIG.1 that these elements, identified in the city, have developed in a different

manner to those in traditional studies, since the geographical context of Belo Horizonte is different to those examined in traditional studies on fringe belts. These elements, identified in the city, are distributed in fragmented form, being composed of several units of fringe belt. This is corroborated by an analysis of the urban evolution of the city. By analysing the morphological periods it is possible to identify the location of fringe belt units and the existing occupancy rates of each period. From this identification, it is possible to assess if the units of fringe belt constitute an inner, intermediate or outer belt and identify the possible formation of rings, recurrent in traditional studies. The figure below shows the open spaces and units of fringe belt identified in Belo Horizonte.

The fringe belt units identified within the perimeter of Avenida do Contorno will be analyzed in the urban area of the city of Belo Horizonte, planned by Aaron Reis in 1887. These were chosen for their historical importance and central location. Furthermore, the area may have been subject to greater transformation since it is in this region that the process of urban occupation began.

The method used in this work consists of the superimposition of maps which facilitates an analysis of the permanence of these units in urban evolution and the urban, historical and economic context necessary to identify the units of fringe belt. The maps used in the study show the urban evolution of Belo Horizonte, the public institutions, public and private open spaces, the urban zoning and average gradient. Fieldwork was also conducted in order to confirm the previously identified elements.

The characteristics of fringe belt units

Fringe belt units, located within the perimeter of Avenida do Contorno, were identified according to their inherent characteristics and morphological elements, as defined by Conzen (2009). These criteria include: institutional land use; low density; larger amount of open spaces in relation to nearby residential areas; location on the boundary of urban occupation in each morphological period. Thus, forty-nine fringe belt units were identified within the perimeter of Avenida do Contorno, illustrated in Figure 2, according to the neighborhoods and Planning Units (PUs) in which they are located. The study area contains four Planning Units: Barro Preto, Centro, Francisco Sales and Savassi.

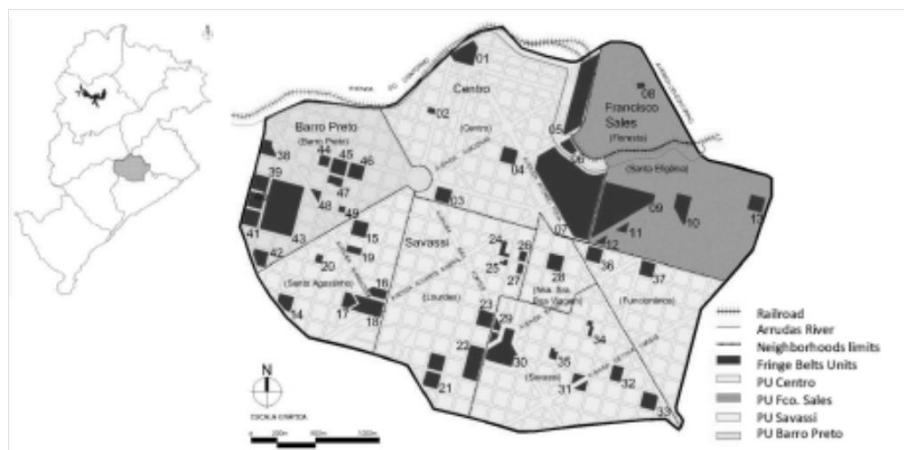


Figure 2. Fringe belt units identified in the inner area within the perimeter of Avenida do Contorno (source: Simão, 2012, p.62).

The first settlements and occupations occurred within the perimeter of Avenida do Contorno, Belo Horizonte. However, this area was not fully occupied as planned, due to the unexpected

growth of the city and the high value of land, which often characterizes the occupation of a Suburban Zone (FERREIRA, 1997). At the end of the period 1897-1935, the area occupied in the Urban Zone was relatively compact and polarized in the downtown area. Fringe belt units located in these unoccupied areas and on the edge of urban occupation constitute the IFB (Inner Fringe Belt), taking into consideration the morphological period and location.

Figure 3 illustrates this urban occupation, whose constructed buildings (occupied area) are marked by the shaded gray/black areas

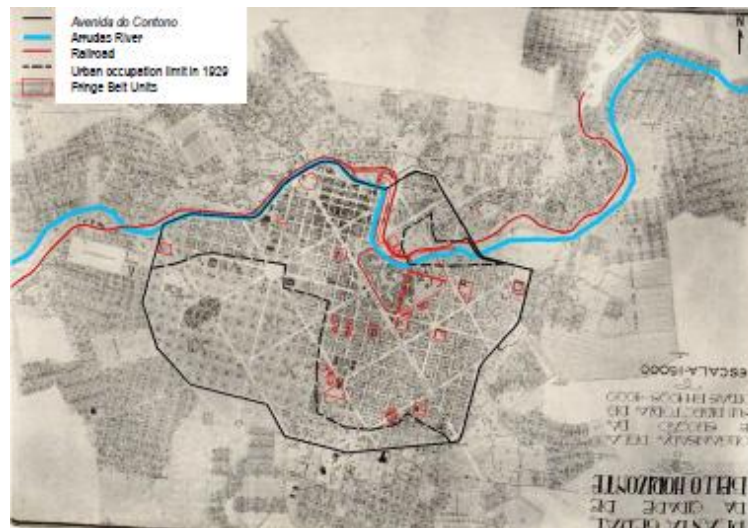


Figure 3. Registered plan of Belo Horizonte in 1929 and fringe belt units constructed in the period 1897-1935 (source: Simão, 2012, p.67).

The initial core of the central area in the urban zone is located near the River Arrudas - a topographically privileged area. The railroad was constructed to run through the original urban area. The river and the railroad became a double barrier that conditioned the subsequent occupation of the city (Lacerda, 1986). Therefore, the River Arrudas and the railway can be considered the first fringe belt line of demarcation in the study area.

The initial period of this urban occupation, from 1897 to 1935, can be considered a demarcation phase of the inner fringe belt, since it is related to the formation of the fringe belt which usually occurs around a line of fixation. Between 1935 and 2011, it is possible to observe the construction of new fringe belt units within the inner perimeter of Avenida do Contorno characterizing the transformation and consolidation phase of the inner fringe belt of Belo Horizonte.

The transformation of fringe belt units within the perimeter of *Avenida do Contorno*, Belo Horizonte / MG

Conzen (2004) believed that, among the three elements that compose the urban landscape, the urban plan (blocks, plots and road system) and the built fabric are more resistant to change, this characteristic being a reflection of the old pattern of land division and a factor in the preservation of a greater number and variety of traditional urban forms. Land use already responds more readily to functional changes, making historical study, through this element, more difficult. In order to assess the changes in the urban and built fabric and therefore, the smallest unit of urban form (the individual division and the buildings or the buildings and open spaces), the following maps of the area will be evaluated: planning and division Aarão Reis (1897), registered plan (1942) and aerial imagery (2011). In the analysis of land use, the history

of the buildings on the fringe belt will be studied and the zoning maps, in accordance with the laws of use and occupation of the city of Belo Horizonte established in 1976, 1985, 1996 and 2010, will be analyzed.

It is perhaps important to note here that according to Conzen's definitions (2004), the transformation of fringe belts include accretion (increase in area) or reduction, which can occur through alienation (loss of area for commercial or residential use) or translation (change in the type of land use from an old fringe belt to a more recent one in the same location). The transformation of the three elements that compose the urban landscape (urban plan, built fabric and land use) will be analyzed on each fringe belt unit and this process of transformation will be reported as an accretion or reduction (alienation or translation).

The fringe belt units identified and their transformation was analyzed individually by Simão (2012). According to the author, twenty three units of the fringe belt underwent transformation, comprising 46% of the total forty-nine (units). In this work, three out of the twenty and three fringe belt units which underwent changes, were selected for illustration. They are: the Municipal Park, Santa Casa de Misericórdia Hospital and the unit composed of the Luiz de Bessa State Public Library, Police Command of Minas Gerais and the Palace of Liberty (Palácio da Liberdade), as shown in the following figures.

Municipal Park

According to Maciel (1998), the park's location was chosen by Aarão Reis as the main area for public leisure and a reference point for his design of the city (Fig. 4). However, only a quarter of the planned (555.060m²) area was occupied as an public open space. In 1907, the southern area was chosen to house a municipal institution and in 1909, the northern region was split into nine blocks (Horta, 1988). The area of the park, therefore, was reduced from 555.060m² to 352 562 m².

In 1942, the built area on the block occupied by the Health Campus (South) was 11.200m² and the open area 91.920m², of which, 47% was vegetated (43.426m²). The occupation density was 10%. In the same period, the block marking the park's location was divided into three (Fig. 5). It is thus possible to observe a change in the urban plan and the free and permeable areas of the park were once again reduced (from 352 562 m² to 182.820m²).

A Map from 2011 (Fig. 6) shows the block formerly occupied by a stadium (east) divided into three. Therefore, the only block planned for the park was divided into fourteen as from 1909. The built area occupied by the Health Campus (South) block manifested an increase from 11.200m² to 42.511m²) while occupation density increased from 10% to 40%. Open space was reduced from 91.920m² to 60.609m², to such an extent that the vegetated area fell from 43.426m² to 10,326 m². Besides the transformation of the urban plan and built fabric, it is possible to witness changes in land use. This is due to the fact that, according to the Law of Use and Occupation 1976, 1985 and 1996, the blocks on which the park and the Health Campus are located, are classified, respectively, as SE-2 (Special Sector 2³⁹), SE-1 (Special Sector 1⁴⁰) and SE-2 (Special Sector 2), ZPAM (Environmental Protection Zone) and ZCBH (Central Area of Belo Horizonte⁴¹).

The block planned by Aarão Reis for the Municipal park was subject to a reduction through transfer as there was a change in the type of land use in the area after its inauguration (from

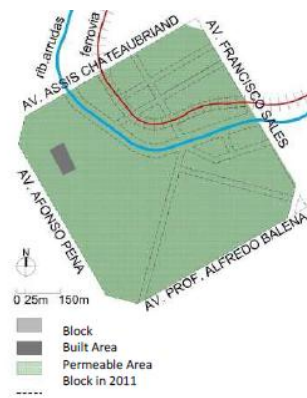
³⁹ SE-2 are spaces, facilities and installations subject to control and allocated for grand institutional use such as: parks, squares, hospitals, civic centers, universities, stadiums, terminals, garbage plants, landfills, cemeteries, leisure areas and schools in general (Belo Horizonte, 1976).

⁴⁰ SE-1 are the spaces, establishments and installations subject to preservation or specific control, such as: areas of landscape preservation, the protection of streams and woods, natural forests, forest and mineral reserves, historical monuments and areas of strategic value to public safety (Belo Horizonte, 1976).

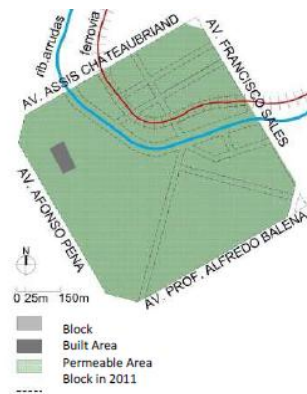
⁴¹ Art. 11 - ZC's are the configured regions such as regional, municipal or metropolitan centers (Belo Horizonte, 1996).

public leisure to health facilities). Because of this change of use, there occurred a transformation in the urban plan through the division of the single block (planned for the park) into fourteen smaller blocks. The location of the block next to the River Arrudas valley can be considered as an important morphological element as it came to function as a demarcation line and barrier to the extension of the Municipal Park and contributed to the consequent fragmentation of the area. The new plan led to the transformation of the built fabric, by increasing the built area and decreasing areas of open space, especially the block occupied by the Health Campus / UFMG (Federal University of Minas Gerais).

The built area on the block occupied by the park presented no increase in the rate of occupation, probably due to its classification in Municipal Law No. 7166/96 as ZPAM (Environmental Protection Zone) and its preservation as a Landscaped area in 1975. However, there has been a 67% reduction in the in the park's permeable open area (from 555.060m² to 182.820m²) and 34% in the open area of the block on which the Health Campus / UFMG is located (from 91.920m² to 60.609m²), resulting in a large loss of permeability.



**Figure 4. Municipal Park in 1897 (source: Simão, 2012, p.97).
Park Area: 555.060m² (permeable)**



**Figure 5. Municipal Park in 1942 (source: Simão, 2012, p.97).
Park Area: 352.562 m²: 182.820m² (permeable) + 169.742m² (Health Campus + football stadium), Open Area: Health Campus: 91.920m²: 43.426m² (permeable) e 48.494m² (impermeable), Occupation density: Health Campus block: 10%**



Figure 6. Municipal Park in 2011 (source: Simão, 2012, p.97).
Park Area: 182.820m² (permeable), Occupation Density: Health Campus Block 40%,
Open Area: Faculty of Medicine block 60.609m²: 10.326 m² (permeable) and 50.283m²
(impermeable).

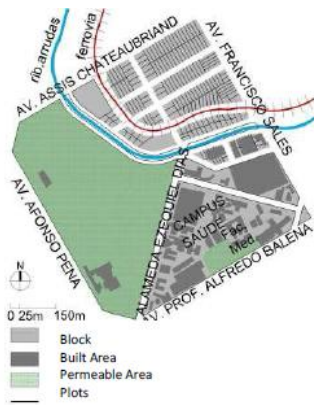


Figure 7. Municipal Park in 2011 (source: Simão, 2012, p.97).
Park Area: 182.820m² (permeable), Occupation Density: Health Campus Block 40%
Open Area Faculty of Medicine block 60.609m²: 10.326 m² (permeable) and 50.283m²
(impermeable).

Santa Casa de Misericórdia Hospital (10)

According to the Aarão Reis plan, the two blocks occupied in 1911 by the Santa Casa de Misericórdia Hospital were orthogonal, one of which became triangular on being divided in the construction of Avenida Francisco Sales, the latter following a diagonal trajectory. The first wing of the hospital was opened in 1903, occupying the non divided square format block (14.400m² area). The triangular-shaped block was divided into seven plots (Fig. 7). By the year 1931, the current block (2011) was divided by Rua Padre Marinho, according to the Aarao Reis urban plan.

Horta (1988) noted that Rua Padre Marinho was deactivated in 1937 and in 1940 the existing hospital building (2.785 m²) was constructed (Fig. 8). The area of the block was increased from 14.400m² to 20.690m² and the occupation density in 1942 was 13%, with 87% of the open area being impermeable. After the deactivation of the street and junction between the blocks, there occurred a transformation in the urban plan, however the triangular block remained intact.

In 2011, new buildings were attached to the hospital (Fig. 9), totaling a built area of 8.645m². The occupation density increased from 13% to 42%. The impermeable open area of

the block was reduced from 87% to 58%. The block was then respectively classified as SE-2 (Special Sector 2), SE-2 (Special Section 2), and ZCBH (Central Area of Belo Horizonte) in the Use and Occupation of Land Legislation of 1976 1985 and 1996.

The block occupied by Santa Casa de Misericórdia Hospital was increased because of the deactivation of Rua Padre Marinho and the union of the two blocks that compose the current block thus generating a transformation in the area's urban plan. Despite continued use as a hospital area, this fringe belt unit underwent many changes in the built fabric with the construction of new buildings and the reduction of the block's impermeable open area.



Figure 8. Santa Casa de Misericórdia Hospital BLOCK in 1911 (source: SIMÃO, 2012, p.101). Block Área: 14.400m²

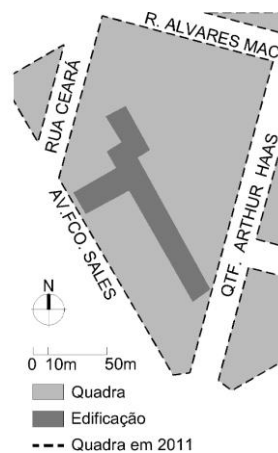
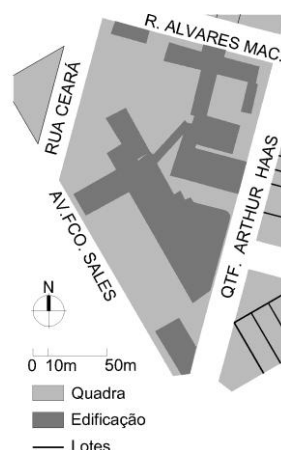


Figure 9. Santa Casa de Misericórdia Hospital in 1942 (source: SIMÃO, 2012, p.101). Block Area: 20.690m², Built Área: 2.785 m², Open Área: 17.905m² (impermeable), Occupation Density: 13%



**Figure 10. Santa Casa de Misericórdia Hospital in 2011 (source: Simão, 2012, p.101).
Block Area: 20.690m², Built Área: 8.645m², Open Área: 12.045m² (impermeable),
Occupation Density: 42%**

In 2011, new buildings were attached to the hospital (Fig. 9), totaling a built area of 8.645m². The occupation density increased from 13% to 42%. The impermeable open area of the block was reduced from 87% to 58%. The block was then respectively classified as SE-2 (Special Sector 2), SE-2 (Special Section 2), and ZCBH (Central Area of Belo Horizonte) in the Use and Occupation of Land Legislation of 1976 1985 and 1996.

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Luiz de Bessa State Pública Library, Minas Gerais Police Headquarters (29) Palace of Liberty (Palácio da Liberdade) (30)

According to the Aarão Reis plan, the Palace of Liberty should have occupied a block with an area of 7.150m², including the surrounding roads (Fig. 10). In 1925 (Fig. 11), the block on which the palace was built in 1897, quadrupled in area from 7.150m² to 27.700m², further growth being restricted by Rua Borba Gato which was deactivated as can be seen in the 1942 plan (Fig. 12). Here, the extension of the block occurred through the deactivation of a stretch of road. However, the palace's plot was reduced from 27.700m² to 24.200m², since the remaining plots were occupied by residences. In 1942, the built palace area was 940m², with an occupation density of 4% and an open area of 23.260m², 20% of which was permeable (4.980m²).

In 2011 (Fig.13), the built palace area increased from 940m² to 4.600m², owing to the construction of a new administrative building (1.300m²) and new Palace buildings (2.360m²). Thus, the occupation density changed from 4% to 20% and the total open area was reduced from 23.260m² to 19.600m² (permeable). Also observed in Fig. 52 is the construction of a new institutional building. In addition to this, as shown in FIG. 12, the block occupied in 2011 by the Luiz de Bessa State Public Library and the Police Command of Minas Gerais was divided by Rua Tomaz Gonzaga into two blocks with an area of 3.700m² (each) and the buildings had not yet been constructed. Figure. 13 shows that the street had already been deactivated and a single block with an area of 8.500m² occupied by the library (1.360m²) and the police command (1.000m²) with an occupation density of 50%.

The Blocks occupied by the Palace of Liberty and the Luiz de Bessa State Public Library were extended due to the deactivation of Rua Borba Gato and Tomaz Gonzaga and there thus

occurred a transformation in the area's urban plan. Despite continued use of this fringe belt unit, there was a change in occupation density owing to the construction of new buildings and a reduction in the open area of the block on which the Palace of Liberty stands.

An Individual analysis of the transformation of the twenty-three fringe belt units resulted in Table 1, which illustrates the change in occupation density, permeability of open space and classification of transformation according to Conzen (2004).

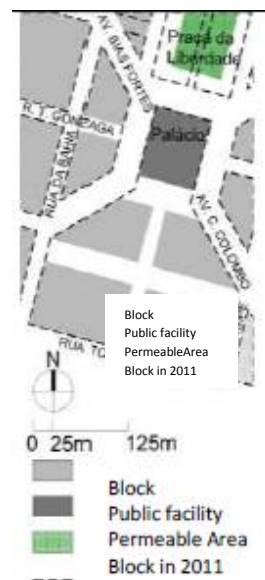


Figure 11. Palácio da Liberdade in 1897 (source: Simão, 2012, p.110). Block Área: 7.150m²



Figure 12. Palácio da Liberdade in 1925 (source: Simão, 2012, p.110). Block area: 27.700m²



Figure 13. Palácio da Liberdade in 1942 (source: Simão, 2012, p.110).
Block/Plot Área: 24.200m², Built Área: 940m², Free Área: 23.260m²: 4.980m² (permeable)
and 18.280m² (impermeável), Occupation Density: 4%



Figure 14. Palácio da Liberdade in 2011 (source: Simão, 2012, p.110).
Block/Plot Área: 24.200m², Built Área: 4.600m², Free Área: 19.6000m² (permeable),
Occupation Density: 20%

An Individual analysis of the transformation of the twenty-three fringe belt units resulted in Table 1, which illustrates the change in occupation density, permeability of open space and classification of transformation according to Conzen (2004).

The transformation analysis of each fringe belt unit inserted within the perimeter of Avenida do Contorno (Table 1) indicates that, out of the forty-nine elements identified, fourteen of them (30%) were subject to alteration, four of them (30%) by extension and ten (70%) by reduction.

Table 2. Transformation of Fringe belt units in the area under study

Fringe Belt Units	1897/1942		2011		transformation
	Occupation Density	Open Space Permeability	Occupation Density	Open Space Permeability	
Israel Pinheiro(01) Central Bus Station	30%	Impermeable	35%	Impermeable	<i>reduction by transference</i>
Minascentre(03)	25%	Impermeable	45%	Impermeable	<i>reduction by transference</i>
São José Church (04)	14%	permeable	25%	Permeable	<i>reduction by alienation</i>
Souza Pinto Saw Mill(06)	48%	Impermeable	42%	impermeable	<i>reduction by alienation</i>
Municipal Park(07) Health Campus (09)	10%	permeable	40%	Impermeable	<i>reduction by alienation</i>
Health Campus (09)	10%	permeable	40%	Impermeable	<i>Reduction by transference</i>
Santa Casa Hospital (10)	13%	Impermeable	42%	Impermeable	<i>Expansion/Accretion</i>
M. Marconi College (14)	12%	Permeable	22%	permeable	<i>reduction of open area</i>
Santo Agostinho College (15)	11%	Impermeable	43%	impermeable	<i>reduction by alienation</i>
Carlos Chagas Square (18)	Not implemented	Not implemented	5%	Permeable	<i>Expansion/Accretion</i>
MaterDei Hospital (19)	50%	Impermeable	60%	Impermeable	<i>reduction of open area</i>
E.Est.Gov. Milton Campos (21)	33%	Impermeable	29%	Permeable	<i>Reduction by transference</i>
Minas Tennis Club (22)	5%	Permeable	32%	Impermeable	<i>reduction by alienation</i>
State Library (29) Pal.Liberdade (30)	4%	Permeable	20%	Impermeable	<i>Expansion/Accretion</i>
Sag. Coração Jesus College (32)	20%	Impermeable	28%	Impermeable	<i>Reduction in open area</i>
Central Firestation (33)	15%	Impermeable	29%	Impermeable	<i>Reduction in open area</i>
Felício Rocho Hospital (39)	15%	Impermeable	60%	Impermeable	<i>Reduction in open area</i>
Monte Calvário College (40)	9%	Impermeable	50%	Impermeable	<i>Reduction in open area</i>
Pio XII College (42)	10%	Impermeable	43%	Impermeable	<i>Reduction in open area</i>
12° Battalion of the Military Police(43)	10%	Impermeable	20%	Impermeable	<i>Reduction in open area</i>
Lafayette Fórum (45)	25%	Impermeable	57%	Impermeable	<i>Reduction by transference</i>
Cruzeiro Sports Club (46)	2%	permeable	25%	Impermeable	<i>Reduction in open area</i>

Source: Simão, 2012, p.102.

Six units of the fringe belt (60%) were reduced through transference and four (40%) by alienation. Therefore, most of the transformed fringe belt areas were reduced.

With regards to the change in the urban landscape component, twenty three fringe belt units, which account for 45% of all those identified, had their urban plan, built fabric or land use transformed. In the fringe belt units that underwent extension, there was a change of urban plan and the built fabric. For those which were reduced through transference, there were modifications in the three elements: change in land use; built fabric; alienation. In the case of the other fringe belt units (nine out of the twenty-three - 40% of the total) which did not undergo extension or reduction due to alienation or transference, the built fabric was transformed (an

increase in built area and reduction in open area), or be it, the block underwent a reduction in free space.

Of the twenty-three fringe belt units that had a morphological element of the urban landscape transformed, all of them had their built fabric transformed, nine with changes in land use and eight in the urban plan (Figure 14).

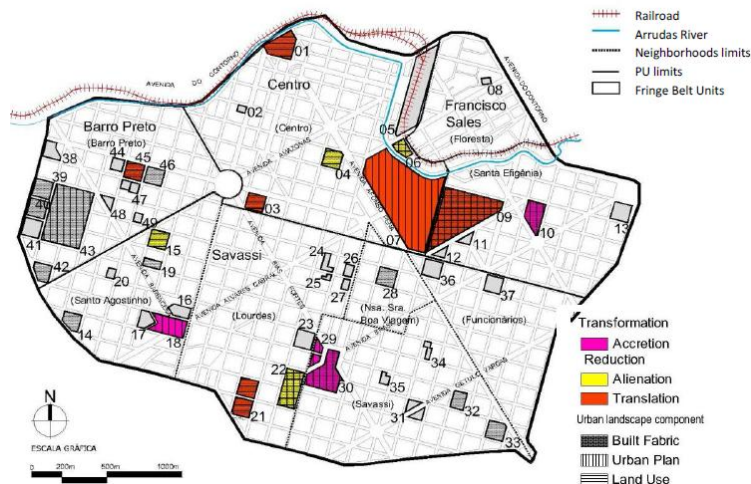


Figure 15. Transformation of fringe belt units identified within the perímetro of Avenida do Contorno (source: Simão, 2012, p.123).

The transformation of the built fabric of 45% of all fringe belts units identified in the area was justified by incentives to encourage increases in density and verticalization, contained in the Use and occupation of Land legislation in the area under study. This phenomenon is a consequence of a change in the classification of most fringe belt units, from SE-1 (Special Sector 1), or SE-2 (Special Sector 1), for ZCBH (Central Area of Belo Horizonte) or ZHIP (Zone Hipercentral). Spaces defined as special sectors and having the characteristics of fringe belts, occupied by public amenities and presenting reduced occupancy rates, were classified in the laws of 1976 and 1985. In the guidelines of the new 1996 law, most fringe belt units had their zoning changed from Special Sector to Central Zone of Belo Horizonte (ZCBH) or Hyper Central Zone (ZHIP), thus allowing greater density.

The increase in built area fringe belt units has occurred mainly in ZCBH, since, according to Caldas, Mendonça and Carmo (2008), the land use and occupation regulations proposed for the zone use a coefficient ⁴² equal to 3.0 and allow smaller side and rear clearances in relation to that permitted in the zoning of the rest of the city, thus facilitating the construction and approval of new buildings on the blocks. Despite this legal incentive, 55% of fringe belt units identified have not undergone transformation. This could be explained by the fact that most are classified as cultural assets and are protected by preservation orders and / or because of their planned and consolidated public amenity status.

Concluding Remarks

The identification and analysis of fringe belts units define the shape and density of the city, as well as, type of use and potential. These characteristics also reflect the historical period and the

⁴² Multiply the area of the land and the utilization coefficient to indicate the highest construction area on the land, adding up the total number of floors in the building.

socioeconomic conditions of urban development. Thus, fringe belt units have been identified with the aim of recognizing the shape and potential of the urban landscape of the area within Avenida do Contorno, starting with the study of the theoretical framework and the fieldwork carried out.

An analysis of the area's urban evolution reveals that the fringe belt units identified in unoccupied areas and on the edge of urban occupation, within the inner perimeter of Avenida do Contorno, constitute the IFB (Inner Fringe Belt).

Each morphological element was analyzed with a view to mapping out the transformation process of fringe belt units in accordance with the alteration of the three elements that compose the urban landscape: the urban plan, built fabric and land use. Thus the results show that 45% of the fringe belt units had a modified element, being that 100% of them manifested a transformation in the built fabric, 40% showed changes in land use and 40% modifications in the urban plan. Therefore, it can be said that encouraging density and verticalization, as in the Law of Land Use and Occupation, induced alterations in the built fabric. There is thus a clear contradiction in a law that establishes the rate of permeability, which should limit excessive density, whilst at the same time defining areas in which increased density and occupation are allowed or even induced, especially in the central area.

In addition, the type of transformation which took place was also classified as reduction or extension. It was concluded that 30% of the fringe belt units were subject to this type of transformation, 30% of them through extension and 70% by reduction. Most fringe belt units had their area reduced. The reduction in the fringe belt is the most important result of the urban transformation witnessed in the area under study, which may explain the distribution of the fragmented form of the inner belt analyzed and the remaining areas identified in Belo Horizonte. The fringe belts in the city are composed of several units that are not connected and do not form the rings recurrently identified in traditional studies on the topic. Therefore, the elements identified in Belo Horizonte have developed in a different way to those witnessed in traditional research.

In view of the importance that fringe belts represent in relation to the urban landscape and the few studies on these morphological elements in Brazil, this work has provided perspectives, which it is hoped will stimulate new studies on the theme, especially in analysis relating to the transformation of the urban landscape and its elements.

Acknowledgments

The authors acknowledge the support received from *Fundação de Amparo à Pesquisa de Minas Gerais - FAPEMIG*, from *Conselho Nacional de Desenvolvimento Tecnológico e Científico- CNPQ* and *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES* for the development of this research and presentation of this paper.

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Urban morphology and architectural design in small towns. The case study of San Vito Romano

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Abstract. *This paper presents a case study of an ongoing research on urban morphology and design in small towns, following an experimented methodology (Strappa, 2013) focused on special building types, and the relationship between consolidated urban tissues and contemporary design. This methodology is applied in the case study of San Vito Romano, analyzing the place as a text, identifying the elementary structures and subsequent changes of the historical fabrics. Reading the place in different scales, territorial, urban organism, urban fabric, building (basic, specialized) we understand the formation process, corresponding to a phenomenological reduction necessary to solve the organism's complexity. Reading buildings and public spaces is substantial and integral part of the project. The specific characteristics of housing expressed by type's notion are transformed over time through continuous updates. The most important of these changes is recognizable as a specific character of Italian architecture, the increasing of basic buildings to form specialized ones. The project is based on the concept of a building as a synthesis of all these processes, so were considered the relations established over time between routes, public spaces, buildings. All this constitutes the primary structure of the project.*

Key Words: Urban-morphology, architecture, urban-design, small-towns, knotting.

San Vito Romano is a case study of an ongoing research on the historical small towns of Lazio (Italy), following morphological - typological approach (Strappa, 2013). The project, that was a part of a thesis degree, has been considered as a final outcome, in order of time, of a transformation process historically determined. San Vito Romano enjoys an excellent geographic location; it extends Prenestini Mountains and overlooks the valley of the Sacco River, lying a few hundred kilometers from Rome. Despite the favorable location and historical importance that the municipality had up until XIX century (it was the seat of the Comarca Notarile), the center of San Vito is devoid of services for citizens's active life and today presents itself as a company town. The abandon of the surrounding agricultural areas is worsening the economic and environmental situation of the area, depriving the center of the dignity that historically has always had. The study of San Vito Romano's territory is based on the idea of preserving the identity of the built, whereas the old town centre as an organism, consisting of elements in a relationship of necessity between them. In this way, the town is not treated as a museum, like any work of art to be protected.

Conservation becomes an active operation, that the current phase of a process, consistent with the historical legacy of the past, of which we can recognize the characters as training and mutants.

Reading San Vito Romano's territory we have carried out analysis on territorial and urban scale to identify several systems which spell out the reasons for the roots of the community in that place, and the "formative process" of the site. The area and the urban aggregate were interpreted according to the paradigm of the method, so we can recognize characters and potentiality of the land that have been transformed by human activity. On a territorial scale the shape has been recognized as a visible aspect of a structure transformation, where it was formed a system of bound distances of the land, the valleys and the hills upon which pseudo-ridge pathways are implanted (Caniggia, Maffei, 1979). Reading the aerial photo we've identified pathways of primary and secondary ridge. San Vito is located along a secondary ridge that

branches off from the main path: in this case, the structuring of the territory is quite common also to other historical centers. Very often the main ridge path does not host the best place to the formation of the settlement. Reading San Vito's urban fabrics was accomplished first by surveying ground plan walls and the orientation of houses along the routes. San Vito Romano's plan has been an essential tool for the analysis of routes and tissues. We have studied the wall's orientation and the houses's access along the route to understand that in the lower part of the city we can find multiple bands of continuity. It is difficult to find elements of continuity between the lower part of San Vito Romano (where we can find the old oil mill) and the higher part (with Theodoli's Castle).

This is due to the morphology of the place and to the numerous restructuring that took place during the XVII and XVIII centuries; all this has caused a shift in land which is no longer legible the old cadastral plan. So by reading the alignments we recognized the hierarchy paths of the urban fabric, to a larger scale, and within individual blocks to a smaller scale. It was also analyzed the shape of many trapezoidal buildings. The presence of trapezoidal form buildings was due to the shift of the front housing or maybe to the less importance of a matrix route. So the cadastral unit is put in a grid of paths much more complex than the last. Before planning it was important to interpret San Vito's formative process, recognizing and recovering the typological matrices. The current reading of the building and public spaces is substantial and integral part of the project, is in fact the logical premise to establish a consequential relationship between the historical and the contemporary city.

The organic form of the town undergoes a transformation in the time that obeys recognizable principles; characters transmitted in buildings, expressed by the notion of "tipo edilizio" (Caniggia, 1972) turns undergoing several changes. The most recognizable transformation in San Vito Romano is the collaboration (repletive absorption, redevelopment) to form specialized buildings (for example in the streets of via degli Orti e via di Borgo Mario). A further analysis on town's paths was carried out to understand the formative process of the fabrics and more generally of the entire town. All these examinations underline the peculiarity of a block in which was found a row house, located in a strategic area of the country, next to the Theodoli's Castle and via di San Biagio. Starting from the identification of land ownership, were assumed the formative stages of this first block; then the plan was compared to the actual and historical cartography. At the end we have studied the building alignments. The analysis of this territory and the subsequent design phase involve in dealing with archeology and the historic built. Even the analytical phase is considered as a critical moment in which to express a historical judgment that concern to the future, not only to the present or the past. So the critical operation and planning begins by reading the reality and concludes the process of knowledge, based on the notions of continuity and organization in architectural design. This develops as a congruent transformation, based on the undeniable fact that the city as a living organism, must constantly evolve to survive. It's also important to state that the design of the new took place not only through the study of primary and secondary paths, but relying on the network of intersections between the routes and the nodes, and according to the notions of basic and specialized buildings.

The projec area is very wide, includes the entire south of the country and it's characterized by different altitude. The gap of 5 m between the two paths of via Borgo Mario and via degli Orti is solved by new building's roof. This seems to continue the square in front of Porta Borgo Mario. The gap of 35 m between via degli Orti and piazza di Porta Olevano is solved either by using a mechanized lift to the inner wall of the so called "Cavone" that with a walk along the slope. The formative process has shown the importance of existing routes that has changed over time through continous updates. In fact through the study of urban tissue and paths's hierarchies we can consider via degli Orti, still in state of neglect, as a new matrix route. Tissues on via degli Orti have the same orientations, so in the past this street had to have an important role for the entire city. For this reason the road is considered as the matrix route on which developed the first cells of the project. The secondary route provides for the first building in the use of an ancient underground route that connects via di Borgo Mario with via degli Orti, and for the

second one, the so-called "palazzo", the use of an existing staircase. Another path, the so called "percorso di collegamento" takes shape as a new via degli Orti and connects the two buildings of the project. In the last phase of the formative process, the central part of the palazzo is specialized on the first level as a square and on the level below as a lecture hall. The building has been called " palazzo", to synthesize the merge process and plot amalgamation of the tissues; so the new building has been project as a urban node, a urban knotting of the paths that can form the new public space. On the second level of the palazzo we can find the knotting of the entire project; there is a square that follows the alignments and the wall warping of the ancient buildings. This square is closed to the south by a barrier, and it is outlined as node design and public space of fundamental importance for the whole town. The second building solves many problems due to the different quotes of the entire area. In fact, its cells develop along the underground route that connects via Borgo Mario with via degli Orti (in the past there were the cells of Carmelite friars and nowadays we can find the seat of municipality. On the ground zero of both the buildings we can find a "percorso di collegamento"; it is a new street designed to connect the palace with the second building. We should underline that the project has recovered and converted some existing buildings (the oil mill, Theodoli's stable, an ancient building and the fountain of piazza di Porta Olevano). In addition, all existing buildings, in particular the Theodoli's stable have defined the size of the cells used in the composition of the project. The existing buildings is in a state of abandon, although he had in the past and it appears to still have a strategic position, especially compared with town nodes. The stable is in fact close to the Theodoli's Castle, the great architectural emergency of the upper part of San Vito Romano, and to piazza di Borgo Mario. The project includes the restoration of all these buildings. Piazza di Porta Olevano is the node of major strategic importance to the lower part of town. The project involves the connection between the main road and via di Porta Olevano through a combined system of squares, rest areas and stairs. The present mill town on via di Porta Olevano has become a garden inside which penetrates the pavement of the square, directing the visitor to the seats. So we can say that the project is the last part of the analysis, and is based on the concept of building as a synthesis of all these processes.

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Railway as vehicle of urban transformation. Past and present of the railway station

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Abstract. *This paper aims to analyse the impact of railway development on the European city, and compare the impact it had in the middle of the nineteenth century and it has nowadays. A core question underlies the analysis and directs the paper on the morphological path: The urban form of the nineteenth century was significantly redefined by the presence of the railway in all scales (Schivelbusch, 1986 and Veselý, 2008). On the single unit level, the train station, as the object of major evidence of railway presence in the city, caused whole city structure to reconfigure, from the position of city centre to the infrastructural network definition (Krejčířik, 1991 and Musil, 2002). In the beginning of new millennium, the European railway celebrates its renaissance, despite not enjoying the exclusivity of its nineteenth century predecessor. The railway has changed significantly over the 150 years, so has the train stations. The hybrid objects, emblematic for the city, remind us remotely of the nineteenth century railway stations (Beneš and Ševčík, 2011). Back to the core question: Is there any transformative force in the contemporary nature of train station, affecting the urban structure in any way comparable to the force of the nineteenth century train stations? Is there any reconfiguration of urban patterns present in the contemporary city, that can be granted to the railway station of present times? The urban transformation is illustrated on several case studies, such as Prague Masaryk station, London King's Cross and Vienna Hauptbahnhof.*

Key Words: Railway, train station, urban transformation, urban structure

Introduction

If there was one single greatest innovation of the nineteenth century, responsible for major development of the society, it would probably be the railway (Powell, 1994). The effect of railway invention and development was ubiquitous, by no means limited to urban development. Through the railway, the technological progress entered everyday life of ordinary people and made them believe in the power of modern science. Railway brought completely new sense of speed, not achieved by any of the vehicles then known, causing passengers to feel overwhelmed with new perceptions (Schivelbusch, 1987). It was also railway which accelerated the spread of revolutionary liberal thoughts throughout Europe, and as many believed, the railway had a power to unify nations (Schreier, 2010). Spread of railway made travelling affordable for masses, contributing to growing mobility and its democratization (Hons, 1961).

The core of this paper will nevertheless focus on the effect of railway development on the transformation of urban structure. The sum and substance is placed on the main passenger railway stations of European metropolises, their role in this process, and transformation of this role comparing the second half of the nineteenth century with current situation. First section analyses the aspects of formation of a modern metropolis, assigned to railway development, in the second section the current role of railway stations in the redevelopment of urban fabric will be tackled.

The heritage of past railway forces as well as their current potential has set the ground for numerous urban regeneration projects, being realized all over Europe on disused railway sites. For demonstration of past and present transformative forces of railway in the cities, three such locations with existing projects or realizations were chosen:

London has an exceptional position among European cities, since the end of seventeenth

century the largest city in Europe and first capital adopting the rail roads. Their quantity and complexity creates highly challenging situation concerning contemporary railway sites regeneration. On King's Cross station, the best practice project has been under construction since 2008.

Vienna on the other hand was rather peripheral metropolis in the nineteenth century, representing a "model" middle European city, sharing common history and cultural background with cities such as Prague and Budapest. Vienna is currently adopting several ambitious railway regeneration projects, including Vienna main station.

In Prague, none of the so far existing projects of railway regeneration has been launched yet, which opens up an opportunity to get inspired by foreign case studies, dealing with similar issues formed by railway presence. The exemplary case is the Railway station Prague (in the text referred to as Masaryk station, its contemporary name), the first and most centrally located railway station in Prague.

Railway in the nineteenth century

The earliest motivation for the construction of railways was transportation of raw materials - wood, salt and stone, later on, with the progress of industrial revolution also coal. Moreover, railway itself stimulated production through demand of further coal, steel and mechanical engineering manufacture products. Private railway companies, investing in the first railway lines, were usually consisting of local businessmen, bankers and industrialists, especially the latter were pushing such railway route, serving their estates, or securing their profits. The passenger transportation was secondary in the first decades of railway development, which started to change in the middle of the nineteenth century, when passenger transport spread.

The environment conditions were also a decisive factor for route choice: Since the railway gives the highest performance on minimal ascent, with carriages moving on smooth, level, hard and straight surface (Schivelbusch, 1987), the railways followed rivers and valleys, if possible. The railway could adapt to the existing environment only to a certain extent, beyond that, the environment was about to adapt to the railway. It cut through the cities and landscape, with new works of engineering such as embankments, cuttings, viaducts or tunnels, the less valuable structures had to give way to rail roads. According to Veselý (2008), railway represented autonomous technical system of objective parameters, layered over the system of everyday randomness. The conflict of these two systems, causing the barrier of movement and development, has represented an especially difficult task for engineers and architects since the first train reached a city.

Locating the first railway stations

Apart from the technical and environmental limits, the price of land was in the foreground, since most of the rail roads were developed by private companies, while each of them constructed their own railway station including all facilities. The first railway stations of the European capital cities were hence almost exclusively terminal stations, rather than single through stations (Nilsen, 2008), placed on the outskirts of the city. Sparse settlements or completely unbuilt, cheap land, was preferred.

For illustration of the early railway stations' location, there are two figures (figures 1 and 2), capturing urban structures of Prague and London in the similar historical moment: The railway node was established for long ahead, yet the urban growth had not yet set the hottest pace. This historical moment came earlier in London (1845), later in Prague (1870).



Figure 1. Schematic map of Prague, around 1872.



Figure 2. Schematic map of London, around 1845.

The middle nineteenth century Prague was built up within the city walls - of baroque construction but of the fourteenth century footprint (Fig.1). The city area was as large as of the medieval town, so was the urban structure and street network. The location of railway station was found in a curious position, the passenger part within the city walls in Prague, whereas the facilities outside the walls, in the rapidly developing neighbourhood of Karlín. Six new gates connected both parts of the station. The site of Prague station was previously used as flower and vegetable gardens and execution ground, later as military hospital and popular pleasure restaurant (Schreier, Kofroň and Sosna, 1995). The available inner city spatial reserve, a sort of inner periphery of the walled city, enabled this rather curious location, in contrast to Vienna, where the stations were located just outside the city walls.

London was developing in a different way than the middle European cities. Before the arrival of first steam locomotive, the oldest district of London – the City – was already surrounded by industrial quarters and working-class dwellings districts, such as Spitalfields, Whitechapel or Southwark, which developed in reliance on the river Thames and numerous canals. By contrast, in the west side of London, to the north and east of the district of Westminster, the more affluent residential quarters were built in the eighteenth century. This social distribution had an enormous effect on the location of the first railway stations. Whereas on the West, the railway stations were located on the outskirts, behind the city structure, in the eastern part the railway stations were built on the perimeter of City district, deep in the city structure, cutting through the working-class neighbourhoods (Figure 2) (Schivelbusch, 1987). The purchase of land for the railway station construction was easier in the less-affluent districts, yet according to Kellet (2007), the expenses for the British railway stations were almost devastating, making it the decisive factor for choice of the site.

City expansion

During the industrial revolution, European cities were facing immense influx of migrants, feeding the growing industry. Even the least advanced European cities launched demolition of their city walls (Prague: 1874, Vienna: 1857 old city wall, 1894 Linienwall), hence the last barrier of the city expansion was gone. The effect of railways was imminent: Factories were settling behind the city on the available land, supply of raw materials and coal was enabled by railway. Newly incoming workers were settling in the working-class districts emerging nearby, or in the unkempt central districts. Introduction of affordable commuter train determined the patterns of suburban development, especially for higher classes, repelled by polluted air and dirt of the city.

According to Brigs, 1968 and Musil, 2002, railway was unambiguously a concentration force, bringing population to the vicinity of stations and standing in the background of rapidly growing cities. Nevertheless, concerning single cities and new perception of space and time (Boyer, 1996 and Schivelbusch, 1987), the cities of late nineteenth century were spreading along the rail roads far beyond the traditional city core. The city centres rapidly depopulated, fell into disrepair or transformed into business districts, whereas new residential settlements of lower density (garden cities) were far beyond the city. This familiar description corresponds to the image of late twentieth century western metropolis, however attributed to the development of automobil industry. Nevertheless, there is a link between future urban sprawl and “Zwischenstadt” culture (Sieverts, 2003) and the development of railway.

London, the first world city of the age, had quadrupled the number of its inhabitants between 1800 and 1900, with over 4 million inhabitants in the beginning of twentieth century. As the first industrialized city, London’s congestion, pollution and lack of greenery was most advanced, so was the development and popularity of living in suburbs (Janata, 2009). Compared to London, Vienna and Prague were conservative cities, expanding later by the end of the nineteenth century, after the demolition of city walls.

The railway stations brought dynamic to the development of inner districts. The previous node of passenger transportation, the stagecoach inn, could by no means compare to the new infrastructural node of railway stations with immense volumes of people and goods flowing in and out (Schivelbusch, 1987). This newly experienced intense concentration in the vicinity of railway stations was attracting certain functions (retail, business), while repelling others (residential or smaller workshops). The smoke of steam engines made buildings black and sooty, yet the bustling atmosphere attracted many cafés, restaurants and hotels, leaving the traditional city centres behind.

First structural changes of the street network were conceived in order to cope with the intense traffic, incompatible with narrow winding streets of inner districts. In smaller cities with through stations located on the outskirts, new street, connecting station directly with the city centre (so called “Bahnhofstrasse”, railway station street), was placed. Such streets are legible in the urban structures of cities such as Zürich or Weimar, until nowadays serving as pedestrian and public transportation shopping and business streets. In contrast, such streets had never been established in the urban structures of Prague, Vienna or London (Vorrath, 2010). Some streets may though play similar role, connecting railway station with the city centre, such as Mariahilfer Strasse, connecting the Western Station with the centre of Vienna. For dispersion of passengers and easier access of horse-coaches, spacious plazas were constructed in front of some stations.

Railway expansion

The spatial requirements for the railway operations were growing in the course of the nineteenth century, mainly the freight transportation required new storehouses and transit sheds. The North

railway station, supplying Vienna with coal and salt grew from initial 2 ha site in 1837 up to 96 ha by the end of the century. That made it as large as the central city district (Vorrath, 2010). In King's Cross, the facilities of first Coke and Gas Company and storage facilities for grain, potatoes and coal created an area of 27 ha (King's Cross Central Limited Partnership, 2014). According to Kellet (2007), up to 10% of central land in London was owned by the railway companies.

Apart from the storage facilities, usual equipment of each railway station consisted of waterworks, locomotive shed, and marshalling ground, shunting yards and sidings. The passenger equipments were expanding as well, with new tracks being added and halls expanded.

The railway stations started to create large "voids" within the cities - vast inaccessible areas, splitting newly formed neighbourhoods and making establishment of efficient circulation network impossible. English idiom "wrong side of the tracks" represents the spatial and social division railway tracks formed in the cities.

In 1960's, Masaryk station had nowhere to expand in the vicinity, so it established repair and maintenance sheds and marshalling yard in Holešovice - Bubny, implanting barrier into another location in Prague. The existing location of Masaryk station proved to be troublesome for the first time after the city wall demolition, when the "Ringstrasse" concept – representative boulevard with public buildings and parks, inspiration from Vienna – was impossible to implement. National Museum, Opera house, new railway station (today Main Railway Station Prague) were built along the former city wall, planting the seed of future north-south communication. The inclusion of the railway sites of Masaryk Station into the urban network as a part of this communication has been an architectural issue since the 1910's (Fig.3) The purely technical solution, a construction of elevated highway over the railway sites, realized in 1980's, can not be considered as an adequate answer to this complex and long-standing challenge (Figure 4).

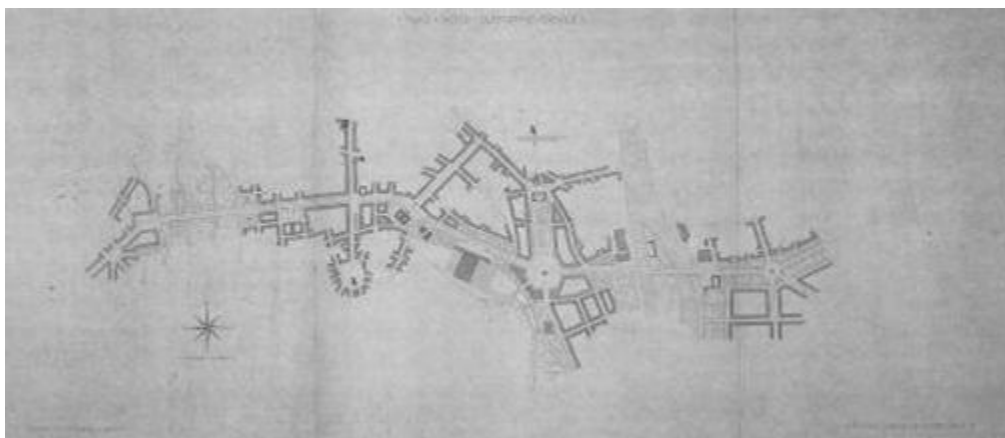


Figure 3. Proposal of north-south connection, with main square on the place of cancelled Masaryk station. Designed by architect Kutchera, the Prague Planning Commission from 1942.

Infrastructure and flows

Travellers and commuters used to cause regular congestions around the stations. The key challenge of the age was to redistribute the enormous volumes of people and goods across the city. The connection of railway stations with the city centre, with the industrial districts as well as with each other was essential.

New public transportation systems were set, first of horse-drawn buses (omnibuses), later horse-drawn trams, replaced by electric tramways by the end of the century. Freight was transported on horse coaches. Those first public transportation lines were nevertheless avoiding

railway stations, prolonging the transportation problem. Also the capacity of such systems, often operated in the street network of medieval cities was soon not sufficient enough.



Figure 4. Photography of Masaryk station railway site, view of elevated highway.

The railway station North in Vienna was served by 3 000 horse coaches a day in 1850's (Vorrath), balancing on the edge of collapse. In Prague, what we know as Masaryk station, was for a long period the only railway station in the city. Rapidly growing industrial districts in the outskirts of Prague were mostly cut off. Transporting the new railway carriages from the Ringhoffer factory in Smíchov, one such district, to the Masaryk Station in Prague on the horse carts was an all-day-long operation, jamming traffic in the whole city centre (Hrůza, 1989).

There were first attempts to connect the single termini through railway lines. These connecting lines remained mostly insufficient in their capacity, facing the demands claimed by the twentieth century traffic. In Prague, the construction of railway node was finished in 1882. The new through Main station (back then Franz-Josef Station) was constructed and new Smíchov terminus was connected with the network. Only Masaryk station, the first railway station in Prague, remained unconnected with most of the network.

First experiments with underground railway were carried out in London with first metropolitan system from 1860's facing the challenge of separated railway stations, spread across the city. First section of the „tube“, connected railway stations Paddington, Euston, St.Pancras, Farringdon and Moorgate, and as such set the example of infrastructural network with multi-modal nodes. The first underground line was later extended and created the „Circle“ underground line, finished by the end of nineteenth century.

Railway station buildings

Before the power of railway was recognized, the very first passengers' railway stations of 1820's and 1830's were plain utility sheds, adjacent to the more important freight stations (Powell, 1994). Yet the principal expression of the railway architecture of great passenger stations, such as London St Pancras or Gare de l'Est in Paris was definitely established by the middle of the nineteenth century. The grandeur of the railway stations was partly inherent by their size, given the volumes of passengers handled in the stations. Nevertheless, another aspect was the representation, reflection of their importance.

The typology also evolved, the arrival and departure buildings started to be constructed separately, the train halls were covered by innovative roof constructions of glass and steel, inspired by Joseph Paxton's Crystal palace in London, the house of Great exhibition in 1851. Monumental facades of the passengers' halls corresponded to the most glamorous civic buildings of the era. The architectural style was turning to the glorious past, with classicist, neo-renaissance or neo-gothic decoration disguising the industrial nature of the buildings (Schivelbusch, 1987).

The cityscape, until recently dominated by the landmarks of castles and cathedrals, gained new monument. Besides theatres, museums and government buildings, the railway stations were one of the most spectacular buildings of the time.

In terms of Aldo Rossi's "The Architecture of the City" (1984), the railway stations of the nineteenth century are primary elements of the city structure – objects capable of accelerating the process of urbanization, they are able to characterize the process of spatial transformation, often acting as a catalyst. Objects of impressive form, capable of structuring the city (1984, 18).

Contemporary railway station

In the course of the nineteenth century, railway worked as unprecedented force in the re-configuration of city structure. The heritage of this force is interwoven into complex reality of current cities: large bleak sites of disused railway facilities as well as magnificent buildings of railway stations, places extraordinarily well connected with the network of public transportation as well as barrier-like object, separating whole districts.

Large railway sites, busy with railway operations, belong to the past. The freight market has changed with the spread of electricity, majority of goods is no longer transported through railways and facilities for steam operations are not in use any more. Rationalization of the operations enable to diminish the marshalling yards, the unified and well organized railway node enables the railway companies to share common facilities efficiently.

The disused railway sites are enormously large and valuable. The price of the land is in the foreground once again. What used to be a periphery behind the city walls in the beginning of the nineteenth century, is within a perimeter of the wider city centre 200 years later. The location of the railway stations represents an opportunity to reuse the sites in a way to extend the functions of the city centre, or set-up a new centre in a derelict, neglected or just fragmented neighbourhoods. To minimize the disused areas, upgrade the infrastructural network and optimize the transfer options, integrate the site to the urban structure of the neighbourhoods, create local or city-wide landmark with urban functions and forms - the ambitions of contemporary redevelopment projects are high. How do London and Vienna meet their ambitions, and what kind of challenges would Prague face in the future?

Location of the railway station and city redevelopment

The process of city expansion, triggered by railway in the last third of nineteenth century, and accelerated by the automobil in the twentieth century had come to the point of unsustainability. Depopulated city centres, settlements sprawling into the free landscape, diffuse settlement structure, skyrocketing energy consumption, dependency on private cars and rising costs of public infrastructure, all that has alarmed governments all over Europe. With over two thirds of the Europe's population living in the cities and towns, the demand of sustainable urban development is getting strong. In the Europe 2020 policy framework, between 2007 and 2013 EU invested about 21 billion EUR in sustainable development projects, such as rehabilitation of industrial sites or urban regeneration projects (European Commission, 2013). Large sites of railway brownfields represent such trend of reuse of well connected inner city reserves.

Vienna adopted a truly strategic approach in railway sites redevelopment, including the city rail (S-Bahn) and underground (U-Bahn). Austrian regeneration program for railway stations, so called "Bahnhofsoffensive" (railway station offence) was launched in 1997 with six railway station areas from Vienna being included, sharing the same project guidelines: Westbahnhof, Nordbahnhof, Hauptbahnhof, Heiligenstadt, Wien-Mitte and Hütteldorf. The first Austrian "railway city" project, development of Westbahnhof, was finished, meanwhile the projects of Nordbahnhof (96 ha) and Hauptbahnhof (109 ha) have begun. Outside the regeneration program, the multi-modal terminus Praterstern has just been finished and the prospective Nord-

West Bahnhof development (44 ha) will begin within few years (Vorrath, 2010).

In London, there has been projects of railway stations redevelopments realized since 1980's, such as Broadgate/Liverpool Street or Ludgate, yet without any overarching framework or policy. The development was primarily a way of raising money for railway operations in times of cut back in public funding with an enormous pressure on commercial appreciation of the site (Bertolini, Spit). Currently the most ambitious of all redevelopment projects is the regeneration of King's cross – St Pancras terminus with implementation of high speed international connections and Thameslink line, along with mixed use development (29 ha).

All over Europe, various projects of railway station areas have been launched or finished, such as Euralille in Lille, Zuidas Amsterdam, Zürich Europaallee, Basel Euroville, Winterthur Sulzerareal, Berlin Hauptbahnhof, Paris Rive Gauche - Gare d'Austerlitz, Milla Digital in Zaragoza or Stuttgart 21. The emergence of new quarters is happening again, and those quarters rise on the former railway sites.

In Prague, there are currently three large central railway brownfields, attached to existing railway stations: Masaryk station (19 ha), Holešovice-Bubny (76 ha) and Smíchov (179 ha, including large industrial regeneration zone). Currently, there is no comprehensive strategy for redevelopment of these zones, neither an effective tool, restricting greenland development and supporting brownfield development. In past years, larger parts of the property were sold to private investors, who initiating single projects and negotiating their approval with city representatives. According to Fragner (2012), urban development project in Prague are mostly a good way to patch up the holes in the city's budget.

The Masaryk station area currently borders three districts: the medieval New city of Prague and two industrial and residential districts, developed in the nineteenth century, Žižkov and Karlín. All districts has been going through massive redevelopment since 1989, in case of the latter accelerated after the devastating flood of 2002, making it one of the most progressive areas of Prague. Complicated topography, rail and vehicle infrastructure, and heritage protection all play role in the separation of these three districts by the Masaryk station area.

Design tasks – permeability, accessibility, integration

On one side of the project there is upgrade of infrastructure: advance of technology made trains competitive on medium-length journeys with air-travel (London-Pars) as well as with automobil (regional connections). Due to the optimization of transfer options, railway nodes are equipped with new multi-modal terminals, including metro lines, old railway stations disabling trains to run through are being replaced by new Main stations.

Another part of the project is the regeneration of railway brownfield, its integration into the surrounding urban fabric and establishment of new connections. In order to eliminate the barrier effect of the railway station and its facilities, urban design tools elaborate on the usual height difference of rail road and surrounding environment, using various forms of sunken plazas, elevated rail road, ground floor passenger halls, bridges or underpasses.

In the main station of Vienna, the whole volume of tracks is elevated, and the ground floor is used as main space for passengers, replacing passenger hall. It is a wide corridor, underpassing the width of six platforms, connecting two squares on both side of the station, with entrances up to the platforms, to shops, to the underground and S-Bahn stations. This spatial configuration also enables existence of regular underpasses, albeit rather long, in the continuation of existing street network.

Among many projects under consideration, some still use rather dated design of mega-structures, inspired by the optimistic 1960's, when the belief in strong, technical solutions was ubiquitous. Nevertheless, the solution as such was available much later, and these projects have often survived up to recent times. Such case was the 1960's to 1990's proposal for Zurich Hauptbahnhof, consisting of large building, spanning over the platforms and railway tracks in full width. Beside being a demanding, overly expensive structure, the design considered demolition of existing historical railway station (Wolff, 2012).

The urban design of King's Cross (design by Allies & Morrison and Porphyrios) has been extensively evaluated by various city bodies in terms of its accessibility and integration. The resulting scheme proves progress in overall accessibility, with focus on the rich network of public spaces, from the generous Granary Square to the modest walk along the Regents Canal, outdoor plazas as well as indoor halls in the Western Concourse. Open space is formed by the newly designed buildings, which are in their shapes, scale, frontline corresponding to historical pattern of the site (Figure 5) (King's Cross Central Limited Partnership, 2014).



Figure 5. London King's Cross urban pattern.

King's Cross project shows several other trends concerning the transformation effect. "The best connected location in Europe" (Argent, 2005) does not mean the dirty infrastructural node – in fact, most of the facilities, such as six metro lines, including new Thameslink, are buried underground and hence do not affect the aboveground urban structure. The new underground world provides passengers with shopping galleries and various services. Another trend is the regeneration beyond the reach of concrete site – the King's place, Regent quarter, British library or The Francis Crick Institute, all has been developed the project started, with a positive effect on the formerly dilapidated neighbourhood.

Future development of Masaryk station in Prague will have to face several serious facts, concerning accessibility and integration: re-connection of Karlín and Žižkov districts, integration of elevated highway, cutting the site in half, and infrastructural solution of the railway node. Masaryk station is the most busy railway station in Prague for regional connections, yet with limited future potential: the railway network configuration enables only connections to the east and north, avoiding the Main station. Past projects of redevelopment were considering several options: expanding the operations when introducing new Airport line, keeping only the existing operations while arranging the pedestrian connection for transfers on the Main station, reducing the station area in order to fit in the network, or complete cancelling of the operations (Novotný, 2007). Various aspects have been debated, such as foundation of a representative central city square, an idea regularly revived since 1930's (Fig.3), or construction

of city railway tunnel, double storey Main railway station and closing of the Masaryk station (SUDOP, 2011).

In spite of unclear future, the railway area and its surrounding is not sleeping any more. Florentinum, a large office building, overlooking Masaryk railway station and exceeding the height of surrounding buildings for about three floors, has just been opened in spring. The developer Penta (joint owner of the railway station property) and architectural office CMA, offer 49 000 m² of office space, shopping passage and piazza with garden, advertised as new public space. This might seem parallel to the strategy of London, nevertheless, the result is maximization of profit from the surrounding area before conceiving the overall future development. This intervention means insertion of a new larger scale of urban fabric, most likely anticipating urban development, intended by developer. (Fig.6)

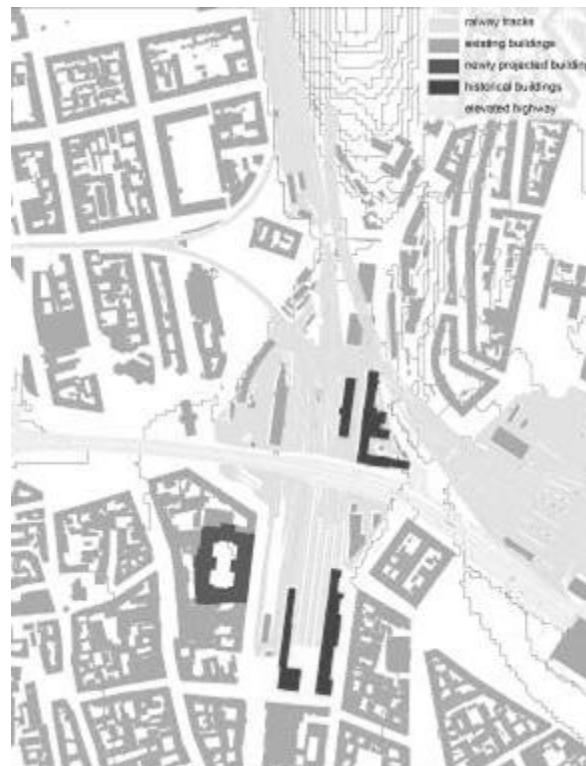


Figure 6. Prague Masaryk station urban pattern.

Railway station buildings

Over the past decades, centrally located railway stations of European capitals became vulnerable to redevelopment. Before establishment of monument protection for the industrial and infrastructural heritage, several railway stations were demolished, with Euston station in London, the first grand terminus, being the exemplary case (Powell, 1994). In Vienna, non of the six original termini remained. The splendid railway buildings of the past were replaced by modernist utility objects, such as new Euston station in London (finished in 1968), South station in Vienna (finished in 1961), or Smíchov station in Prague (finished in 1956). The deep contrast between the buildings of the past and of the contemporary modernist ones caused severe public protests, resulting in the remaining grand stations of the nineteenth century being classified as historical monuments, despite with protection mainly limited to passenger and train halls (Nilsen, 2008).

For various reasons, some of the historical railway stations has been transformed for another

functions – they were either not meeting the requirements of contemporary railway operations, or the railway network was remodeled in another way. For example, North-West station was used for exhibitions and events, in 1920's a „snow palace“ was set in there with a ski run and inclined plane for ski jump with artificial snow. Since 1989 Parisian Musee d'Orsay has been established in the building of former railway d'Orsay, while Atocha station in Madrid was transformed into tropical garden.

Another railway stations of the past go through conversions – in order to become the railway stations of the present, with extensions or new railway buildings added to complement the services, such as shopping mall, cultural venues, facilities for commuters, sweetening the transit between various modes of transportation or transforming the railway station into a destination (Namiki, 1995). New railway stations are truly multifunctional objects, with rail travelling being only one of the range of functions provided. The once strong statement of monofunctional monuments – railway stations – has gone for good.

In some cases, monofunctional buildings evolve into hybrid objects, containing the world in itself, with privatized public space and with functions not adding up, but merging (Ševčík and Beneš, 2011). Such objects are big in terms of Koolhaas' theory of bigness (1993): their envelope does not communicate the inside, there are various autonomous parts, uncontrollable of single architectural gesture, but is still committed to the whole (Koolhaas, 1993). Large part of the terminals takes place underground, without really revealing it through the urban structure visible on the surface.

Reconstructed railway stations often aim for striking aesthetics and expressive form, along with galleries, museum, airports and shopping malls, they are on the mission to upgrade the image of the metropolis and improve its competitiveness (Ševčík and Beneš, 2011). Parallel to the nineteenth century train halls, the contemporary train sheds and canopies became popular landmarks, in contrast, the passenger halls as such are sometimes even omitted. The case of Vienna Hauptbahnhof is symptomatic, the passenger hall is a mere corridor, whereas the roof, diamond shaped steel and glass structure covering the platforms, was given the most attention of designers and engineers (Fig.7) (ÖBB-Infrastruktur AG, 2014). In these terms, for many architects the most Inspirational is probably the work of Santiago Calatrava, who has been shaping the infrastructural landmarks of European cities since his 1990 project for Zürich Stadelhofen railway station.



Figure 7. Vienna Hauptbahnhof, underpass and iconic roof design.

St.Pancras international and King's Cross development area show the way of creating space of various rich forms. The Iconic red-brick pseudo-Gothic building of former Midland Grand Hotel from 1860's and 1870's is forming the main facade of St.Pancras International towards Euston road and one side of the King's Cross square. Another side of the square is dominated by Western Concourse, newly constructed steel and glass canopy by John McAslan + Partners, extending the passenger hall of Kings Cross station. St Pancras was recently extended by a large hall of high speed international connections of rather generic design. In the King's Cross area

redevelopment, about twenty historical monuments has been kept and integrated into the scheme: landmark buildings such as The Granary building, conversion of former wheat storage by architect Stanton Williams, hosting The University of Arts London – Central Saint Martins, voted the “world’s best higher education building” in 2012 (University of the Arts London, 2014), along with ordinary utility buildings of the past, such as canopies for unloading of goods (King’s Cross Central Limited Partnership, 2014). This strategy helps to keep the memory of the site, integrating the rich railway past into the current city fabric.

Masaryk station is located within the Prague Heritage Reservation, with railway station building being the last great railway station in Europe of the first generation buildings, constructed before 1850 (Zeithammer, 2009). Pseudo-Renaissance building was designed by engineer Anton Jüngling in 1845, the objects were going through extensions in 1870’s, with corner restaurant and glass canopy spanning over the platforms, and facilities building such as locomotive shed and workshop being constructed in distant position. The railway buildings are under protection as national monument since 1958, the former locomotive shed is nowadays conceived for foundation of Railway museum, part of the National technical museum. There is a chance that these buildings will remain on the site as a part of the future urban development, keeping the site memory and creating landmarks of the area in the same way we can observe it in King’s Cross.

Conclusion

Schivelbusch (1987) is writing about the gigantic brushstroke of the early railroads, cutting the nineteenth century cities’ urban fabric. The works of contemporary architecture and engineering gives the opportunity to almost erase the legible traces of this brushstroke. Voids are disappearing, urban structure interconnected, bleak sites revived. From the city structure interventions caused by railway, seemingly only the positive ones remain.

On large-scale, railway serves as a tool to re-configure the cities, enabling re-establishment of sustainable urban patterns. Railway enables to regenerate the inner city districts, while providing place for new development, and limits suburban development to areas well connected to the city. This tool may or may not be used, as observed in case studies.

In the framework of single cities, there are mostly urban design tools available for overcoming the barrier-effect of the railway sites, establishment of new connections and integration of the newly developed land into an urban fabric. In the best practice cases, the regained confidence of the contemporary railway station is signalized by expressive architectural features, yet incorporating old memories of early railway times into urban schemes.

In Prague – all these tools to make railway stations prominent, though positive, transformative force, have not been fully employed yet. The development is in the point, where much of the potential could be wasted by ill-conceived implementations of urban development, but also where a lot can be achieved by using wisely the transformative force of railway.

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The impact of Lisbon's subway development on *Avenida da República*

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Abstract. *In an environment of political regeneration, Lisbon expansion during the XX century is marked by the “Avenidas Novas” (new avenues) project. In this work we show how the development of the Avenida da República is affected by the development of the Lisbon subway. The opening of a new subway station is transformative event that has potential impacts on the development of different sectors and of the growth of the city. This work was done by in several steps: (i) critical reading of works that focus the space and time of the object of this study; (ii) identification and analysis of several specific moments of the growth of the Avenida da República through urban cartography and (iii) assessment of the urban form of this avenue through a comparative analysis of the results.*

Key Words: Urban design, morphology; urban form, Lisbon subway, Avenida da República

Introduction

This work is to be considered in the context of a larger research project. Starting from the hypothesis that the mass transportation system of the subway acts as a driver of the transformations of the urban fabric this work presents the case study of the *Avenida da República* in Lisbon in the context of its three main subway stations. We aim to examine the evolution of this main boulevard in terms of its buildings, taking into account the several crucial development periods of Lisbon's subway system.

How can the transportation systems, namely the subway system, condition the development and growth of the city? How will it interfere with the social and economical factors of the city policies? How does the subway change the urban fabric, connecting (or eventually disconnecting) different city areas? These are some of the questions that this study aims to answer.

The subway constrains and promotes simultaneously the territory development. It is in itself a process of urban renewal. The subway growth gives rise to new forms of centrality, acting as an attractor for new city usages, according to the location of subway stations. This role of the subway can define different typologies, with places suited for services, commerce, and office buildings, residential, among others.

This research aims to contextualize the city growth at those dates with the subway expansion. In the inauguration date of the subway (1959) the stations of Entrecampos, Campo Grande, and Saldanha open their doors to *Avenida da República* forcing changes in the boulevard uses and stimulating its growth. The development of this subway line, the relative importance of its stations would see changes in their centrality that would then have several implications on the boulevard identity, mainly in buildings facing the boulevard.

Objectives

The main objective of this research is to study the changes suffered by *Avenida da República* through time, taking into consideration the crucial periods of the development of

mass transit systems in Lisbon, namely the transformative implications of the construction of the Lisbon subway.

This was accomplished also with the fulfilment of secondary objectives in the study of *Avenida da República* such as: i) the Identification the buildings that are still intact since their construction; ii) the identification of the architects that took part in the different phases of its growth; iii) the evaluation the impact of the construction and expansion of the subway of Lisbon; iv) the Identification of the reasons for the demolishing of buildings seen between 1959 and 2014.

Related Work

There have been several methodological contributions to the study of the city of Lisbon, and in particular for the study of the new avenues (*avenidas novas*) and the *Avenida da República*. Those contributions are based on different approaches ranging from urban history (Dá Mesquita e Serrano, 2007; Silva, 2006), to urban design (Sampayo, 2003, 2011, 2012), to infrastructural analysis and network analysis (Rodrigues and Sampayo, 2009; Derrible, 2012).

Dá Mesquita and Serrano (2007) in “Construção Moderna” performed an extensive analysis of the different aspects that are involved on the development of the city plan in the early XX century, which are crucial to the present study. The authors state that in this period the city development had little dependence on the city plan once the power of decision belonged to the owners. Thus, they describe that the urban intervention is regulated by “special solutions whose technical and strategic value superimposes the construction of an image of the city established earlier - translation by the authors” (Dá Mesquita e Serrano, 2007, p. 69).

Silva (2006) presented the new avenues as “an efficient picture of Lisbon development in the latter part of the XIX century - translation by the authors” (Silva, 2006, p. 127) referred to the industrial era. Accordingly to the author the Parisian-like Boulevard was the main reference to inspire the connection between *Campo Grande* and the ancient *Passeio Público*. However, she states that the quality of the architectonic solutions adopted was inferior when compared to the great quality of the urban project (Silva, 2006, p. 127). This fact is still visible today on the buildings along the *Avenida da República*.

Previous studies by Sampayo (2003, 2012) analysed the urban form and its public space, showing that Lavedan’s plan permanence law is observed in several urban locations through out history. The new avenues plan is one more example where this can be observed.

In Derrible (2012) work entitled “Network Centrality of Metro Systems” the author studies the subway systems of several cities using a network analysis based methodology, namely in terms of traffic. For this the author analyses the *betweenness* (Freeman, 1977) of 28 subway systems across the world to understand the regularities and trends in centrality as a function of the subway system size.

Rodrigues and Sampayo (2009) showed the role of Closeness and *Betweenness* in the subway of Lisbon in the period spanning from 1959 to 2009. The authors produced a comprehensive analysis of the different stages of the subway expansion measuring the network properties of interest for the study of the urban form. This work expands the work of Rodrigues and Sampayo (2009) by extending the study to the upmost recent transformations of the subway network.

Methodology

The methodology used for this research is based on four steps: i) research in archives for material gathering; ii) production of building report cards from gathered material and direct observation (when possible); iii) graphical analysis of the cartography and maps, and iv) data

interpretation.

In the archives research (Arquivo do Arco do Cego, Arquivo Fotográfico e Arquivo Intermédio da Câmara de Lisboa) several maps were identified and dated to different periods. A comparison between these maps proves the evolution of the buildings through out the years.

The building report cards were produced for the buildings of *Avenida da República*. These include: i) images of the built structures before the building and of the existing ones, ii) dates of construction, demolition and reconstruction, iii) functional description of the building, iv) number of floors and v) author of the project.

These report cards allowed the construction of a historical timeline about the evolution of the boulevard. This timeline highlights the changes that it suffered through its history.

The graphical analysis of the existing cartography was done using software systems for Geographical Information Systems (GIS) and Computer Aided Design (CAD). The usage of these two software programs helped in the understanding of the *Avenida da República* growth over time. Both software systems allow for complimentary analysis of the boulevard allowing a quantitative analysis of spatially defined data.

In this study of the development of *Avenida da República* four dates were taken into particular consideration: 1908, 1950, 1970 and 2014. i) 1908 corresponds to the initial phase where the initial plan of the city blocks is defined by the construction of the main avenues that support the plan and the initial constructions are built; ii) 1950 is the phase just before the start of the construction of the subway in *Avenida da República* where one can observe the big developments since the 1908 city plan; iii) 1970 in this phase, after the subway construction in the avenue, its when the roads, sidewalks and some city blocks suffer some minor rearrangements; finally iv) 2014 corresponds to the present situation, where all city blocks are fully occupied.

In the data interpretation step, the analysis was aided by two software packages: GIS and visone (Brandes and Wagner, 2004). GIS was used for spatial quantitative analysis of the maps and visone was used for the topological analysis of the network of the Lisbon subway system.

This methodology allowed the confrontation of the data obtained for the evolution of *Avenida da República* and the subway expansion.

Avenida da República

The growth of Lisbon in the XIX century arrives on a later stage when compared to other European capital cities.

The idea of planning the modernization of Lisbon begins to take shape in the latter part of the XIX century. In 1864, it is created the Ministry of Public Works (*Ministério de Obras Públicas*) with the aim of creating a plan of general improvements. However, that plan ends to be formulated by the municipal chief engineer Pierre-Joseph Pézerat (1800-1872), in 1865, entitled “*Mémoires sur les études d’amélioration et embellissement de Lisbonne* - translation by the authors”. On this work Pézerat describes “a strategy to apply in Lisbon similar to the one adopted in Paris by Haussmann - translation by the authors” (Paixão, 2007, p. 107), in which are included plans for a sewerage system and water supply plan, with the main purpose of “renewing the urban design of the city and of improving the existing infrastructures translation by the authors” (Paixão, 2007, p. 107). However, the proposals presented by Pézerat would end by being rejected by the city council of Lisbon, “who considered them unrealizable and utopian in a time when the city council was dealing with economic difficulties - translation by the authors” (Paixão, 2007, p. 107).

With the need of expansion came the necessity of a new urban design plan for Lisbon. Consequently, it was asked to Frederico Ressano Garcia to formulate the expansion plan. Ressano Garcia finishes his studies in engineering, in 1869, at the École Imperiale des Ponts et Chaussées of Paris. He returns to Lisbon and starts working at the city council as a municipal

chief engineer using the work of Pézerat as a starting point.

In 1888, it initiated the expansion of the city from the Ressano Garcia's plans with all the ideas inherited from Paris. The expansion project presented had the main purpose of congregate the previous plans in order to create a fluid and fast connection to the river. It also intended "to endow Lisbon of new residential blocks with efficient internal articulation and capable of stimulating the external environment - translation by the authors" (Silva, 2001, p. 60). The plans correspond to "an area defined by the topography and by the configuration of a future block - translation by the authors" (Lamas, 1993, p. 221). According to Ressano Garcia, the narrow streets of the ancient Lisbon and the interior of the blocks were poorly ventilated and illuminated.

In the planning Ressano Garcia decides to include some hygienization ideas with emphasis laid upon the regularization and enlargement of streets, the integration of a sewerage system and a water and electricity supply system, and the plantation of trees. The latter consisted in long central bands of trees along the avenues so that the public sidewalk could be adapted to the residential area around.

The foundation elements used in the creation of a new image of Lisbon were "the grid, the convergent square, the blocks and grid typologies as the reticulated grid translation by the authors" (Lamas, 1993, p. 224). The blocks were divided in plots that could have been used to build different kinds of buildings. The plots were sold mostly depending on its location in relation to the most important avenues. This organization method gave origin to a discontinuous development of buildings and of the plots occupation.

In contrast to what happened in the planning of *Baixa*, a block of Lisbon, the new avenues did not have an architectural development plan. The absence of restrictions in terms of construction gave origin to diverse kinds of buildings along the avenues. This fact is also referred by Silva (2006), as mentioned earlier, as she states that the poor architectural planning when compared with the great quality urban design planning, are one of the characteristics that one is still able to observe on today buildings present along the new avenues. In the late 1930s the expansion plan was not finished, as there were still some plots of land in the *Avenida da República* free to build on. However, there were already some building demolitions registered.

Analysis of Lisbon's subway network: 1959 – 2012

The development of a subway infrastructure plays a revolutionary role in the growth of a city. On one hand the subway follows the development of the urban fabric, on the other, it acts as the driver for the renewal of the latter.

In this case study it was shown that the subway was the main factor by which the *Avenida da República* saw major changes, mainly in terms of its buildings.

The first initial subway line of 1958 foresees a great city development encompassing the urban fabric of the new avenues through an axis starting in *Marquês de Pombal* and bearing *Entrecampos*.

Since 1959, the subway network has gained complexity being composed by four lines, 55 underground stations for a total of 43km. Of these 55 stations only 49 represent a "place" in the city of Lisbon (the remaining 6 stations are the result of the unfolding of existing stations due to crossings of two subway lines). Figure 1 shows that the majority of the expansion of the subway occurred in 1998 and 2004 as consequence of two major international events (World Exhibition – Expo 98 and the European Championship of Football in 2004).

As a consequence of the expansion of the subway networks, existing stations reflect that expansion in terms of the traffic to and through them. Considering the subway network as a graph composed of nodes (stations) and edges (connections) one can study the *betweenness* and the *closeness* of every station in this graph (Rodrigues and Sampaio, 2009). *Closeness* gives

the level of proximity a certain node is from all others, while the betweenness represents the role as intermediate in traffic between other stations.

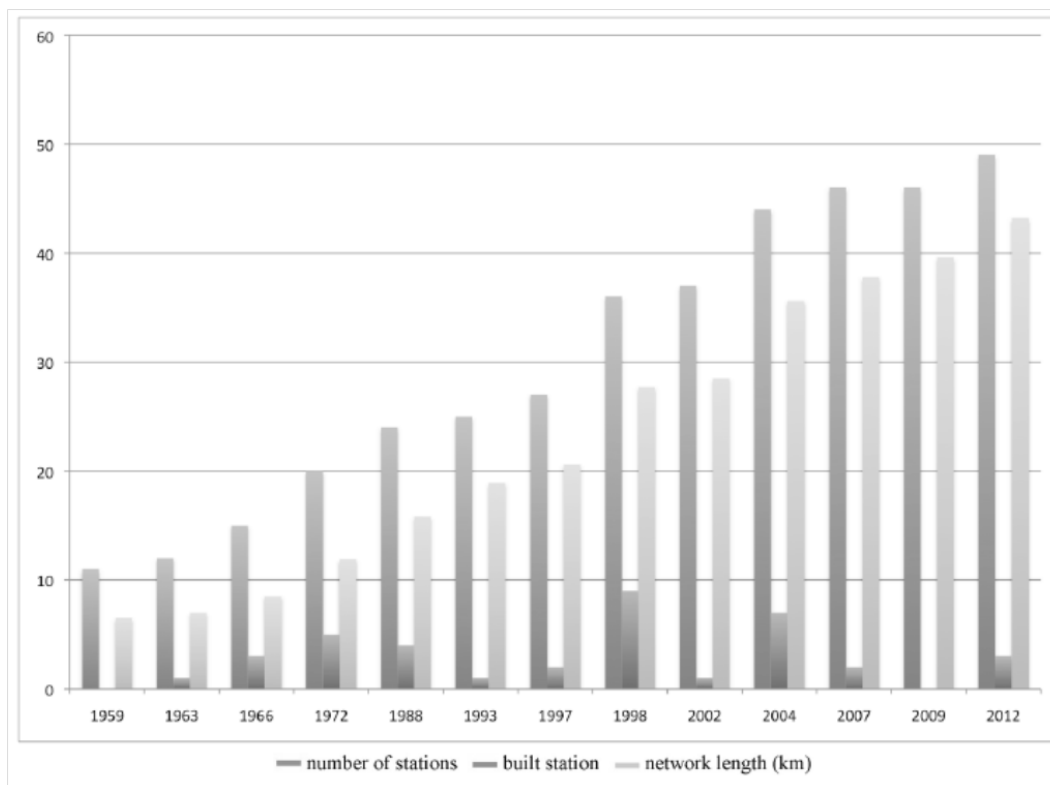


Figure 1. Expansion of the subway occurred in 1959 and 2012.

Focusing on the stations that are directly situated in *Avenida da República* (*Entrecampos*, *Campo Grande* and *Saldanha*), all of which exist since the opening of the network, the role of the subway as driver of the renewal of the urban fabric was studied. In particular, it was important to show the subway changed the buildings in plots facing the avenue. To avoid boundary definition problems in the analysis this subset of the network was extended by one station in each direction of the 2012 network. In *Entrecampos*, *Cidade Universitária* was added and for *Saldanha*, *Picoas*,

S. Sebastião and *Alameda* were added.

In figure 2a) the betweenness of the seven stations shows that *Saldanha* always had an important role in terms of betweenness, but after 2009 this role has been greatly enhanced by the connections to *Alameda* and *S. Sebastião*. It means that this station is now the station that potentially can have more traffic going through it. It is an important point for the flow of people in the network.

Figure 2b) shows rank of the seven stations in terms of *closeness*. It is observed that once again *Saldanha* is in first position with the highest *closeness*. This means that it is also the station that on average will be closest to any other station making this station the most central station in the network. It is observed in this situation that *Picoas* also is highly ranked (4th place) in terms of *closeness* and that it had in the past higher ranking than *Saldanha* (mainly because it was connected to what was for many years the most central station, *Rotunda* (Rodrigues and Sampayo, 2009)).

Figures 2c) and 2d) show the evolution of the values of betweenness and closeness for the top 10 stations in the entire network ordered by the 2012 values. It is clear that in 2012 *Alameda* becomes almost as important in terms of *betweenness* as *Saldanha* and stations connecting to

Alameda like *Chelas*, *Olaias*, or *Bela-Vista* can now enter the top 10 in what was until now considered a peripheral area of the city. In terms of the stations of the new avenues we see that neither *Campo Pequeno* or *Entrecampos* make it into the top 10 in terms of *betweenness*, but *Campo Pequeno* ranks high (4th in 49 stations) in terms of *closeness* taking advantage of being just one connection away from *Saldanha*. *Saldanha* has become the new central station of the city after many years where *Rotunda* occupied first place.

In summary both *betweenness* and *closeness* show that the centrality of the subway network stations is shifting towards the stations of the new avenues, namely *Saldanha* and *Campo Pequeno* are becoming the new centralities of the network.

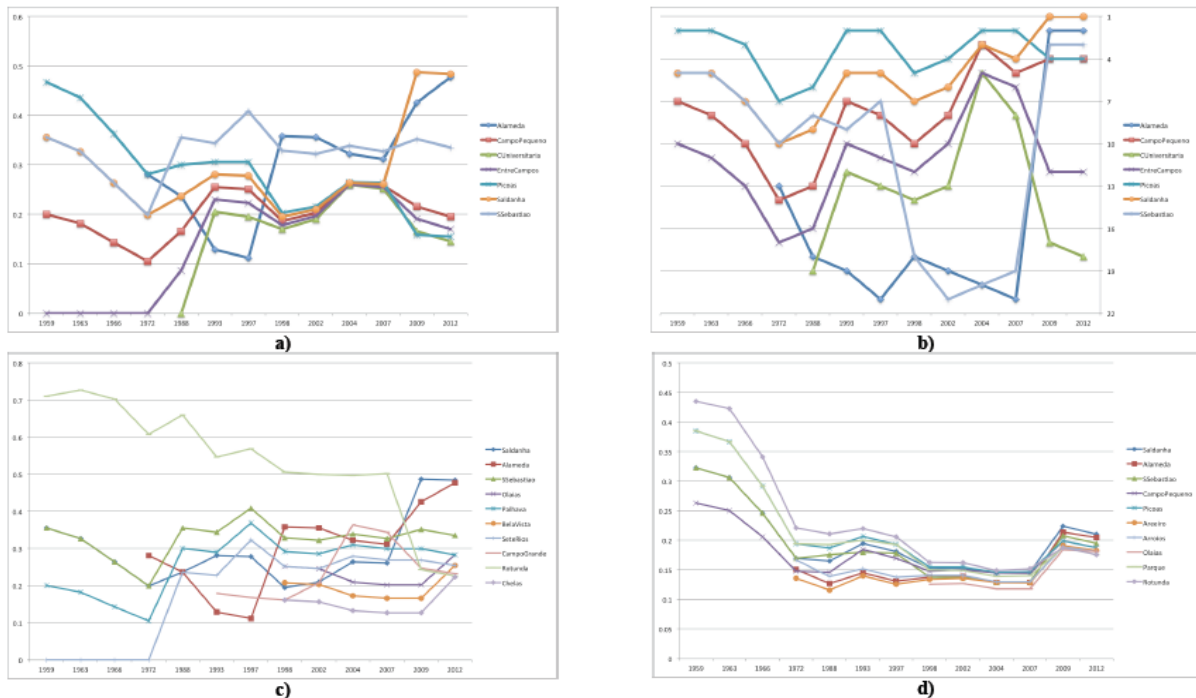


Figure 2 a) Betweenness of the 7 stations serving the new avenues; b) rank of the 7 stations serving the new avenues in terms of Closeness; 3) Betweenness evolution of the 2012 top 10 stations at different phases of the subway expansion; 4) Closeness evolution of the 2012 top 10 stations at different phases of the subway expansion.

Graphical Analysis of the 1908, 1950, 1970 and 2014 Cartography

The graphical analysis is based on the study of the different cartography found for the years of 1908, 1950, 1970 and 2014. Several synthesis drawings were generated using ARCGIS that facilitate the reading of the several timeframes of this boulevard.

This study presents a detailed analysis of the buildings in *Avenida da República* taking into account their evolution over time. The original plan for this boulevard was made in 1889, making the time frame for this span between 1889 and 2014. The buildings are characterized by the construction dates, demolition date, by the architects that designed them, by the number of storeys of the different construction phases, and by the different functions that they had over time. This research includes all the existing buildings and pre-existing buildings of *Avenida da República*, and also the buildings of the square Duque de Saldanha and the buildings of the roundabout of Entrecampos.

Concepts

To be able to synthesise the outcomes of this research, it is necessary to explain here some concepts usually used in the context of urban form studies and that are applied in this work in the context of the study.

This research has considered the following concepts:

‘Public Space’ – this is a space not built. The public space can be subdivided in two types: i) the linear public space, corresponding to channels of movement like streets, avenues and ii) the non-linear public space, corresponding to the places of staying like squares and ‘largos’ (Sampayo, 2011:69). In summary the public space is made of all the circulation space and the permanence space in the urban form. It is always made with the aim of solving questions related to the urban design.

‘City block’ – It is an element that can generate and be generated by the urban fabric. The city block has the particular characteristic of being a regularity, a structure, in the urban layout. It is in this way important in “the local concretisation of a certain model of city, in the conception of ways of life, in the shaping of the space and the architecture that builds the city...” (Coelho, 2013, p. 123, translation by the authors).

‘Avenue’ – It is an important public space of the urban agglomerate. It integrates the two types of public space: the linear public space and the non-linear public space. An avenue is usually designed in a very linear way and with great width, integrating both circulation and permanence spaces. Usually they are closed by the buildings that define it and by green spaces. The avenues gain particular importance in the urban fabric because of their ability to integrate buildings of major importance (commercial, monumental or cultural) usually at their endings.

‘Plot’ – It is a space of land “representing a land-use unit defined by boundaries on the ground” (Conzen, 1969, p. 128), usually with a regular shape (square, rectangle or other), that when associated with other plots defines a zoning area (Merlin and Choay, 2010, p. 448). The plot existence doesn’t imply its occupation by buildings in all its area.

Phases of the Evolution of the Urban Fabric of the New Avenues

The graphic timeline in (Figure 3) illustrates the evolution of the urban tissue in the new avenues and the integration of new grids adjacent to the initial plan. Only the streets that gave origin to the blocks were sketched. The original surroundings on the central area of the plan were not considered.

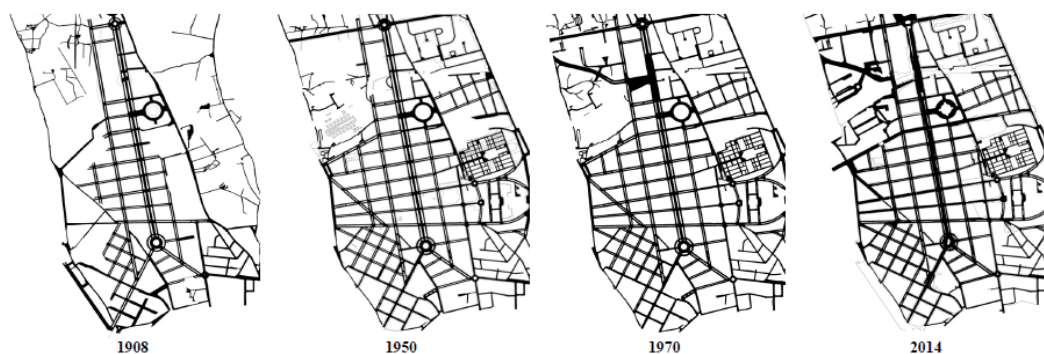


Figure 3. Urban fabric development of the new avenues around Avenida da República.

In 1908, the avenues grid was not fully defined yet. Important avenues such as the *Avenida de Berna*, the *Avenida das Forças Armadas* and the *Avenida Duque de Ávila* were on an early stage of development not creating significant hierarchies on the grid. On the borders of the plan the

grid is defined by considering the existent road network, which causes the appearance of blocks with different shapes.

In the plan of 1950, the project of the new avenues was finally concluded. Adjacent to the initial plan emerge new grids that highlight other influent avenues as the *Avenida Duque de Ávila* and the *Avenida Miguel Bombarda*. It can also be observed the extension of the *Avenida Praia da Vitória* Boulevard adjacent to the square *Duque de Saldanha*.

In 1970, the evolution of the grid does not present significant changes. Nevertheless, it is worth mentioning the introduction of new roads near the *Feira Popular*.

Finally, in the scheme of 2014 the grid is completed and consolidated. The most influent avenues as the *Avenida de Berna*, the *Avenida de Duque Ávila*, the *Avenida Miguel Bombarda*, the *Avenida das Forças Armadas* and the *Avenida da República* no longer present the sidewalk as a central band.

The blocks

The analysis of the growth of the different city blocks (Figure 4), can be made by comparing the following periods: 1908, 1950, 1970 and 2014. It was observed that the blocks had a slow evolution. In 1970, the most part of the blocks was still not completely defined.

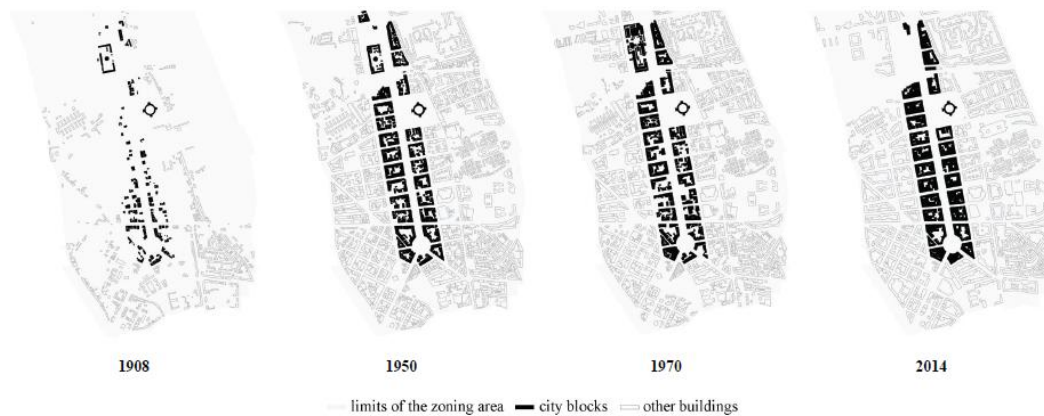


Figure 4. City block evolution in Avenida da República.

In the 1908 chart, it is noted that the building development in the *Avenida da República* begins south close to the square *Duque de Saldanha*. The building development at north near *Campo Pequeno* and near *Mercado do Gado* can be considered as residual.

In 1908, south of the *Avenida da República* some blocks were already completed. Those blocks also define the first great perpendicular boulevard named *Avenida Duque d'Ávila*.

When comparing the charts of 1908 and 1950 it is observed that in the latter the blocks were almost completed. In the front blocks to the *Avenida da República* there were no plots left to build on. Nonetheless in 1950, it is still possible to find some free plots in the secondary avenues adjacent to the *Avenida da República*.

In 1970, the blocks undergo some modifications with the appearance of new empty spots. The demolition occurred mostly on blocks frontal to the *Avenida da República* and not so much in the secondary avenues as visible in the 1950 chart.

In 2014, it is observed that the blocks were finally consolidated as there no more free plots to build on. It is also possible to observe that construction grows out to the block interior, thereby occupying the remaining large empty spots.

The Buildings

As previously mentioned, the plan is developed from South towards North. This growth direction is clear by taking into account the density of existing buildings in the southern part of the area during the initial years of the avenue (Figure 5). In any case, the small number of buildings in the avenue in 1908 is not totally relevant for the future layout of the city. The 1908 plan already shows the city blocks adjacent to the avenue, allowing an understanding both in terms of its length and its width.

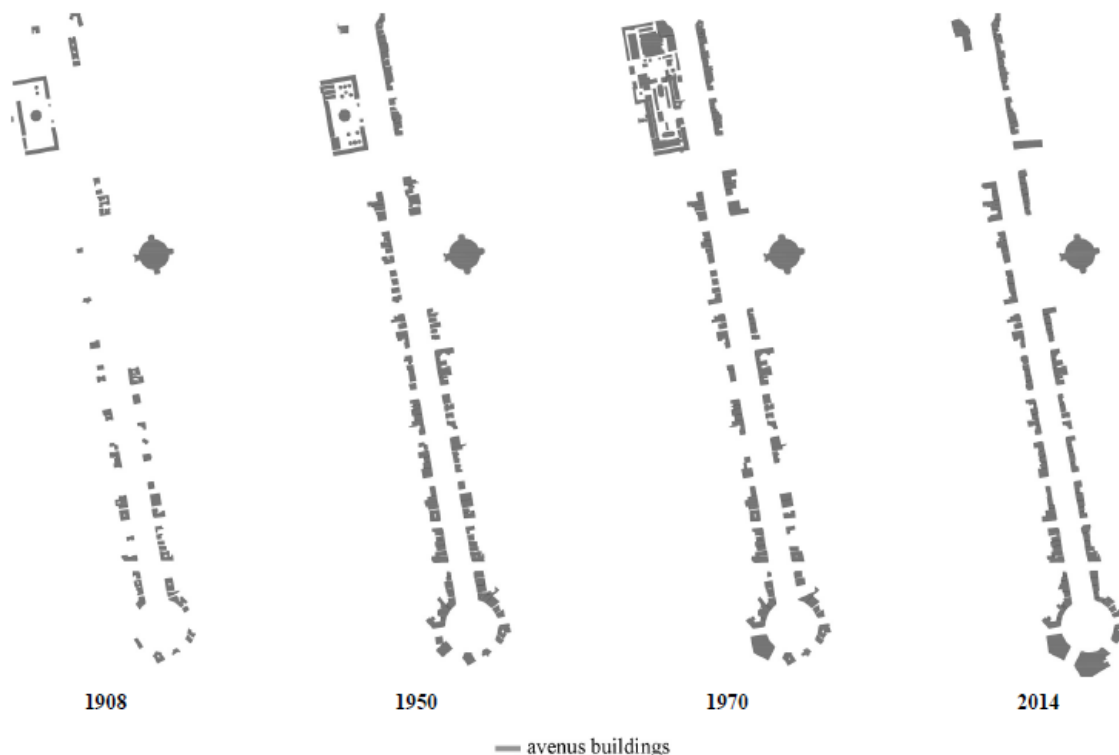


Figure 5. Evolution of buildings in the plots of Avenida da República.

The buildings of this phase are sparse and only in rare cases one observes plots being merged into a single construction. Buildings present diversified architectural characteristics namely the varied depths of construction into the plot and the varied sizes of the frontages.

In the plans of 1930 the buildings are not so far apart. The limits of *Avenida da República* are finally established. In this period all the plot sides facing the avenue are now built. Each city block pacing the avenue has between 3 and 13 plots facing the avenue, but the majority of them show an average 5 or 6 plots. In the 1950s it is observed that all the construction is made without voids between consecutive plots.

By the 1970s some of the constructions start to disappear and some plots facing the avenue become empty again. Some of these plots are merged with others and in some cases the total size of the frontages and the plot depth are extended.

In the present all the plots facing the avenue are built and one can observe that cases where plot merging and subsequent increase of frontages happened.

City blocks have now between 1 and 10 plots and the majority of the city blocks now present 4 or 5 built plots.

Comparing the map of the avenue (found in the archive of Arco do Cego), from 1902, with

the survey made by Silva Pinto (map of 1908), in terms of the number of plots sold, one can conclude that in 1902 there was a regularity in the drawing of the plots that is not observed in 1908. In the 1902 map the plots facing the avenue in the middle of the city blocks had identical dimensions while the corner ones were bigger. It is natural that some owners bought more than one plot and by 1908 the map shows a variety in term of the sizes of built frontages.

Building Height

When analysing the photos of buildings of that time one observes that those buildings presented no more than 5 or 6 floors. Nowadays, the buildings present in general more than 10 floors. From the 1950s until the 1970s, the number of floors increases significantly from 8 to 20 floors.

The schemes presented correspond only to the year of 2014 (Figure 6). The first one illustrates the buildings with 1 to 5 floors and identifies the buildings of the first phase of development of the *Avenida da República* from 1880 to 1920. The second scheme illustrates the buildings with 6 to 8 floors (from 1930 to 1950) and the third scheme illustrates the buildings with 9 to 20 floors (from 1970 to 2014). Finally, the forth scheme sums up the previous ones.

Today the most part of buildings with 10 to 20 floors are located on the block corners along the boulevard.

It is worth mentioning that the buildings nearer the subway stations are generally the buildings from the period between 1889 and 1950.

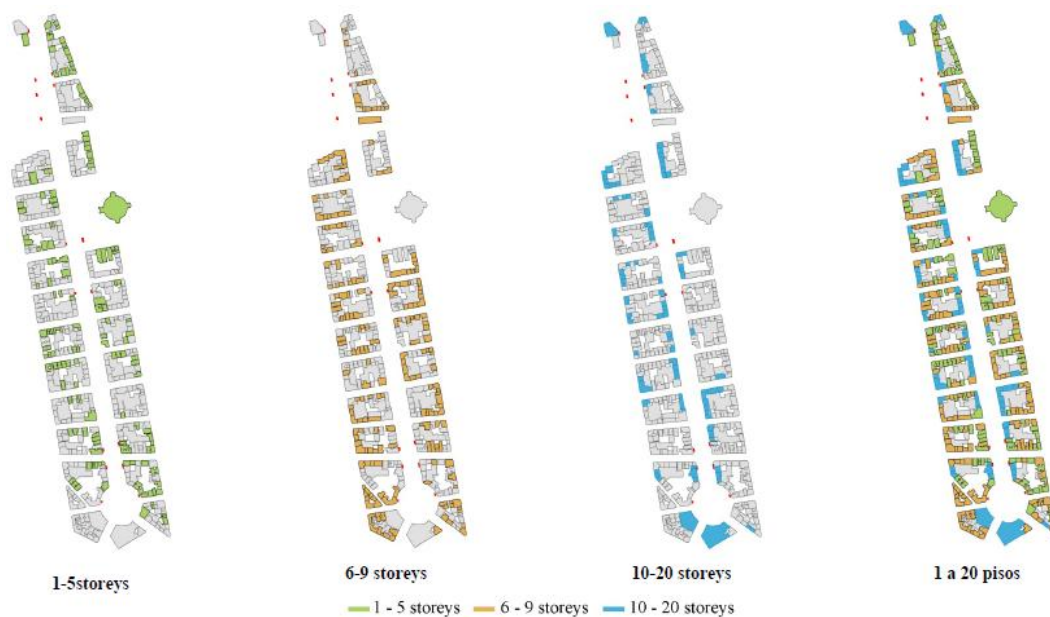


Figure 6. Number of storeys of the buildings in the city blocks adjacent to Avenida da República in 2014.

Function of the Building

Initially the most part of buildings of the *Avenida da República* were residential buildings. The buildings for business function were only introduced at the late 1950s. Figure 7 illustrates the function of the buildings as it is today.

Nowadays residence and business buildings occupy the front of buildings to the *Avenida da República*. On block corners near subway stations and bus stops it is possible to find mostly business buildings whereas on the central part of block fronts are present both business and residential buildings.

At the square *Duque de Saldanha* is where the buildings present the highest number of floors (Figure 6). Those buildings are mainly occupied by the third sector activities due to the eased access to public transportation systems.

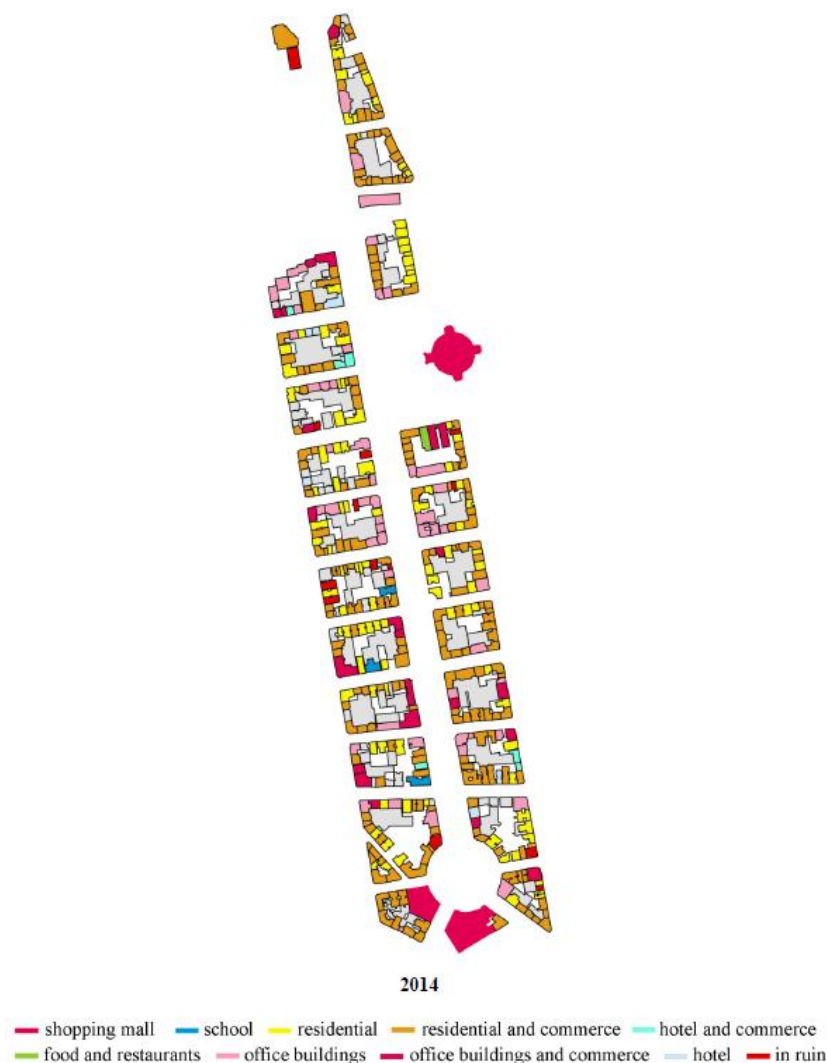


Figure 7. Present function of buildings in the city block adjacent to Avenida da República.

Building Preservation State

The building preservation state, when considering the façade, was divided into 6 different classifications: i) 'Well preserved' – new building or not presenting any kind of anomalies; ii) 'Preserved' – building with some anomalies due to lack of maintenance; iii) 'Degraded' – building with severe anomalies; iv) 'Highly degraded' – Vacant buildings (inhabited); v) 'In construction' – Building in construction from the scratch; v) 'In restoration' – Building in restoration.

From the data collected in the beginning of 2014, 38 buildings were classified as 'well preserved', 60 buildings as 'preserved', 7 buildings as 'degraded', 4 buildings as 'in construction' and 3 as 'highly degraded' (Figure 8).

The buildings in better state of preservation are generally located on block corners. The buildings classified as 'preserved' are located mostly on the central part of block fronts. The

‘degraded’ and ‘highly degraded’ buildings are still from the early beginnings of the *Avenida da República* development.



Figure 8. Present condition of the buildings facing Avenida da República

Urban Void and Green Structures

In addition to the building evolution study, it is important to mention the green spaces role on the urban design transformation through the time. Ressano Garcia's plans goal was to integrate new hygienization solutions on the new boulevards. One of those solutions was the introduction of new green structures. When analysing the existent cartography from 1908, 1950, 1970 and 2014 it is visible the progressive disappearing of green zones on the *Avenida da República* (Figure 9). When observing to old photos it is visible that the subway integration gave origin to the removal of several trees.

Furthermore, the significant increase of traffic in this area forced the introduction of additional number of lanes. The need for a better traffic flow induces a reduction on the size of sidewalks, which used to contain the most part of planted trees.



Figure 9. Overview of green space development in Avenida da República.

Conclusions

It has been shown that the new avenues organised the structure of the public space, but didn't regulate the height of the buildings, neither did they regulate the architectonic typologies that define those spaces. The city is organised by a structure based on designed voids that need to be analysed and thought off in a chronological manner. The law of permanence of the plan attests the importance of the public space structure (squares, streets) as they resist the change of time. It is clear that the plan of the new avenues allows for the introduction of new rules over time that will improve its composition. Those new rules will weight in the typologies, the facades and the heights of buildings.

Ressano Garcia incorporated Haussmann social and urban sanitation and hygienisation ideas in the plan, but war more respectful of the existing urban features. He opted to keep and linearize many of the existing roads (some resulting from stigmergic foot paths), and chose to consider the particularly heterogeneous topography of Lisbon. With this balance this plan can is considered as a good illustration of urban design.

The subway and the stations built in Avenida da República (Entrecampos, Campo Pequeno e Saldanha) have a big role in the renewal of the buildings of the avenue. Saldanha always presented a high betweenness but has since 2009 become the most important station in terms of betweenness with the connections to Alameda and S. Sebastião. Together with having the highest closeness value, Saldanha is now the most central station in Lisbon with the most potential to see traffic being sent through and to/from its station. The placement of bus stops on the surface also potentiates further its centrality, making this station and its above ground square the new central area of the city. The analysis of the buildings in this square showed only buildings in normal and good conservation states. Nearby Saldanha station it is clear that a greater renewal and construction effort was made. This is in part justified by the role attained by the subway station over time being the most central station in Lisbon (just followed by Alameda).

In Avenida da Liberdade it was observed that Campo Pequeno is also becoming one of the most central stations of the network with positive effects on the renewal of the nearby plots. Near the Entrecampos station no particular changes were observed in the buildings in the past few years. This is in accordance with the lower values obtained for the centrality measures of the subway network.

This work also verified the law of the permanence of the public space through a reading of the cartographic material form 1908, 1950, 1970 and 2014 for Avenida da República and it was shown how the evolution of the buildings in the avenue are consequence of the expansion of the Lisbon's subway network.

Acknowledgments

The authors are thankful to Dr. David M. S. Rodrigues of The Open University, United Kingdom, for his mathematical insights and discussion on the subway network expansion measures. The authors are thankful to the students of architecture Sara Albuquerque e Pedro Baptista from the Lisbon University Institute, Portugal, co-authors of Carina Silvestre in the production of images 3, 4 and 7 for allowing their publication in this paper. The authors are also thankful to Mr. João Salmim Ferreira for his help with the translation of the document.

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Urban chronicles: exploring the evolution of the entrepreneurial disposition of Coimbra's periphery

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Abstract. *This paper is intended to assess if the roadway infra-structuration of the peripheral areas of the Coimbra municipality (Portugal) plays a significant role as an engine of urban reorganization and territorial cohesion in the perspective of the long-term evolution of municipality's morphology and land use. To achieve this aim we examine the eastern parishes of Coimbra, long known for their industrial and entrepreneurial character, though the delineation of a longitudinal dataset on the human appropriation of their territory. The methodology entails the construction of chronological series of axial maps of the area, which are associated with satellite images from the Global Land Survey Landsat and data collected from the Portuguese national registration of corporate entities. The combined analysis of these informations permitted to identify the morphological parameters of change and continuity that are responsible for the maintenance of the economic strength of these parishes throughout the years, and to summarize the reasons for their success inside Coimbra municipality.*

Key Words Coimbra periphery, roadway infra-structuration, economic strength, Space Syntax, Landsat

The ordinary way of life

Ordinary, banal or mundane are words that are rarely used in the architectural academic field to describe something that is worth studying. Nonetheless, ordinary, banal and mundane may well be the words that best convey the reality of both the western contemporary architecture and the western contemporary urban development system.

Described as “emphatically un-monumental, anti-heroic, and unconcerned with formal extravagance” (Harris, 1997), these everyday architectural pieces and their surrounding urban spaces are much more devoted to serve people's necessities on every aspect of human life as it is routinely lived, than to fulfill people's desires for a certain aesthetic pattern in their lives.

In his 1987 essay “The Everyday and Everydayness”, Henry Lefebvre argues that the notion of “everyday” is a product of the contemporary world, “the most general of products in an era where production engenders consumption, and where consumption is manipulated by producers” (1987: 9). Therefore, “everyday” is “the most universal and the most unique condition, the most social and the most individuated”, but also “the most obvious and the best hidden” of our time.

In fact, the never ending repetition of gestures of human life, whether commuting, working, consuming, or having leisure time, is itself most of the times taken for granted, somewhat like as it was as natural as the cycles of nature, such as day and night, hunger and satisfaction, activity and rest or life and death. Nonetheless, these ordinary everyday actions are in fact deeply related to the space where they take place; they are products of the human-constructed space that hosts them and permits their occurrence (Lefebvre, 1995). Plus, all such actions and human relations have in common a general law of functionalism, a stipulation of a certain range of functions, ordered according to the legibility of the forms and structures that serve them, creating this way, a system of mutual support.

This mode of spatialisation of the society is arranged in a system of different types of networks, both physical and intangible that occur at every moment, continuously, and infinitely. The type of network that this paper addresses is the mobility network of goods, people, energy

and information (Ascher, 1995), which creates various types of systems of interdependences and relations, both at global and local scales.

This network reality is described by Castells (1993) as a “space of flows” and is explained by Delalex (2006: 62-65) through its four main features:

1. It relies on the simultaneous coexistence of events and social interrelations more than on their contiguity in space. This spatial form of interaction is constructed from social relations that are detached from the physical contiguity and live in the space of flows;

2. It is supported by a series of global infrastructures used to carry both hard copy information (through transportation infrastructures like motorways, airports and mail) and electronic signs (through co-axial cables, fibre-optic cable or satellite) (Lash and Urry cited by Delalex, 2006: 63);

3. It is simultaneously concentrated and dispersed. Delalex explains that cities tend to develop as loosely interrelated exurban constellations that emphasize long distance interdependencies and minimize the role of territorial contiguity. On the other side, certain types of organizations, namely those related with economic activities, tend to concentrate in areas that have greatest access to advanced infrastructures of communication, at relatively affordable costs. The geography induced by the space of flows is therefore neither an effect of concentration, nor an effect of dispersion, but an intricate association between the two.

4. It's geometrically varied and the absolute geographical position of the objects is less important than their position within global networks. The geographical hierarchy is by no means definitive or stable, which implies a great flexibility and adaptability to the potential and requirements of the network of flows.

The following sections will explain how these assessments materialize in our case study.

The Coimbra municipality as a case study

Paraphrasing Lefebvre, the study of the banal isn't necessarily itself banal (1987: 9), since the ordinary that is present on the human life also encompasses the extraordinary that we can't (or ignore how to) appreciate. In this sense, both stressed citizens and unwary investigators may miss out the relevance of the everyday urban infrastructures, depreciating or devaluing their power in maintaining the contemporary pattern of urbanization, which this paper tries to tackle.

Hypothesis, aim and context

We believe that the characteristics of the mobility networks of goods, people, energy and information (Ascher, 1995) is relevant for the expansion and functional polarization process of new urbanized areas, pattern of urbanization of increasingly importance in contemporary occidental cities. We also believe that functional urban polarization is better understood if analysed through the forces that act on the actual processes of the territorial structuration.

In fact, the study here presented is part of a wider research that aims at discussing the role of high speed roadway networks as structuring elements of the new centrality systems located in the periphery of the traditional, compact urban centres. This way, we evinced (Tavares, 2013a) that roadway infra-structuration is an important mechanism of territorial cohesion at the periphery of the Coimbra municipality, in Portugal. We also tested the roadway infra-structuration attraction role for a diversified set of urban equipment that prioritizes the connection to the transportation networks of people and goods instead of the proximity to the consolidated urban core (Tavares, 2013b). The ensuing development of this line of investigation raises the question about how far the narratives of the observed integration and spatial connectivity of the roadway networks are in fact supported by a long-term perspective on historical evolution of the morphology of the Coimbra periphery and of its land use.

From this main proposition, the following questions arise: (i) Is it possible to reveal the morphological parameters that explain the settlement of industrial and entrepreneurial

equipment at the periphery of the Coimbra municipality? (ii) Is the pattern of urban organization and territorial cohesion around the roadway network presently observed also perceptible in the past? (iii) Is it possible to outline a chronological dataset of the industrial and entrepreneurial appropriation of these peripheral parishes?

Methodological procedures

In order to answer the questions outlined above, we opted to use a combined methodology of analysis, based on the confrontation and complementation of three different sources of information.

In order to reveal the morphological parameters of accessibility of these parishes we employed the Space Syntax methodology of analysis. In the first place, we collected the Coimbra's military cartography (sheets 229, 230, 240 and 241), which is available for the years 1947, 1984 and 2002. We chose to use exclusively the military cartography in order to guarantee the stability on the representation patterns of the territory, even if the time slot between the charts is not homogeneous. These charts were used to produce the correspondent axial maps of the municipality, from which the analysis of the Global and Local Integration and Choice variables were performed. The software used for this purpose was Alasdain Turner's Dephtmap.

We would like to stress that the scope of this study is restricted to the eastern parishes of Coimbra (São Martinho do Bispo, Ribeira de Frades, Taveiro, Ameal and Arzila). However, we decided to use the axial maps correspondent to the entire area of the municipality: an axial analysis performed partially could induce errors and reading misinterpretations due to the scale of the system itself, and also to the lack of representation of the connections with other major roadways, which we wanted to avoid.

Respecting the assessment of the parishes' pattern of territorial organization, we resorted to Esri's Change Matter website (<http://changematters.esri.com/compare>). This tool uses the US Geological Survey and NASA operated Global Land Survey Landsat data to display the Earth surface at six time epochs (1975, 1990, 2000, 2005 and 2010), in a combination of the visible and infrared portions of the light spectrum. In these infrared images vegetation appears red, water appears blue and human constructions appear grey (among other categories), which is very useful when it is necessary to detect changes, such as deforestation, fluctuations in water elevation or urban sprawl, on the landscape. For this study, the infrared images were used to uncover the modifications on urban density of the parishes.

For the study of the economic patterns of land appropriation, we used data provided by the *Registo Nacional de Pessoas Colectivas* (national registration of corporate entities, in a free translation), a section of the *Instituto dos Registos e Notariado* (the Portuguese institute of registry and notary). The collected information regarding all the corporate entities based on these parishes since the beginning of the registration (the oldest entry is from May 1930), and included, among other information, the date of their establishment, their address, the CAE (*Classificação Portuguesa de Actividades Económicas*, or Portuguese Classification of Economic Activities) and the date of their extinction. This information was processed in the form of several charts and analyzed in tandem with the axial maps.

In this respect, we should mention that the national registration of corporate entities only started to collect the "extinction date" data since 2009, reason why there are surely entities erroneously represented in some of the chronological maps. We are aware of that fact, but we believe that the advantages of using this information outweigh punctual inaccuracies that may exist in the representations.

Data analysis and interpretation

Global axial analysis

As said above, we performed the axial analysis of the whole of Coimbra municipality for the years 1947, 1984 and 2002 and the axial maps, when placed side by side, showed an ever changing territorial reality. Please note that the darkest lines on the images presented are equivalent to the red lines on the more classic red-blue colored axial representations, and are thus the most integrated ones. Also note that the lighter the lines become, the least integrated they are.

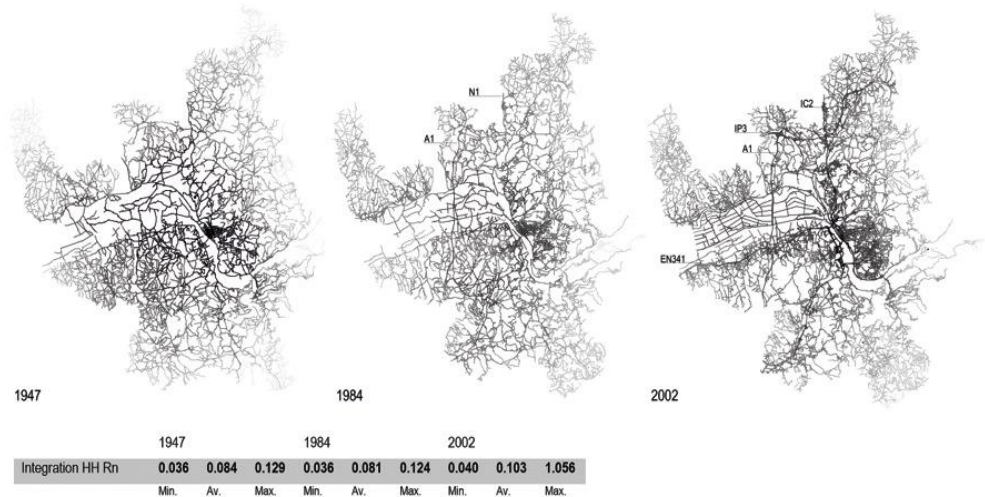


Figure 1. Global integration maps and numeric values for 1947, 1984 and 2002.

Analyzing the Global Integration maps (Integration HH) on Figure 1, it is clear that a process of urban consolidation has been taking part throughout the years. It starts with a fairly dispersed set of highly integrated routes, yet located on the central area of the 1947 map. The more elongated representation of the 1984 map follows, assuming the N1 (*Nacional 1*) and the recently inaugurated A1 highway (1982) as part of the ensemble of the most integrated roadways of the system. Finally, the 2002 map displays a more balanced urban network, encompassing a strongly connected center (that corresponds to Coimbra’s downtown, alongside the Mondego river) and strong roadway connections, represented by the N1 (that in the meantime experienced enhancements that transformed it into an expressway, now known as IC2), the Taveiro’s Expressway (the final part of the EN341, the national roadway that connects the coastal city of Figueira-da-Foz to Coimbra), the highway A1, and also the IP3 national roadway (that connects Coimbra to Viseu).

The numeric values corroborate the visual impression by displaying a drop on the average Global Integration values in the year of 1984, abrogated afterwards on the 2002 representation. This last map inclusively overtook the 1947 values, disclosing a strengthening of the global accessibility of the entire system.

Concerning the Local Integration Maps (Integration HH radius 5) on Figure 2, it is also perceived a drop on the average Local Integration values on the 1984 representation, compared with the 1974 situation. But, also in this case, both the average and maximum values of integration raise in the 2002 graphical and numerical data. In general terms, it is observable that the 1974 trend of having several well connected local agglomerates was partially lost in 1984, being replaced by a concentration on the Coimbra historic town and downtown, a similar outcome to what we observed for the Global Integration. The 1974 pattern is restored in 2002, with more peripheral agglomerates being better connected with the main roadway axis.

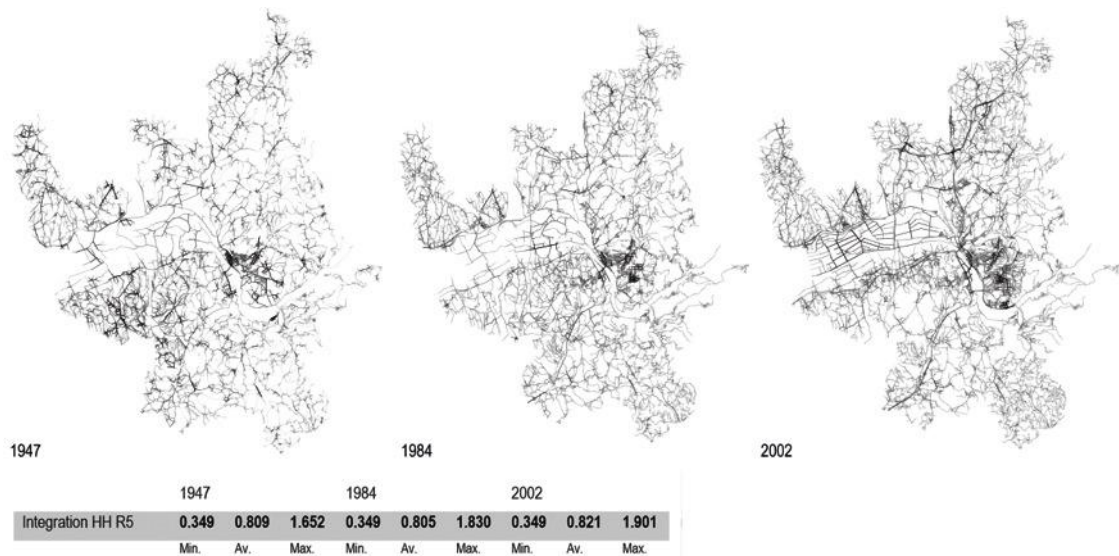


Figure 2. Local integration maps and numeric values for 1947, 1984 and 2002.

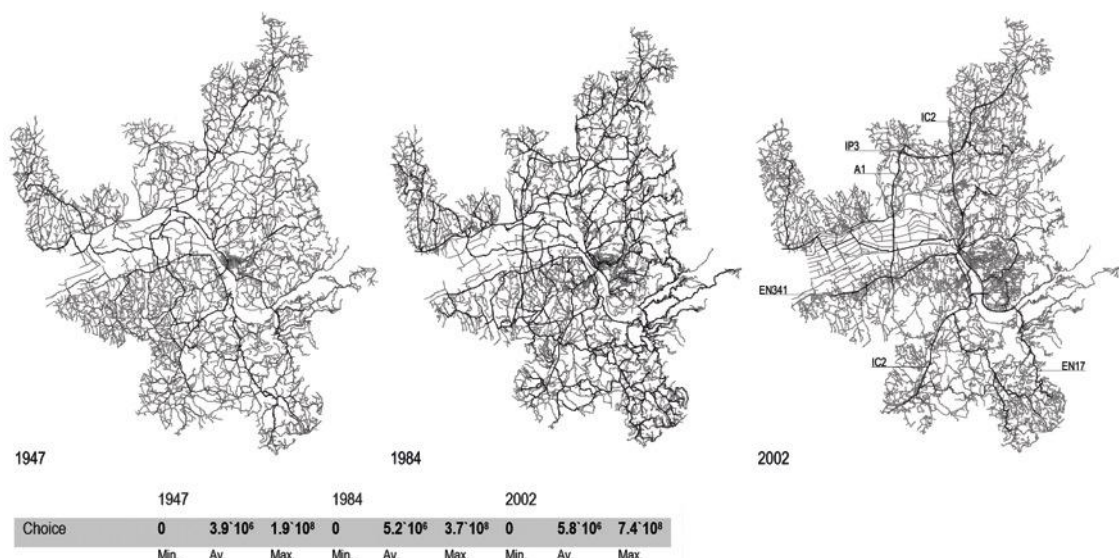


Figure 3. Choice maps and numeric values for 1947, 1984 and 2002.

The confirmation of these observations was made resorting to the Choice map and values on Figure 3. However in this case all values increase continuously over time, the correspondent axial maps reveal a change in the pattern of use of the Coimbra roadway system: in 1947 it appears to be fairly structured around a few main road axis, the ones most likely to be chosen from any given position of the system. In the next map, the polarization power of these few roadways seems to be minimized and the system appears to be more fragmented in general, as more roadways appear with darker colorations. The final map shows a return to the previous patterns of attraction, stabilizing into a representation where the main roadways A1, IC2, IP3, Taveiro's Expressway and also the EN17, also known as Estrada da Beira (that connects Coimbra to Celorico da Beira, through some important towns, such as Vila Nova de Poiares and Arganil) prevail.

To conclude the general reading of the tripartite axial analysis of the Coimbra municipality, we reckon that not only the construction of some major roadways, namely the A1 highway (it's Condeixa-Mealhada section was inaugurated in 1982) and the IP3 (inaugurated in 1995), but

also the improvement of others, particularly the IC2 and the N341/Taveiro's Expressway, had major consequences on the patterns of movement throughout the municipality and on the patterns of accessibility of certain areas. Along the years, both the new and the transformed roadways created a destabilization *momentum* that had the fragmentation of usages as a main consequence. In most recent years, with the stabilization of the roadway development and with the creation of better punctual connections with the urban agglomerates, the system regained its equilibrium, in a very similar pattern to the older one.

Morphological parameters of change

Bearing in mind the findings expressed above, we proceeded to the analysis of the eastern parishes of the municipality. We both assessed the influence the roadway networks have for the urban organization and territorial cohesion of these parishes and outlined a chronological dataset of their industrial and entrepreneurial appropriation. We zoomed the axial maps previously presented in order to have a better perception of the color gradation of their axial lines.

In the *Global axial analysis* section we identified the EN341/Taveiro's Expressway as one of the most integrated axis of this municipality's roadway system. This roadway was constructed after the publication of the 1985 *Plano Rodoviário Nacional* (the national road network plan), as a direct result of this document's recommendations for the Portuguese roadway infra-structure. On the article 11, section II of this Plan, it is stated that it should be set up a construction programme of alternative roadways to those that cross urban agglomerates (Ministério do Equipamento Social, 1985: 3208). This indeed happened in Coimbra, as the construction of the EN341 deviated traffic from the municipal roadway that served and crossed all the small agglomerates along the left bank of the *Mondego River*, freeing them from the burden and hazards of the heavy vehicle traffic.

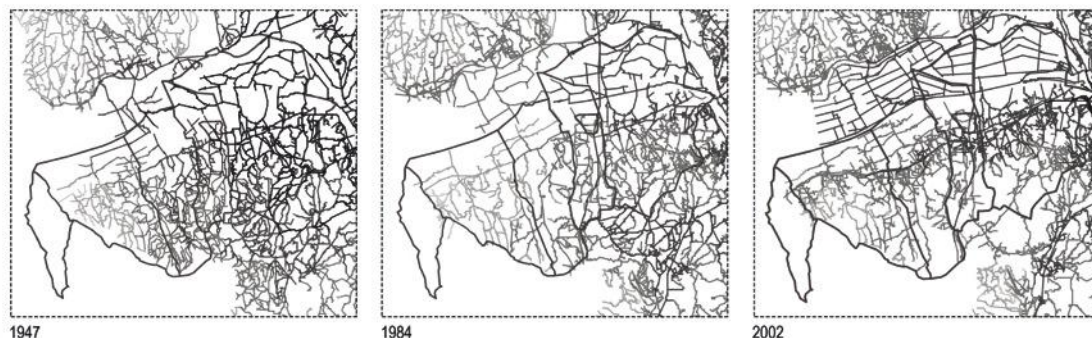


Figure 4. Global integration maps of the eastern parishes of the municipality.

This change between the 1974 and 1984 plans and the 2002 plan is perceptible on the Global Integration axial maps of Figure 4. It is particularly remarkable how well the EN341/Taveiro's Expressway nodal connection with the A1 highway seems to work, fostering the integrator power of this ensemble inside the system.

Patterns of territorial organization

Having such an extended history of constant changes, between new constructions (the A1 in 1982 and EN341 in the late 1980's) and improvements (the transformation of the EN341 into an expressway to better connect the highway exit to the Coimbra city centre, after the turn of the century), changes on the pattern of urban organization should easily be spotted. The Figure 5 is a succession of three satellite images we accessed through Esri's Change Matter website (<http://changematters.esri.com/compare>). The main feature of these images is that they were obtained by the infrared cameras of the Global Land Survey Landsat, presenting in a clear way

the differences between various types of territorial occupation. All three images are the result of the superposition of two other images, from different dates, highlighting changes on vegetation (such as agriculture, forest or meadow) and water levels (rivers and lakes or wetland for instance).

Please note that as these images are presented in grayscale, the darker coloration corresponds to vegetation decrease and lighter coloration corresponds to vegetation increase. Grey colorations correspond to absence of modifications. Also note that the first image represent the superposition of the 1974 and 1990 images, that the second are of 1990's and 2000's, and that the third represents the 2000 and 2005 images. This way, even if the dates of satellite captures don't correspond to the military charts that we used for the axial analysis, we're still able to have a complete coverage of the territorial transformations for the time period that we are addressing in this paper.

The major change we notice on the 1975-1990 superposition is a large decrease on the acreage of the right bank of the Mondego River, an area usually named as *campos do Mondego* (Mondego fields). This area is characterized by its low elevation and marshy soil and is mainly used for growing rice. The activity of the growth of rice in this area comes from ancient times, but the drop that the image shows on its cultivation may be the best proof of the change on the life and work paradigms that the adhesion to the European Union in 1986 (named European Economic Community at that time) brought to the Portuguese citizens. Another explanation for this disinvestment on agriculture may come from the fact that the construction of both the A1 and the EN 341 brought another type of territorial dynamic, with the development of modern urban conditions at the existing agglomerates and the arrival of new inhabitants, which were not as interested in farming the fertile lands of the Mondego basin as having a more specialized and well-paid type of occupation.

The 1990-2000 image shows a more localized pattern of change, especially regarding the decrease of vegetation around the roadway axis in three main areas: along the old roadway that crosses the urban agglomerates; at the Ameal and Arzila parishes; and at the area of the *Parque Empresarial de Taveiro* (Taveiro Business Park) and *Mercado Abastecedor da Região de Coimbra* (supply market), both inaugurated in the early 1990's. In this case it is clear that the motivation for the change is the infra-structuration and urbanization of these areas, which is the reality that we expected to observe.

Again the 2000-2005 image shows punctual vegetation decrease and densification of the urban area, namely on the Taveiro area (the *Parque Mondego Retail Park* was inaugurated in 2002), one of the parishes that developed the most since the early 1990's. By contrast, it is also observable a considerable increase on the farming area on both margins of the river. This fact might strike the reader for a moment, but it seems to be a natural result of recent year's assistance and support on agriculture by the Government and by the European Union, as well as of a rediscovery and "trendification" of the Portuguese national products.

Bearing in mind the readings expressed above, we feel confident to assert that there is a close relation between the roadway infra-structuration at the eastern parishes of Coimbra municipality and their territorial organization. These infra-structures, as constantly evolving entities, are inclusively responsible for the different types of patterns of territorial organization observed on different time periods.

Industrial and entrepreneurial appropriation

We also wanted to know if the roadway network of the eastern parishes of Coimbra have any influence on the settlement pattern of industrial and entrepreneurial equipment, and if this settlement pattern has been changing throughout the history. For that, we located on the military charts all the companies that have their headquarters in these parishes and that are listed at the *Registo Nacional de Pessoas Colectivas*. We then compared the result with the three Local Integration maps.

In Figure 6 we can see that right on the 1947 map, and despite having only six enterprises registered at that time, it is already clear that there is, in fact, a bond between the most accessible axial lines and their location. The same pattern is visible on the 1987 and 2002 maps, with industries and enterprises joining the others that were already set in place. However, we also observed that when they choose to settle on different locations, they tend to choose the most integrated areas of the parishes.

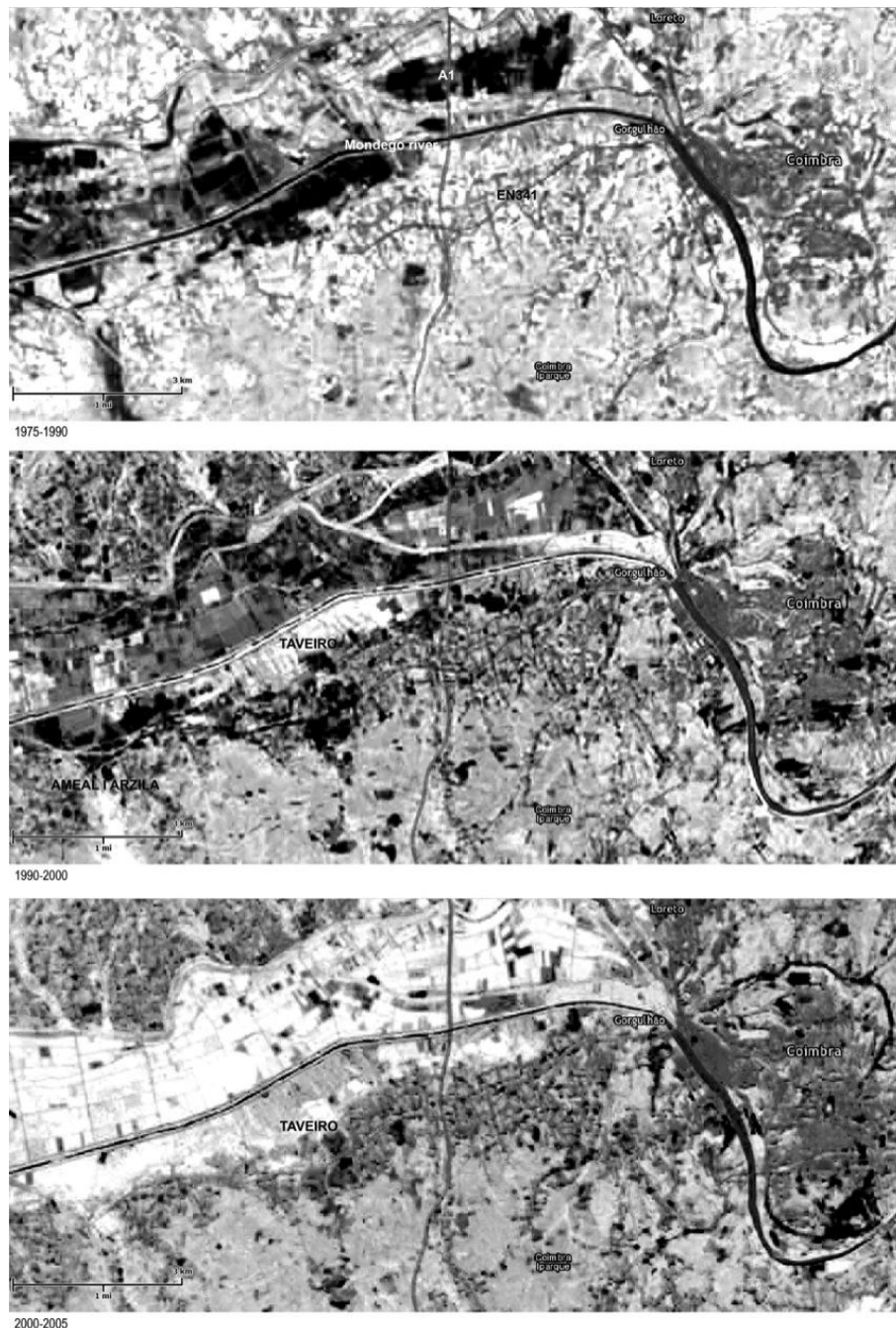


Figure 5. Landsat images of the eastern parishes of the municipality.

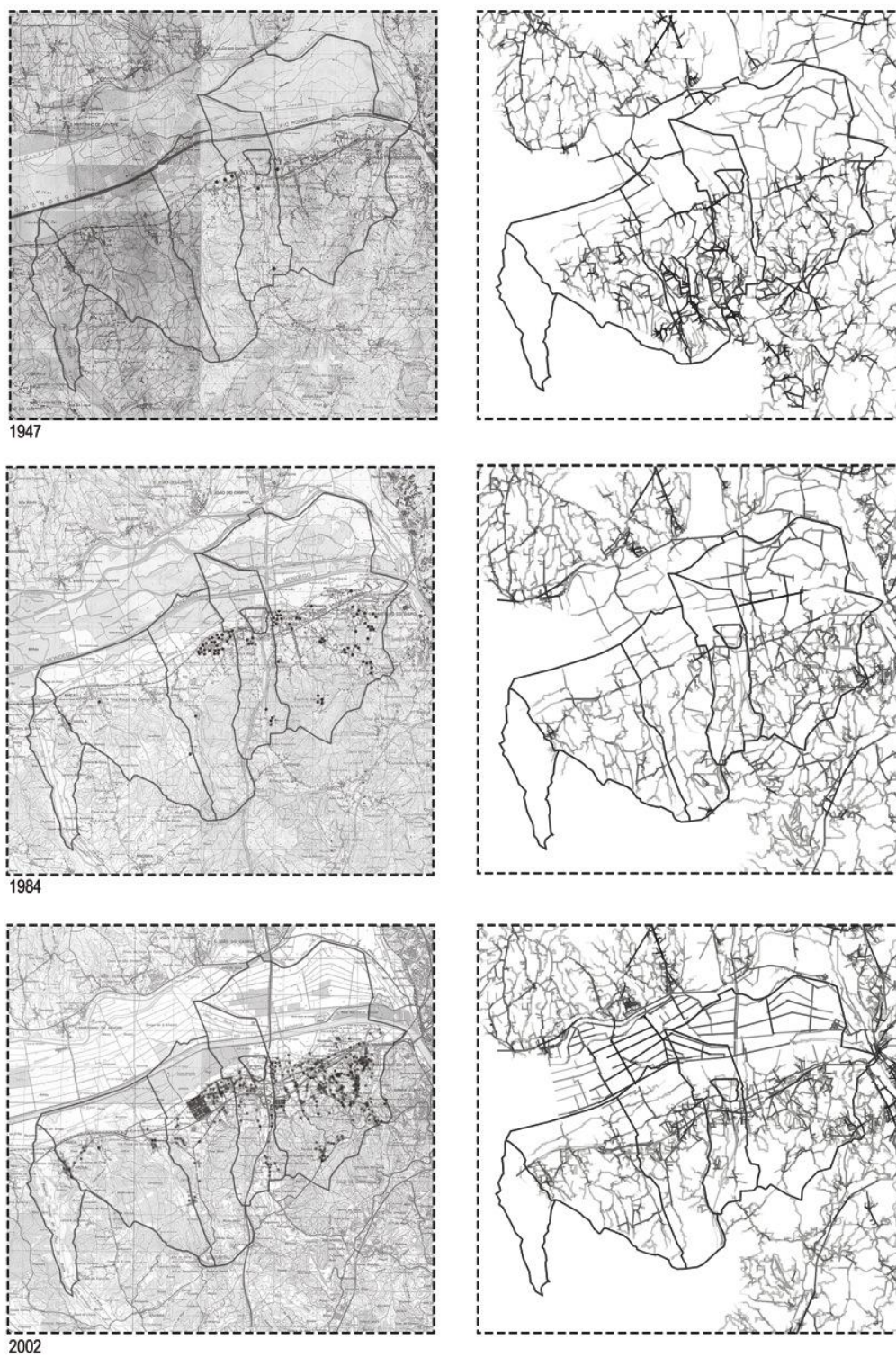


Figure 6. Location of the existing corporate entities for 1947, 1984 and 2002.

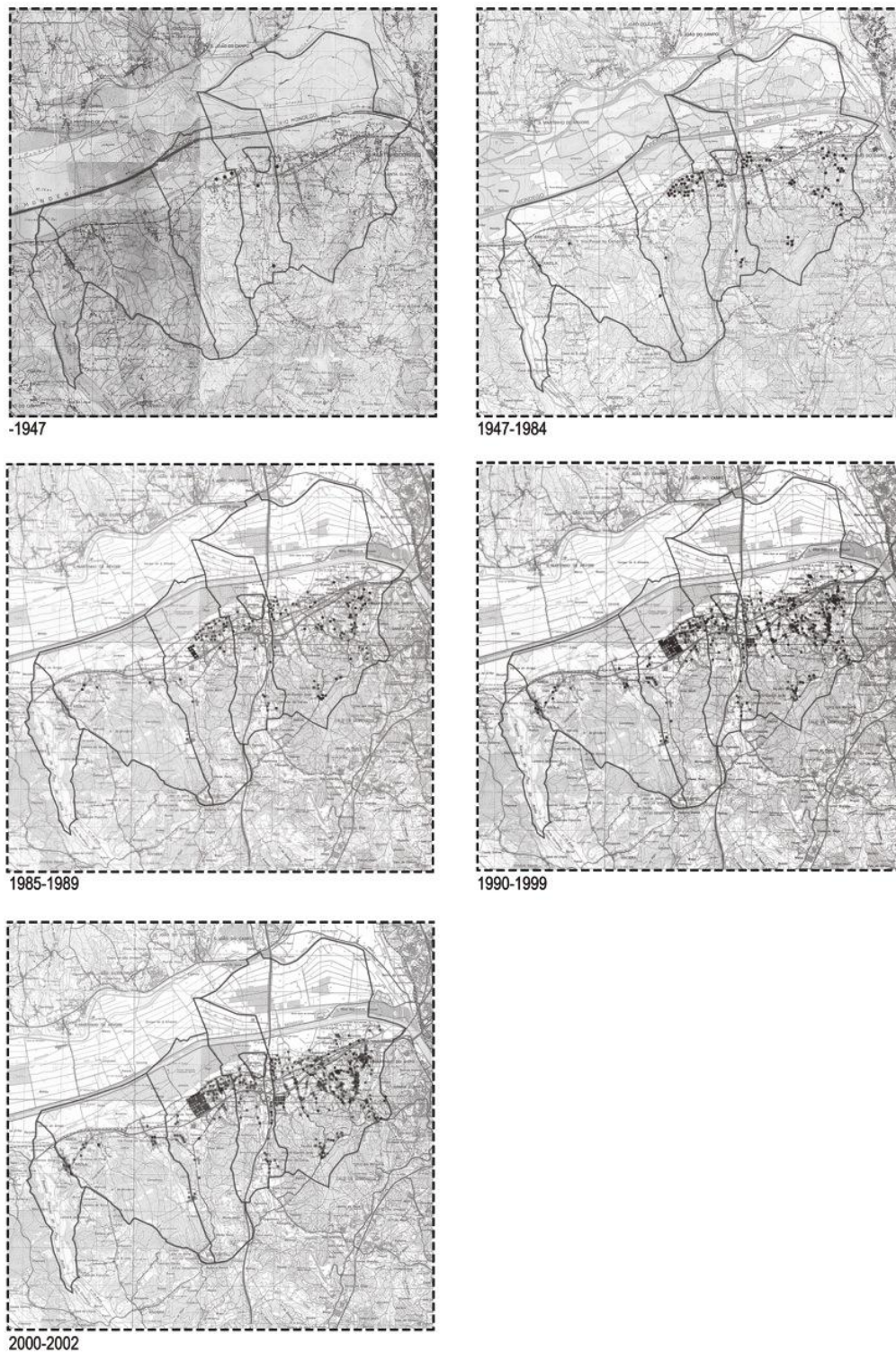


Figure 7. Location of the existing corporate entities for before 1947, 1947-1984, 1985-1989, 1990-1999 and 2000-2002 time periods.

Observing the settlement of these entities by different periods (before 1947, 1947-1984, 1985-1989, 1990-1999 and 2000-2002) in Figure 7, we can foretell the political and economic trends of each period. The 1947-1984 map shows the beginning of the industrial appropriation of the area, embodied in a slow start of the development process of a ruralized territory, located

just a few km outside Coimbra. In the 1985-1989 map we can see the installation of the first enterprise at the *Parque Empresarial de Taveiro*. From this point on, there are two different location patterns for the industries and enterprises along the Coimbra's eastern parishes: the first one is settling inside the business park, which have great advantages in terms of saving infra-structuration costs, dividing every-day operational costs and creating synergies with other enterprises; the other location pattern depends on each industry or enterprise assessment of the importance they give to factors such as accessibility, land cost, parking space, possibility of creating synergies, among other factor. This way, besides the consolidation of the business park, it is noticeable a preference on the agglomeration of enterprises in certain areas, and the choice for more integrated, hence accessible, areas. The 1990-1999's rends visible an "explosion" on the number of industries and enterprises, which is explained by the Portuguese adhesion to the European Economic Community in 1986 and the euphoric period that followed. With the financial support given by the EEC, specifically for the entrepreneurial development of the country, many had the chance to start their own businesses, and thus creating better life conditions for their families. Finally, the 2000-2002 map shows a stabilization on the process of opening new business activities. The establishment of the single currency in the EU brought new challenges to the Portuguese economy and the sense of euphoria suddenly dropped.

Nevertheless, the industrial and entrepreneurial presence inside these parishes is strong and visible until today. Of course the city continued to evolve after 2002, the most recent date addressed in this paper, but due to financial constraints and to the arrival at a point of equilibrium, the infra-structural changes haven't been as evident as in past times. This way, we dare to allege that the territorial organization hasn't changed much as well, maintaining the pattern that we described above.

Conclusion

At the beginning of this paper we claimed that we wanted to investigate how far the narratives of integration and spatial connectivity that are observed on the contemporary roadway infra-structures of the eastern parishes of the municipality of Coimbra are in fact supported by a long-term perspective on historical evolution of the morphology of these parishes and of their land uses.

We questioned if it was possible to reveal the morphological parameters that explain the settlement of industrial and entrepreneurial equipment at the eastern parishes of Coimbra, which we did through a set of three axial maps of the parishes, for the years 1947, 1984 and 2002. The analysis of these maps uncovered a process of urban consolidation that has been taking part throughout those years. We inclusively reckon that both the construction of some major roadways and the improvement of some others had major consequences on the movement patterns throughout the municipality, and on the patterns of accessibility of certain areas as well.

We wanted to know if the pattern of urban organization and territorial cohesion around the roadway network presently observed was also perceptible in the past. For that, we arranged a succession of three infrared satellite images that were the result of the superposition of two other images, from different dates. These images allowed us to understand the changes on land uses of the parishes, namely the increasing and decreasing trends of agriculture and urbanization. The results allowed us to assert that the roadway infra-structures, as constantly evolving entities, are responsible for the different types of patterns of territorial organization observed on different time periods.

We also wondered about the possibility of outlining a chronological dataset of the industrial and entrepreneurial appropriation of these parishes. For that, we used the data provided by the *Registo Nacional de Pessoas Colectivas*, which we located on the military charts and compared with the Local Integration maps. This comparison highlighted two different location patterns, being the first one the settling inside the business park, and the second one the dependence on the assessment of the importance of accessibility to each particular business plan.

Coimbra, as many other Portuguese cities, is constantly under constructive and destructive changes. The forces that create these changes are various in type and action and are not, by any means, banal or ordinary.

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Spatial fabric of urban cemeteries. Two cases in Lisbon

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Abstract. *This paper explores the question of how built environment affects spatial cognition. It is focused on two 19th century Lisbon (Portugal) burial grounds (Alto São João and Prazeres). These cemeteries were founded at the same time, but in result of different urban-social and political concept gained different spatial expression. Using Space Syntax theory and Depthmap software, the paper approaches axial and visibility parameters, connectivity and integration, that are put into a cross comparison with real estate and burial service prices, aiming at identifying spatial similarities and differences, with a focus on social segregation expressed through the cemetery planning. Findings suggest the chess-like grid (common for both cemeteries) and the connection among parts are crucial for general spatial cognition's performance. Besides that, the cemetery "design", at a certain level, reproduces diachronically the urban ethos. A more refined intelligibility depends on the conceptual framework: community vs. lonely mourning.*

Key Words: Cemetery, Lisbon burial grounds, burial services, spatial analysis, Space Syntax

Introduction

Cemeteries of the 19th century Lisbon result from the urban ideas, that took them out of the city fabric together with asylums, slaughterhouses and prisons. The two cases of this study were the first burial grounds in Lisbon that responded the tendencies. However throughout 2 centuries they have developed in slightly different manners, though maintaining common social features in their morphological nucleus.

A burial system in Lisbon presents a list of different services of a cemetery and several burial options differing in price (Câmara Municipal de Lisboa, 2013: 14; 2014: 151), pushing the whole cemetery into a structure of social inequality. This social premise is examined morphologically in two cemetery plans. The root of both cemeteries is *cardo* and *decumannus*, where the center is the most sacred, crowned with a chapel and expensive, richly decorated private burials – *jazigos*, serving as the tourist attractions nowadays. Getting away from the sacred center, the "prices for death" go lower, and the burial ground gradually becomes more profane.

A further study of social stratification considers Space Syntax theory (Hillier, Hanson, 1984) applied to cemetery plans and retrieving the axial graphs from Depthmap software, focusing on 2 main variables: integration and visibility.

Integration "basically represents the amount of steps it takes to get from one particular location to any other in the environment" (Kalff, 2012: 10). Integration, following the formula described by Hillier and Hanson (1984: 108), considers a value for a mean depth and a number of axial lines in the system. Parts of a structure of the highest values of integration usually are found in the city centers (Holanda et al, 2012), same organization is found in Alto de São João cemetery.

An isovist, or viewshed, is the area in a spatial environment directly visible from a location within the space. (Turner et al, 2001, for details). This variable is important for its capability to show the variations of visibility pattern associated to different kinds of spatial conditions around different burials.

The study is complemented with some data from a questionnaire, carried by Egle Bazaraitė. The questionnaire focuses on the visitor's sense of orientation in burial grounds, the habits of the visitors and their expectations of spatial qualities of the cemeteries. Comparative table of different aspects of two Lisbon cemeteries concludes the paper.

Premises: notes on the history of urban cemeteries

The 18th century marks an important turning point in the cemetery culture in the Western world. At the time illuminist and hygienist ideas were applied to the cities, taking cemeteries, slaughterhouses, asylums and prisons out of the city (Ariés, 1976). These institutions, placed in the populated city territory, were seen as impure (Oliveira, 2007: 65).

Literary and art works appeared approaching the phenomenon of death, revisiting the idea of the paradise, the world of the antique deities, awaking the nostalgia of the past that served as a key image to the Romantic movement of the 18th century. Thomas Gray lingered in the poem "Elegy Written in a Country Churchyard", as well as many other English poets, that described cemetery as the place for meditation (Oliveira, 2007: 53). All these tendencies led to questioning the position of cemetery in the city's intramural structure, leading to constructing the tombs and sepulchers in the open natural context and starting to apply Ancient Egyptian and Classical Graeco-Roman burial models in different scales (Etlin, 1991: 178; Curl, 2002: 189-196). Simultaneously, doctors, city planners and scientists focused the attention to the salubrity of the overcrowded cemeteries/charniers, located inside the cities and in the church territory.

These ideas gave an impulse for the great changes in cemetery culture. Garden cemetery appeared as a new, but in fact revisited alternative to the cemeteries. Various parks have been created in England (Stowe Garden, Leasowes, Howard castle *inter alia*) and in France (Ermenonville, Mauperthuis, Monceau *inter alia*), receiving mausoleums and tombs, sometimes fake, though evoking the nostalgia for the wisdom of the ancestors. "Now the cemetery was to be a picturesque landscape garden which conveyed a radically different understanding of death" (Etlin, 1984: 146).

Cemeteries were to include new aesthetical functions like "*embellishment* of the city" (Etlin, 1984: 41), as well as a moral message by honouring "worth of ordinary citizens" (Etlin, 1984: 42) serving "as a school of virtue" (Etlin, 1984: 59).

Père Lachaise was established in the existent gardens and constituted "the final stage in the ongoing debate about how social values and sentiment should be accommodated in the new Arcadian landscapes for the dead" (Etlin, 1984: 229). The types of burials have been defined, dedicated to different classes according to their financial capacities.

French approach to the burial gave an impulse to the creation of similar cemeteries around the Western world. Different urban contexts and natural conditions of climate helped those burial grounds with the same root of ideas and architectural expression evolve into the structures with local characteristics.

Burial system in Lisbon cemeteries

Taking into account the premises, the analysis conducted in this paper is based on the syntactic investigation of the two oldest existing Lisbon cemeteries: Prazeres and Alto de São João. All in all there are 8 cemeteries inside the city of Lisbon (figure 1) and the burial system and taxes are regulated by City Townhall (Câmara Municipal de Lisboa, 2013: 14; 2014: 151).



Figure 1. Axial map of Lisbon: the darkest black lines show the potencial urban core. 5 main burials grounds and 3 smaller supplementary ones are located outside the urban center.

Different options of burial imply different expenses. Presently there are 7 options: temporary sepulcher, perpetual sepulcher, ash field, private burial construction – charnel house (*jazigo*), public burial construction – charnel house (*jazigo*), public ossuary, private or public columbarium.

The options can be divided into two groups: one can either use a family *jazigo* for burial (private *jazigo* or perpetual sepulcher) or the options of public equipment. Both choices imply service fees, however in private burial the fee of a burial service is paid once, while for burial in public constructions it is paid for a certain period of time (1, 5 or 25 years). When this period is over, a person responsible for a buried body has to pay the fee again. If there is no one to take care of the situation, cemetery rules define “taking care of the bodies in the most appropriate way to the situation” (Câmara Municipal de Lisboa, 2013: 10). Table 1 presents values for burying in Lisbon cemeteries. The values are different from one city to another since they are defined by the local authorities.

For burial in a private *jazigo* or perpetual grave, a piece of land must be acquired from the municipality, and the construction costs are to be paid by the acquiring person (Câmara Municipal de Lisboa, 2013: 14; 2014: 151). This person decides on the architectural style and materials of the project, though following the regulations defined by the municipality (Câmara Municipal de Lisboa, 2013: 14) (table 2).

This data must be seen in the context of the minimum wage in Portugal for 2014, that is 565,83 euros (Fundação Francisco Manuel dos Santos, 2014). 1 m² for private *jazigo* is almost 3 minimum wages, and perpetual grave costs more than 17 minimum wages.

As a burial ground is a paid service, it makes sense that people acquire services responding to their financial capacities, and though interested in decent treatment of the passed away, rare one would go over his/her financial limits or even into debt for paying the funeral.

Table 1. Fees for burial in public cemeteries in Lisbon, 2014 (Câmara Municipal de Lisboa, 2014: 151)

Type Of Burial	Period	Fee In Eur (2014)
Burial in Temporal Grave	once	85
Burial in Perpetual Grave	once	145,65
Burial in Ash Field	once	52
Burial in a Private <i>Jazigo</i> (Charnel House)	once	189,55
Burial in a Public <i>Jazigo</i> (Charnel House)	1 year	116,8
Burial in a Public <i>Jazigo</i> (Charnel House)	5 years	306,15
Burial in a Public <i>Jazigo</i> (Charnel House)	25 years	1712,6
Burial in a Public Ossuary	1 year	98,1
Burial in a Public Ossuary	5 years	201,65
Burial in a Public Ossuary	25 years	615,1
Burial in a Public or Private Columbarium	1 year	95,45
Burial in a Public or Private Columbarium	5 years	188,45
Burial in a Public or Private Columbarium	25 years	562,1

Table 2. Prices for land concession in Lisbon cemeteries (Câmara Municipal de Lisboa, 2013: 14)

Concession Of Land For:	Price For:	Price In €
private <i>jazigo</i>	1 m ²	1619,7
perpetual grave	1 lot	9718,1

The ones unable to pay burial service have a financial support from the religious charity institutions, eventually covering the expenses for the most appropriate (supposedly the cheapest) way of burial.

Burying in Prazeres burial ground is not possible anymore, unless a deceased belongs to the family that owns a private *jazigo* or a perpetual grave. This burial ground is in a kind of state of conservation, turning itself into a pure museologic jewel of Lisbon tourist map with various guided visits.

In the case of Prazeres cemetery, one can only purchase a *jazigo* from another family, which would “abandon” it by taking away the coffins, and sell *jazigo* in an auction. As newspaper (Alemão, 2013) announces, the price of *jazigo* in Prazeres cemetery can go up to 150.000 euros. Alto de São João cemetery today is the most central burial ground in Lisbon, that includes crematorium and gives service of all possible burial options defined by law.

History of Prazeres and Alto De São João cemeteries

During the 19th century the nucleus of the current Lisbon cemeteries have been founded (except Carnide), and even after various transformations their initial structure is still present.

Both – Alto de São João and Prazeres cemeteries – were founded in the first half of the 19th century – precisely in 1833 during the cholera epidemic for handling the great number of victims. The cemeteries were placed in the outer parts of the city territory, both occupying

beautiful undulating topography with the views to Tejo. Burial grounds were established in peripheral and rural suburbs of Lisbon, that in the middle of the 19th century still served agricultural purposes (Oliveira, 2007: 252).

Alto de São João was planned in the Eastern part of the city, occupying existing São João estate. Prazeres cemetery was founded in the Western part. These cemeteries, established at the same period received quite different “inhabitants”. Prazeres served for the burial of liberal figures – politicians and writers of the period, including the nobles and the enriched bourgeois. Alto de São João cemetery obtained political mission, though of a later period, serving the masonry and institutional monuments erected by the initiative of *Estado Novo* (Oliveira, 2007: 254).

The idea of preserving the memory, and burial ground as a place for education and evocation of moral, including value of historical conscience, turned this space into some kind of the museum. Several project proposals have been made for the Alto de São João and Prazeres burial grounds. Nowadays the responsibility of cemetery planning belongs technicians (including architects) working in municipality.

The site chosen for development of Prazeres cemetery had been used for burials in the periods of epidemic crises since the 16th century. The site included as well an existent chapel. Prazeres grew twice its size; while Alto de São João has grown by 3 times since it was founded.

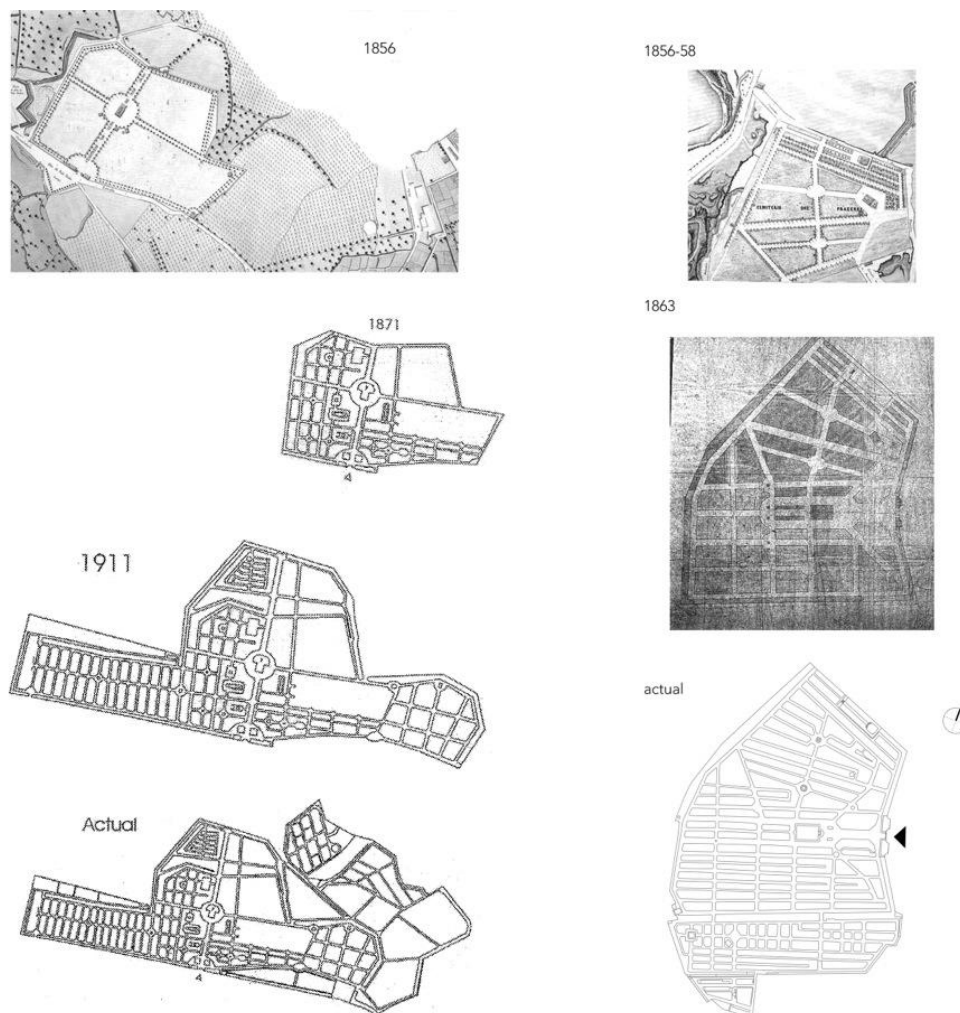


Figure 2. The development of Alto de São João and Prazeres cemeteries (Oliveira, 2007: CCLVI, CCLXII, Ferreira, 2009: 1139).

Comparison of the urban context of these two cemeteries

Prazeres cemetery is 1.5 km away from the nearest metro station (Rato), and it takes about 21 min to get from one point to another⁴³. (Buses of 5 different routes (712, 701, 709, 774) and trams of 2 different routes (25, 28) take one almost to the gate of the cemetery.

Alto de São João burial ground is 1.2 km away from the nearest metro station (Arroios), and it takes about 17 min to make the distance on foot. Buses of 2 different routes (718, 742) stop at the gate, and buses of 7 different routes stop 600 m away from the entrance (at Paiva Couceiro square: 206, 706, 718, 730, 735, 742, 797).

There is certain group of people that are interested in burial grounds as public places, using them as a kind of parks with historical contents. The same approach in the 19th century revealed the necessity of a public park - a kind of a public space that did not exist before (Etlin, 1984: 367).

38 respondents age 20-68 filled in the questionnaire prepared by the author of this paper. Though it is still early to make the conclusions, it is interesting to note that those burial ground visitors interested in a burial ground as a place for a walk – public place, might not have any sentimental connection to the graves of their family members and would have a difficulty to explain where exactly these graves are in the certain burial ground plan. Respondents that mentioned this had university education and in most cases were connected to arts. They would visit a cemetery on their trip abroad, expressing their fascination to burial ground as a place of culture, history and architecture.

Structure of the two burial grounds

Analysed cemeteries differ in size. Prazeres, occupying 0.12 sq.m, is almost twice smaller than Alto de São João cemetery. This area responds to the permanent sepulchers area in Alto de São João cemetery. The rest of the Alto de São João cemetery is dedicated to the temporal burials.

At the first glimpse, one can notice that both cemeteries' central structure is defined by orthogonal grid, based on the cross like relation between the entrance and central chapel, expanding its "rays" in three points, shaping the cross, reminding of *cardo* and *decumannus* (Figure). There is another element that resembles a structure of a Roman city – a wall that surrounds almost every cemetery of European tradition. This wall – a frontier of symbolical protection from the dead, and physical protection from the living – differs in height from one tradition to another. In case of these two cemeteries in Lisbon – it is a tall, sometimes 5 m height structure, impossible to surpass. It is expected to discover this cross like structure highlighted after processing Depthmap analysis.

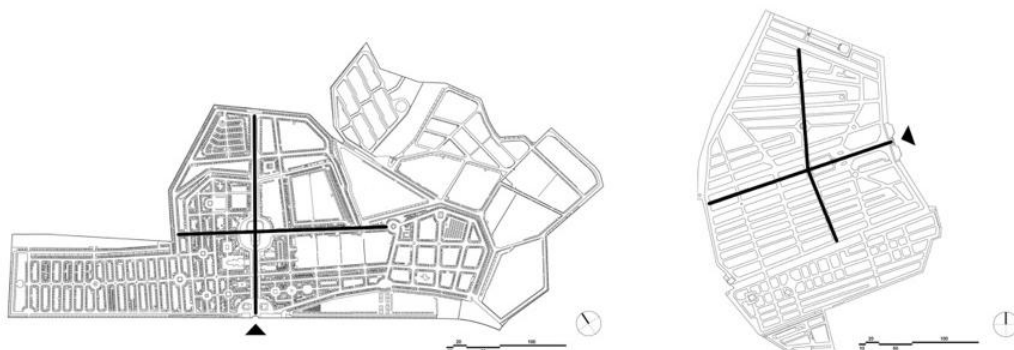


Figure 3. The root of Alto de São João cemetery and Prazeres cemetery is a cross structure with a chapel in the center, serving as the most sacred element of the burial ground. The structure gets more profane when getting away from the very center .

⁴³ Estimation obtained from googlemaps.com

The rigid central structure defines the rule of the further development, however in the case of Alto de São João topographical conditions might have implied the further decisions of the planner when designing the outer structure for temporal burials. Simple identification of axes of the cemeteries lead to understanding the level of a homogeneity of the cemeteries (Figure 3).

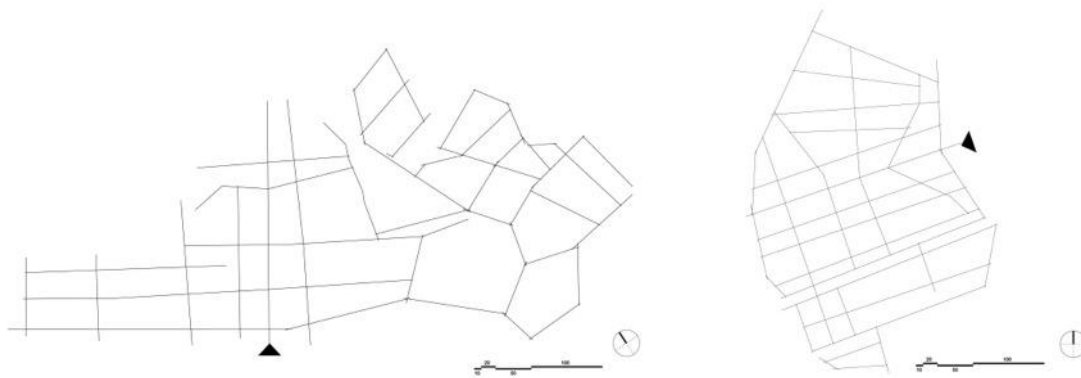


Figure 4. Axial system of main pathways in Alto de São João and Prazeres cemeteries.

Alto de São João structure reveals two different types of organization – orthogonal at the core and spontaneous-organic structure at the Eastern outskirt. How these parts of cemetery differ in function and price? Is there any social difference between the “clients” of these parts?

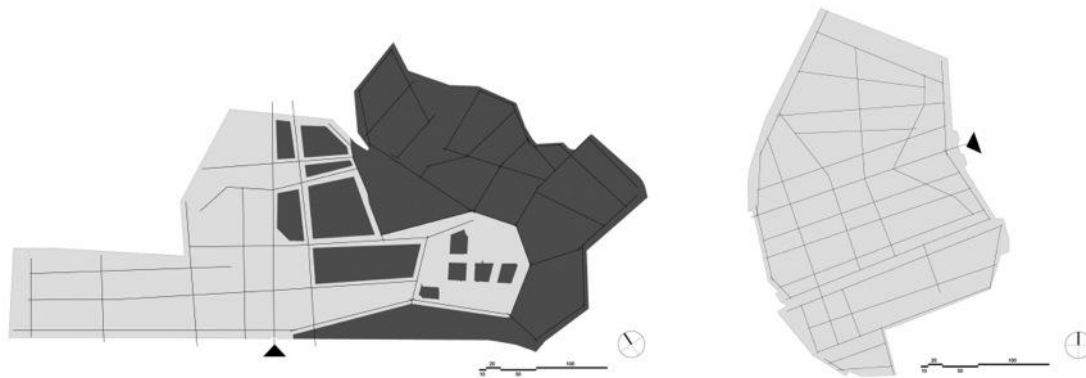


Figure 5. Alto de São João cemetery is composed of permanent (light grey) and temporal (dark grey) burial grounds. Prazeres is entirely permanent.

The structure of the Prazeres cemetery coincides to the core plan of the Alto de São João burial ground, and has no visually identifiable suburbs, except the southern part, that reveals to be less connected to the central part.

Orthogonal structure in two burial grounds share the same kind of land use – in Prazeres they are all occupied by private *jazigos* (chapel houses) and permanent graves (light grey colour in Figure 4), while in Alto de São João part is exclusively dedicated to permanent burial, while organic structure of suburbs is all used for temporal burial (dark grey colour in Figure 4). Temporal burials appear in the orthogonal structure surrounded by private *jazigos* (chapel houses), columbariums or municipal *jazigo*, this way isolating the temporal burial grounds, and sometimes turning their “backs”, giving the space a feeling of harshness and austerity (Figure 5). The reality reveals a formula neighbourhood&community (Figure 6) vs. desert&austerity (Figure 5).



Figure 6. Temporal burial ground in Alto de São João cemetery with the back walls of public ossuaries.



Figure 7. Private *jazigos* are mostly organized in orthogonal grid.

Space syntax study

Space Syntax analysis is carried out for two burial grounds in Lisbon for understanding how each spatial structure of the burial ground is related and connected to others. The focus is on the possible social stratification inside the cemeteries expressed through the spatial organization. The data retrieved from Depthmap is to be cross connected to cemetery service values that serve as an indication of certain social groups using certain part of a burial ground.

Burial ground as a typology is a segregated element in the city fabric. It is separated by the wall from the rest of the surroundings, in case of Alto de São João and Prazeres wall in some points reaches 5 meters. Both burial grounds only have one entrance each that segregates them even more from the urban context. It is like a city in the city, protected from the exterior world by the walls, as a kind of Roman city with a notion of danger of the exterior world, of the unknown. It is like a closed condominium, with guards at the entrance, or a prison, or a hospital – it is an institution that cannot be entered whenever one wants. It is a territory with rules, visiting hours, prejudices and myths, with lots of worries expressed by the ones who visit and the ones that will “inhabit” it in the future.

Different levels of interior segregation can be observed in the “interior” of the burial grounds. In figure 3 Alto de São João shows a combination of two grids – orthogonal and organic-spontaneous, while Prazeres has almost homogenous orthogonal grid, only with one change of direction.

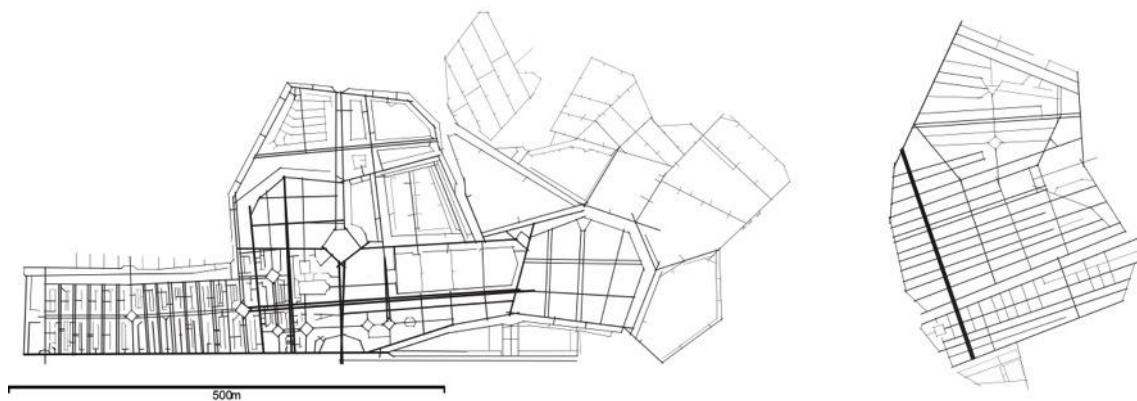


Figure 8. Integration HH axial map shows the most integrated parts of the cemetery (the thickest lines). Alto de São João cemetery has a more expressed center and several sub centers. Prazeres cemetery holds most integration in one line.

Axial map uses a scale of lines that differ in their thickness, where thickest line is used for the most integrated lines, and the thinnest ones for the least integrated lines, varying as well in black to grey tones.

In the structure of Alto de São João the spectrum of values of levels of connectivity reveals almost “one colour” plan – meaning that most of the lines are of alike values. Structure of Prazeres, even though revealing more homogeneity in plan, has a hierarchy of connectivity values, with the most connected path in the back of territory, stretching in the direct line.

The level of integration of a burial ground structure can give hints of how this kind of built environment functions socially, indicating existence of the social stratification of a certain level.

Table 3 presents the integration values with a burial options found on the pathways of certain level of integration in Alto de São João burial ground. Temporal graves only appear on the second most integrated pathways (average thickness and grey colour in the plan). These temporal graves, however, are hidden inside the “neighbourhoods”, surrounded by private *jazigos*, that beyond the service price of burial, implies the value for land concession and construction of *jazigo*, or acquisition of one already built. Same rules are applied for perpetual graves, values for land concession are presented in the table 2.

In the case of Alto de São João cemetery, while the integration value goes down, temporal graves get further from the entrance and from the nuclear center. The most celebrated and the most expensive private burial grounds surround the temporal graves that are closest to the center, hiding this reality and sometimes even turning their deaf walls to them, as shown in a figure 4. Private *jazigos*, found in the green level of integration make part of homogenous “neighbourhood” that consists only of private *jazigos*. Perpetual graves located in the pathways of lowest integration are surrounded by private *jazigos* as well.

Differences of the urban fabric in Alto São João burial ground lead to different visibility maps retrieved through Depthmap software. The rigid orthogonal grid of three-dimensional sepulchers are visibly less permeable. One can sneak peak into the interior of the little “neighbourhoods” of sepulchers, however the proportions of space only allow one looking along the extended visibility lines constructing organized chess-like cemetery fabric. “The right wing” of the cemetery, used for temporal burial, have different qualities – the core is an open vast space and 3 dimensional objects only surround the territory, serving as a wall of the burial ground. There is an appealing difference of space quality and it actually differently affects a visitor. Death is somehow more painful here. There is no caressing and compassion. Death is a fact, a number marking the grave. Its poetry speaks of loneliness, on the contrary to the qualities of the area in the core of the cemetery, that reveals itself as more communal, more “neighbourhood” type.

Table 3. Integration values and burial option with service costs

Line thickness	Integration values	Burial options	Price for service, €
5	1.94 - 1.84	Private <i>jazigos</i>	189,55
		Perpetual graves	145,65
4	1.77 - 1.68	Private <i>jazigos</i>	189,55
		Temporal graves (surrounded by <i>jazigos</i>)	85
3	1.65 - 1.52	Private <i>jazigos</i>	189,55
		Perpetual graves	145,65
		Temporal graves (surrounded by <i>jazigos</i>)	85
2	1.51 - 1.09	Perpetual graves	145,65
		Temporal graves (surrounded by <i>jazigos</i> and open field)	85
		Private <i>jazigos</i> (inside the neighbourhood)	189,55
1	1.08 - 0.53	Perpetual graves	145,65
		Temporal graves (open field)	85

One point eye-sovist graphs show what is visually reachable from one chosen point. The view from the entrance of Alto de São João cemetery ends by the chapel, located 130 m away from the entrance. On the right the view stretches along the columbariums, until it ends by the cemetery wall 370 m away. On the right the view stretches the same distance, however not as wide. These isovists are linear. Analogue shape of visibility at the entrance is revealed in Prazeres cemetery. Eye-sovist and knee-sovist are placed aside since the barriers are of the same origin – three dimension sepulchers and the chapel.

In the open field of temporal graves in the right wing of the burial ground the eye-sovist graph is different – it is open, stretching up wide almost to 360°, eventually bringing to sight the industrial landscape by the Tejo river.

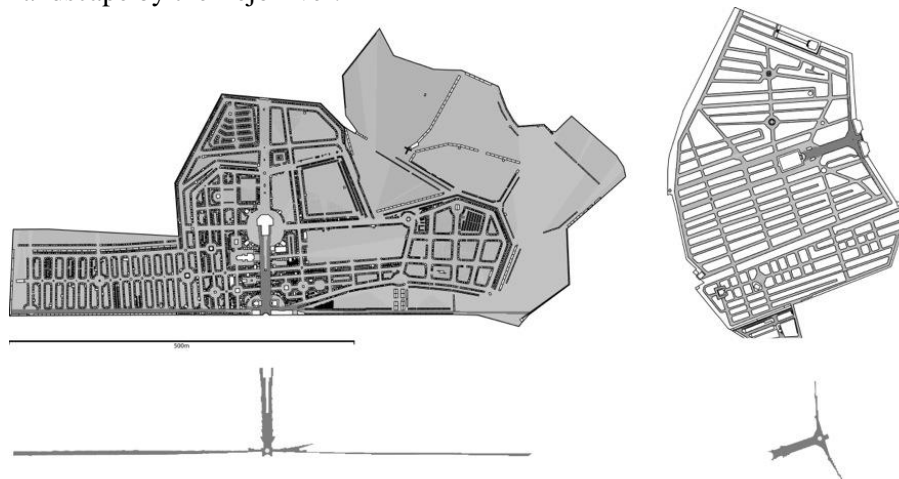


Figure 9. One point eye-sovist from the entrance in Alto de São João and Prazeres cemeteries are the same “T” shape. Inside the orthogonal plan eye-sovists are either linear or cross like (where the paths cross).

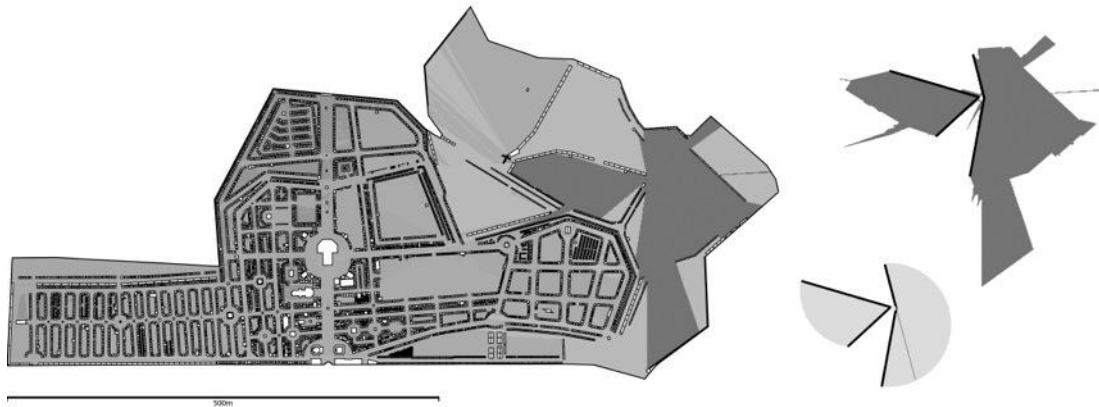


Figure 10. Eye-sovist in the temporal burial field stretches almost to 360°. This analysis is processed only to Alto de São João burial ground, as temporal burials are not implemented anymore in Prazeres cemetery.

Final comparison and conclusions

Spatial qualities speak for themselves, and the historical facts, morphologic analysis, data retrieved from Depthmap software and the burial service prices serve for confirming the raised question – at what level social stratification exists in the burial grounds? Can it be confirmed with a quantifiable data?

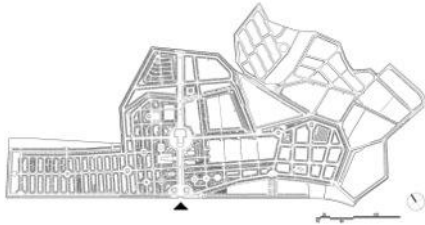

It is concluded that these notions can be confirmed joining historical facts with morphological studies, real estate and service values for burials and graphs retrieved through Depthmap software, based on Space Syntax theory.

Alto de São João burial ground found at the same time as Prazeres cementery, is still in use. It is almost twice bigger, both structures started by kind of *cardo* and *decumannus* combination of paths, still identifiable today. The service prices for burials are the same in both cemeteries, as they are defined by municipality, however Prazeres receives only the ones that already have family burials there or acquired *jazigos* in an auction. Prices for *jazigos* are higher in Prazeres than in Alto de São João. Prazeres is a prestigious cemetery, a celebrated touristic point, praised by historians and art lovers.

Alto de São João cemetery has in its territory a crematorium that is in full function. Both cemeteries are out of urban nucleus of Lisbon, but still in Lisbon territory. Alto de São João is bigger structure, but less public transport passes, and metro is a big further than in case of Prazeres cemetery.

Alto de São João is composed of two kinds of morphological structures – orthogonal and organic (spontaneous), different morphological structures serve different burial purposes. Prazeres is all orthogonal, with on one change of direction, that still continues orthogonal grid. Segregation of an organic part of Alto de São João cemetery is identified by the weak syntactical connection to the orthogonal structure. The far end “east wing” of the cemetery is used for temporal burial, that is the cheapest burial option, accessible for most of social levels. After 5 to 7 years in the temporal burial the bones are taken out from the ground, cleaned and put where family decides – either public ossuary, public columbarium (if cremated), ash field (if cremated) or any other option. Whatever is chosen, the burial service must be paid again (table 1). Prazeres cemetery has no temporal burial grounds, and this type of segregation is impossible to identify.

Table 4. Two cemeteries, founded at the same time, throughout the years developed into two directions, differing in their relation to the urban context and their own spatial organization, serving as well different social classes

	ALTO DE SÃO JOÃO	PRAZERES
		
Year of foundation	1833	1833
Size	0.22 sq.km	0.12 sq.km
Still used for burial	Yes	No (only for special cases)
Price of land concession	Defined by municipality (same for both)	
Price for burial services	Defined by municipality (same for both)	
Price for private <i>jazigo</i> (in auction)	Lower	Higher
Crematorium	Yes	No
Relation to the city	Outside the urban nucleus	Outside the urban nucleus
Distance to nearest metro	1.5 km	1.2 km
Public transport taking to the gate	2 buses	4 buses and 2 trams
Internal structure starting with <i>cardo</i> and <i>decumannus</i>	Yes	Yes
Internal structure	Orthogonal and organic (spontaneous)	Orthogonal
Space syntax results - integration HH (segregation)	Segregation identified	Segregation not identified
Temporal burial grounds	Yes	No

The continuation of the research

Continuing this approach to morphological studies of cemetery design, more cemeteries must be studied for either confirming or denying the question of social stratification of a burial ground. Therefore questionnaire will be handed for more respondents for understanding what mostly disturbs and caresses people in cemetery – a place of both personal and public memory, as well as their relation to the cemetery as a place of intimate relation of the passed away – are they visiting it for celebrating the life of their dear ones, or they live the memories in other places?

The comparison made in the paper joined axial map data with burial service values. It would be useful to take into account average family savings of the minimum income in Portugal. It would let to understand which burial option they would more likely acquire. What is more, a questionnaire for the family of minimum wages could include the question about their burial options.

In relation to social stratification in the cemetery, it makes sense to analyse the historical development of Alto de São João cemetery for understanding how temporal burial were planned throughout two centuries.

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U+D urban form and design. A tool of Urban Syntax to design

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Abstract. *It's time for a reflection about architectural design through European geographical's thought of the late nineteenth century (LEIGHLY, 1965), developed further especially in English and Italian cultures and particularly in urban morphology (urban morphology – Conzen) (Conzen, 2012) and architecture design (building typology – Caniggia) (Caniggia Maffei, 1979). This subject, initiated by Richter and Ratzer's thesis, advances to the primary synthesis with the idea of "region" by Vidal de la Blanche, and afterwards with the Sauer's idea of landscape as an "organic body" (Sauer, 1925). Later it was improved by Conzen in urban morphology's field, and Muratori and Caniggia in the field of architecture relatively to the concept of "tipo". Morphology and architecture, landscape and building process are, actually, complementary scientific fields, essential for designers of historical landscape (Nevter, 2009). Several research and comparative studies between these two schools, have been the focus and a field for reflection. This has produced some major studies like that of space syntax (Marcus, 2011). Landscape and historical spaces are texts that one should learn to read (Strappa, 2011), with this point of view the tissue and the urban body are words of a paper written by many authors, that shall be interpreted. They are like sentences and words of a collective work to be interpreted in order to build a grammar and syntax for architectural and urban design. U+ D wants to bring the Italian exception (typological analysis-Muratori-Caniggia) to a wider international discussion of urban morphology and in the same time it wants to emphasize the architectural aspect of this theme, which is essential for further and more effective architectural design dimension.*

Key Words: Urban form, urban syntax, design

The european roots of cultural geography

"The systematic organization of the content of landscape proceeds with the repression of a priori theories concerning it. The massing and ordering of phenomena as forms that are integrated into structures and the comparative study of the data as thus organized constitute the morphologic method of synthesis, a special empirical method. Morphology rests upon the following postulates: that there is a unit of organic or quasi-organic quality, that is, a structure to which certain components are necessary, these component element being called 'forms' [...]; that similarity of forms then being 'homologous' and that the structural unit may be placed in series, especially into developmental sequence, ranging from incipient to final or completed stage. Morphologic study does not necessarily affirm an organism in the biologic sense as, for example, in the sociology of Herbert Spencer, but only organized unit concepts that are related." "[...] there is a unit of organic or quasi-organic quality [...]" (Sauer, 1925).

1925, Carl O. Sauer spells out scientific theory of urban morphology, argues the study of physical space by systems orderly within a process in which man and territory are included in the unit. System, organism and process inaugurate, from the beginning of last century, the time when these terms beginning key words among scholars of territory and landscape. Between those have tried synthetically to explain the character of human environment within interrelation of material quality and cultural capabilities.

Ritter, Ratzel, Vidal de La Blanche, Davis, Boas, Wissler, Demangeon, Passarge, Lehmann are, from the beginning of nineteenth century, among the earliest scholars to operate in disciplinary field divided between those who stiffly defines the physical surroundings decisive for human component and whoever later shall reduce the value, within interrelation of material

quality and cultural capabilities, from absolute to relative. Later others will spend time and effort trying to specify and to point out reasons and values of transformation process notion's, but despite this, few will be able to supply adequate and exhaustive useful indications for architectural and urban design. In several cases, these are suggestions made on surveys intuitive or derived from studies on border line architectonic field that rarely goes into the merits of the systems and anthropic physical structures with the typical tools of architecture.

Leighly in 1965 (Leighly, 1965), in an interesting anthology of writings by Carl O. Sauer, emphasizes the elements that have helped to establish the theoretical formulations, the cornerstones of urban morphology. It is begun by Otto Schluter (Whitehand, 2007) and for a few decades raised to field for urban study, then from purely geographic area it's relocating to the pragmatic professional architectural.

In fact, It is common conviction among those who deal of territory that the morphology and the physical character (altimetry, hydrometry, etc.) influence the history and evolution of the urban landscape. "[...]l'individuazione dell'identità territoriale (alle diverse scale della regione e del singolo luogo è fondamentale per avviare processi di riterritorializzazione (riappropriazione dello spazio ndr). Questa individuazione richiede la lettura del processo di formazione del territorio nel lungo periodo per reinterpretare invarianti, permanenze, sedimenti materiali e cognitivi in relazione ai quali produrre nuovi atti territorializzanti.

Ogni ciclo di territorializzazione, riorganizzando e trasformando il territorio, accumula e deposita una propria "sapienza ambientale", che arricchisce la conoscenza delle regole genetiche, contribuendo alla conservazione e alla riproduzione dell'identità territoriale attraverso le trasformazioni (distruttive e ricostruttive) indotte dalla peculiarità culturale del proprio progetto di insediamento."

"[...] l'analisi storica del processo di formazione del territorio non è finalizzata alla ricerca-conservazione della "natura originaria" del luogo (genotipo o memoria genetica) ma all'individuazione delle sue buone pratiche riproduttive che forniscono regole (costruttive, insediative, relazionali) per proseguire l'opera di territorializzazione secondo criteri e forme innovative[....]" "[...] l'analisi non è finalizzata né a trasformare il territorio in museo, né a copiare stili; ma ad acquisire sapienza ambientale e arte di edificare che hanno creato, in epoche precedenti, relazioni virtuose fra insediamento umano e ambiente e utilizzarle per il progetto di trasformazione." (Magnaghi, 2010). Despite of all these efforts is sufficiently clear to most people, and like this writing Magnaghi points out, what is the node to be tackled in order to contribute effectively to the development of the knowledge accumulated. It should go into the "environmental knowledge" is not so much from the theoretical point of view, rather than the operational level of development, including the diachronic analysis and urban morphologies. This operation today is certainly more difficult to recognize than in the past for amount of layers and architectonic structures and urban areas that are superimposed. The acceleration of the process of transformation of the territory in general and Italian in particular, has upset the "spontaneous" metabolising capacity, that human infrastructure had regularly expressed at each stage of the process of transformation on the landscape. The structure is achieved continuously overwhelmed by other anthropic structures, by disconnecting the physical context, produce fragmentation of the urban system, disarticulate content in the urban unit of the institution, sometimes irreversibly damaging the whole. From the organic unit it switches to the juxtaposition of heterogeneous and serial elements so in the expression as in the economic and social function.

The request disciplinary, especially the fields that deal with the design of the territory, it shall notify the urgent need for new rules to study the transformation process so as to restore valences and meaning nodality extensive and peculiar to the territory and urban centers otherwise destined to remain satellites of the large agglomerations or sentenced to abandonment.

U+D urbanform and design aims to be a space for reflection to accept even the disciplinary point of view of human geography in its contemporary paradigms (Vallega, Vagaggini, Corna Pellegrini, Quaini), which coincide (with the idea of type and process concept and history

operating of the Roman school of urban morphology) with the idea of human space and geographic complex, the product of evolutionary processes and involutive of cultural areas, or parts of them, which contribute and have contributed to define a new unit to larger scale. The limited range of human geography and urban geography in particular, as a representative form of the collective imaginary gives particular importance to the relationship between physical components and the main anthropic structures intended for to displacement, settlement and conomic productiones (Wissler, 1965). Elements used also by Gianfranco Caniggia in the synthetic representation of the territory. A position that is in fact agree geographers and architects of the territory and which has led us to confirm such as particularly useful representation of these elements to describe the territory nodes (settlements), axis (paths), areas (production areas) and lines (boundaries).

The italian school contribution and new tools and elements of reflection

It also wants explore significance synchronic and diachronic in Urban Syntax and in drawings of the territory. Those who Caniggia had already graphically synthesized in the phases of the formative cycle of the territory, which begins with the phase of the ridge and ends with the step of the valley.

Now, although the concept of culture area is now common knowledge, the connection of this with the physical characters (borders, usable areas, structures for the movement and anthropic elements for settlement), shared and assumed in the domain of human geography and its related fields is still fuzzy in the design perspective, however, this seems recently emerge more clearly from the domain of the sciences of architecture. Gianfranco recovering the regional synthesis of Saverio Muratori published in the book *Cività e territorio* (Muratori, 1967) had summed up in a few but significant marks central places, already proposed as significant elements of cultural regions recognized in the territory by Smile and Dickinson in 1947 (SMILE 1947, Dickinson, 1947). He had introduced the design theme that was missing in the geographical field; something which in fact was distilling in these disciplines alike to architecture they had in common the natural environment (in which there are the territorial and architectural. design), its understanding and its representation in phases and for regional areas geographically homogeneous and cooperating.

The projective intuition of these studies is the result of the progression of interdisciplinary knowledge, which developed within a European geographical line of thought binds Otto Schluter with Carl Sauer, Vidal de la Blanche Lucien Febvre and Fernand Braudel, and which find continuity in the school of urban morphology Anglo-Saxon and North American (Conzen, Whitehand, Moudon, J.Conzel, Larkan), and for urban and regional project showing interesting elements in results achieved by research and reflection of the Italian school. School that registers a growing consensus (University of Laval, Portland, Utah, Birmingham, Porto, etc..) and receives strong encouragement in the field of design, at the international level.

Limits and boundaries are identified on the maps and cadastral tools. They vary in time and space. In a subsequent phase they may appear, values and hierarchies, the opposite way to the previous one. Organization and roles of the components are constantly changing from the sites more easily umanizabili (ridges) to the less antropizzabili territories (valley). All in all this trend is gradually increasing the extension of the cultural area and at the same time it is articulated, at the local level, in sub areas qualitatively significant. The study of the formative processes of the urban fabric of the historical cities of the youngest cities in Europe and America and Asia (Davis H., 2013), suggests the idea of a reflection space oriented towards the approach of the scientific analysis of the physical forms of nature and landscape A disciplinary field that involves the geographic and architettura domain, a field of study and experimentation still undefined at the boundary between the Space Syntax (Whitehand J., 2007) and the urban morphology.

The overlap of marks, forms that make up the urban design it is now well-established field of study of urban morphology (Kroft, 2014). Concepts such as range or boundary dividing relevance (Conzen, 2013), in the description of the relationship built between the path and lotto is commonly used in the school of geography in Birmingham (Whitehand, Conzen) and in schools of architecture like Laval (Moretti) in laboratory of urban form on the shape and the process of the urban fabric in Lisbon (Diaz). While the confusion of the signs as an expression of economic, political, morphological factors is object of scholarly attention of Space Syntax, it seems to sketch, in dimension of the Urban Syntax as a grammar of a three-dimensional text and collective work.

the renewal of relations between geographic and domain historic (Maffei, 2014) has always been upstream of the urban process, of the study on building characters, on analyse of type aimed at project (Strappa, 2014) it seems emerge as the Rosetta Stone in understanding "architectural text. "

Lines and shapes of the urban space and territorial, still shrouded in the fog of the chaos that seem to emerge from the apparent confusion such as words of layers superimposed traces of a collective work, composed by a grammar still largely to be encoded and the story which we believe is can change, sometimes intentionally amazing but mostly by continuing the process that generated them.

U+D urbanform and design is an online magazine dedicated to architectural and urban design. Its an utility open to scholars and architects involved on the project summary of the process connected to the urban morphology of the city and the region. Wants to offer an interdisciplinary space between urban morphology and building typology design dimension. He wants to reflect and offer the space for the comparison of architectural projects in the continuity of the idea of intentional or unintentional process, the shape of the space in its results and in relation to contemporary traces of material culture inherited recognizable in their unitary character stays in the residuals of masonry and organized on knots and cultural areas of different temporal phases.

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The evolution of house forms and the change of culture: a Turkish perspective

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Abstract. *People continuously modify their living environment to improve their life quality. This has been done in a piecemeal manner traditionally where the physical forms could be gradually adapted to meet the change of life-styles. However, rapid transformation of cities in the modern age has caused incompatibility of physical forms and the local culture. It is therefore important to study the dynamic link between house forms and the residents' everyday life and needs over time. Within the Turkish context, this paper will explain the change of Turkish house types within 5 different morphological phases when external influences have been in effect. The spatial arrangements of each house type will be analysed through case studies and special attentions will be paid to the everyday use in those houses and the relationships between private, semi-private and public spaces. The conclusion will be drawn on the house form in relation to people's way of living and will shed light on socio-culturally sustainable development and regeneration in contemporary Turkey. This paper will also contribute to the argument for a positive impact of typological processes of physical environment on the local culture.*

Key Words: House form, spatial organisation, residential satisfaction, quality of life

Introduction

Since people interact with each other in spaces, their satisfaction with life depends on their relationships with the constantly changing built environment. As Ozaloglu (2006, p.75) indicates, 'life style and physical environment do not change simultaneously'. Physical conditions can be easily changed; however, even if these conditions are positive, they might not meet residents' genuine desires after change (Cheung&Leung, 2008).

This impact has become more prominent in contemporary built environment, because the concept of type, which was introduced as a social and cultural tool by Gottfried Semper in the 1830s (Chen&Thwaites, 2013), has lost its power in contemporary world and people have become less socially and culturally connected to their living place. In this study, the term 'type' refers to housing types, presenting similar characteristics in terms of functional zoning, spatial organisation and public-private area relationships; and 'typological process' refers to the continuous transformative changes of these house types.

To understand the relationship between a house type and the inhabitants' life style, internal layout of the house type and its relation to the surrounding are important parameters to examine, because people organize their surroundings based on their living habits and the intervention to the organisation of space can easily affect their life styles. Specifically, spatial relations in Turkey can be represented by the relational structure among private, semi-private and public spaces. This is because the concept of social interaction derived from nomadic life style and the concept of privacy changing after adoption of Islam (Yildirim & Hidayetoglu, 2009). Therefore, privacy and social interaction are the most important factors that should be considered in the investigation of the impact of spatial relations on residents' life style and quality in Turkey.

This paper focuses on the relationship between spatial organization and people's life styles over time in the Turkish context with special reference to five house types chosen from the capital city Ankara in five morphological phases from the late Ottoman Empire period to the present. These house types will be analysed based on their spatial arrangements and the relationships between private, semi-private and public spaces in order to explain how the

physical housing unit fits to its residents' life styles. The conclusion will be drawn on the house form in relation to people's way of living and will shed light on socio-culturally sustainable development and regeneration in contemporary Turkey.

The evolution of house form in Turkey

In Central Asia, Turks had the nomadic life style and lived in tents until settled. After the settlement (VII-XIII. centuries), tents have been replaced by rooms (Ozcan, 2005). The different spatial organisations of these rooms have resulted in the emergence of different house types now called traditional Turkish houses. These houses, which have had about 500-year history, have experienced major development along with social, cultural and economic changes and their impacts on housing design have continued until the 1940s despite the recession period of Ottoman Empire in the late 19th century (Yildirim ve Hidayetoglu, 2009 and Eldem, 1975). However, the growing relations with western countries in the second half of the 19th century have resulted in the emergence of new house typologies (Sey, 1998a; Sey, 1998b).

In 1923, Republic of Turkey replaced the Ottoman Empire. Despite the significant housing shortage, the first years of the Republican period were a period of stagnation in terms of housing construction because of economic problems after the WWI (Sey, 1998b). Despite the desperate housing shortage and the introduction of apartment buildings called rent houses (Guney & Wineman, 2008), the ideal housing types were still single-family detached houses (Guney & Wineman, 2008). Therefore, it was still possible to see gradual extensions of historic residential areas (Osmay, 1998). Moreover, the 1930s was the period when apartmentalisation was criticised (Balamir, 1994) to have ignored the traditional Turkish life style by offering flats to everyone without considering social, cultural, economic differences and forcing them to live on top of each other (Kansu, 2009). Therefore, garden city house type became the alternative; however there has not been a significant increase in the number of houses due to economic constraints (Sey, 1998b).

The emergent problem in the period of 1950-1980 was the extensive construction of informal houses (Batuman, 2006; Sey, 1998a). As an initial response to these slum developments, apartment buildings, which were generally 3-storey and with two flats per floor (Toker & Toker, 2003), were offered (Batuman, 2006). Afterwards, large scale mass housing projects and multi-floor apartment buildings were extensively implemented; however, this caused the replacement of garden houses by apartment blocks (Sey, 1998a; 1998b). In this period, there was no determination in the construction of similar house types because of the emergence of various types of apartment buildings and their extensive construction. Furthermore, there have been important social changes due to the promotion of apartment life style.

The early 1980s was the recession period of housing production because of decreasing demand for housing as a result of the financial crisis and there had also been a significant decline in the ratio of slums by introducing new housing regulations as a result of expanded liberal economy policy (Turel, 1989). From the mid-1980s, the housing production has dramatically arisen (Turel, 1989) and the housing cooperatives became more dominant in the construction of collective houses until the 1990s (Sey, 1998a). In the late 20th century high-rise apartment buildings have become dominant (Toker&Toker, 2003). Apart from these projects, there was a new form of housing complexes—gated communities, called '*site*' in Turkish and whose target group was high-income groups (ibid) and the aim was to increase the QoL with the preservation of historical, social, cultural and natural resources and the national identity (Tapan, 1998).

From the 2000s, the emphasis has been given to urban regeneration projects due to rapid increase in the number of slums in Ankara (Dikmen, 2012). Mass housing projects consisting of an isolated group of apartment buildings which are at least 5-floor or more and usually linearly arranged in a plot and the borders of which are clearly defined have continued to be

implemented. Currently, this type of housing is still the most popular type of collective housing.

Case studies

From the general description of the evolution of house form in Turkey, five morphological phases can be identified: The late Ottoman Empire period (1890-1923), the early republican or modern period (1923-1950), industrialization period (1950-1980), liberalisation period (1980-2000) and the contemporary period (2000s). Similar phases are acknowledged in literature by various researchers (e.g. Ataov&Osmay, 2007; Ozbek-Eren, 2012; Tekeli, 1998). These phases represent the periods when different external influences have been received. This study analyses these phases under three sections: Traditional, transitional and contemporary (Figure 1).

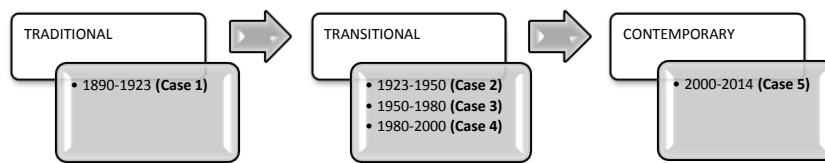


Figure 1. The categorisation of the morphological phases.

The investigation of the evolution of house form under economic, administrative, social and cultural changes starts with traditional single family houses, focuses on how these houses have developed over time and transformed to apartment buildings in contemporary Turkey.

The traditional period

The design of the traditional Turkish houses developed based on two main elements: rooms and a hall (called '*sofa*' in Turkish) (Tavsan and Sonmez, 2013; Oztank, 2010). It is acknowledged that despite the variety, there are three main types of traditional Turkish houses showing differences based on the location of the '*sofa*': with outer hall, with inner hall and with central hall (Figure 2).

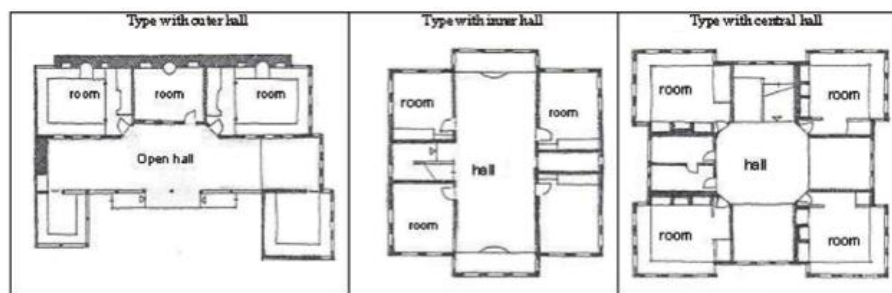


Figure 2. The main traditional Turkish house plan types determined by different arrangements of Rooms and the Hall (Oztank, 2010, p.273).

The hall in all types was not only a passageway but also a place where residents and/or guests interacted with each other (Tavsan & Sonmez, 2013). As the traditional types transformed, *sofa* had turned to an interior space serving as a living room, which directly opened to the rooms. Each room was designed to serve one nuclear family and the extended family shared the entire house. Every family member had to pass through the *sofa* to access his or her more private family rooms. One or two sides of these rooms generally project outwards

from the outside wall of the ground floor [Fig.2c] to expand the view and increase the control over public realm by looking at who came to the house through the narrow windows located on the projected side wall (Yildirim & Hidayetoglu, 2009). Overall, therefore, traditional spatial arrangement has played a key role in creating opportunities for social interaction and protecting privacy at both family and social levels.

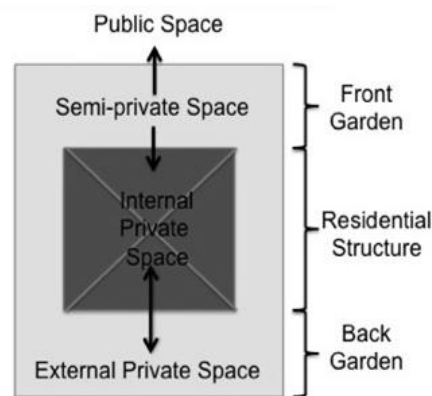


Figure 3. The relative organisation of private, semi-private and public areas in traditional house developments (By author).

The importance given to privacy was also evident through the relationship between a housing unit and its surrounding because of Islamic rules. For instance, these houses had at least 2 floors and there was limited interaction with the lower floor, and the main living space was usually on the upper floor (Tavsan & Sonmez, 2013). Moreover, the size of windows was smaller on the ground floor than that of the first and/or second floor. The connection of the house to the public realm was provided by private and/or semi-private walled-gardens around the house [Fig.3].

Regarding traditional Turkish neighbourhood structure, neither buildings nor streets were randomly organized. Even though the houses were designed individually, they were respectful to each other and became a part of a whole. Houses and streets always defined boundaries in both 2 and 3 dimensions (Oktay, 2004). For instance, streets were hierarchically ordered based on inhabitants' needs, which was achieved through organic street development from the main streets to narrower ones and ending up with cul-de-sacs (Oktay, 2004).

Overall, the traditional housing formation at building, street and neighbourhood scales has been designed strongly depending on the social life style. Currently, it is widely believed that the traditional Turkish houses were the best house types which have satisfied the needs of the Turkish people for centuries in terms of having an appropriate shape and plan based on the life style, culture and morals of the traditional Turkish family (Oktay, 2004;2002). It can be predicted that the reason for this achievement lies behind the naturally established relationships between private, semi-private and public areas at both small and larger scales.

Transitional period

Transitional period presents the housing developments from 1923 to the 2000s under 3 sub-periods. This section will analyse 'Bahcelievler Housing Cooperative' in the period of 1923-1950, '14 Mayıs Houses' in the period of 1950-1980, and Apak Housing development in the period of 1980-2000.

Bahcelievler housing development

Bahcelievler housing development planned by Hermann Jansen in 1934 in Ankara was the first garden city in Turkey and has been actively used until the 1950s (Kansu, 2009; Yalcinkaya, 2007; Ucar, 2005). After the 1950s, the settlement has undergone rapid urban transformation (Yalcinkaya, 2007).

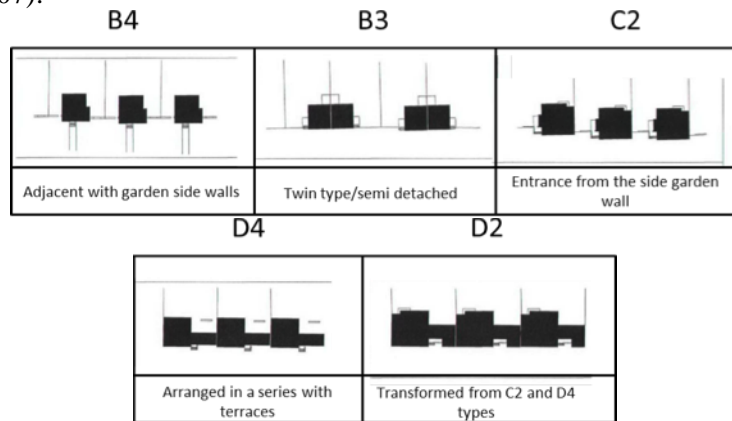


Figure 4. Bahcelievler Garden city house types (Adapted from Ucar 2005, p.101).

The development consists of five house types: B4, B3, C2, D4 and D2 [Fig.4]. B4-type houses, which were mainly located on the south of the site, were the majority of the settlement [Fig.6]. As an individual unit, this house type had two-floor with level entry onto the lower floor: The living room and the kitchen were located on the ground floor and the bedrooms were on the first floor. The separation of day and night activities was new for Turkish people.

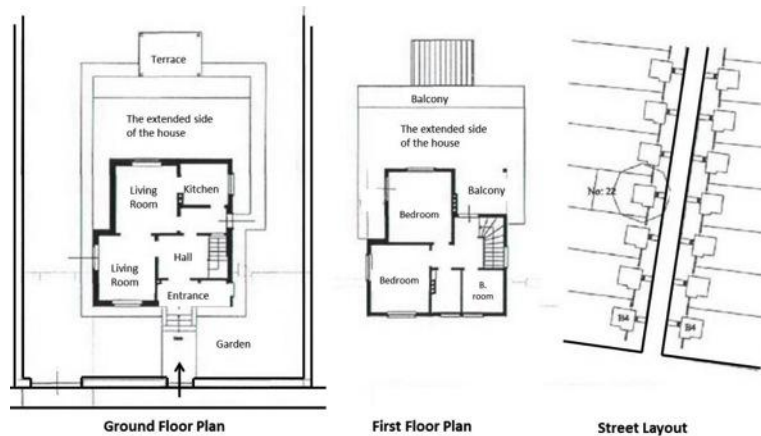


Figure 5. B4-Type House layouts (Adapted from Ucar, 2005, p. 104).

The accesses to these function areas in both floors were provided via a hall. Unlike in traditional houses, the hall was not a common room anymore but only a passageway. Nevertheless, the hall is still an important part of the housing layout, centrally located and separated from the entrance. It was essentially different from the entrance halls or short corridors in English garden houses. The location of the living room allows the residents to have control over both the street side and the garden side. The living room was designed as two sections separated by a glass panel door, which allows residents to customise the living room depending on changing daily activities. For instance, when they have guests, they could turn the back half of the living room into a bedroom or if one of the family members is an elderly, this

room generally given to him/her because of its privacy and ideal location to other functional areas of the house.

The entrance to the houses is directly from the street through a front garden, which is more public and there is a back private garden accessed through the house from the kitchen balcony on the ground floor and through a secondary side entrance [Fig.5]. This also contributes to the natural connectedness. Privacy is also important in these houses. The garden walls on the street side are higher and there is a clear separation between front and back gardens. The residents can both benefit from social and environmental contact and have more private family life away from the public space.

All house types are linearly arranged along the streets and have their own private gardens at the back. They were detached houses located close to the street side in individual plots; however, there was a continuous façade pattern formed by the erection of pergolas between two houses, which has well defined the borders of the street (Ucar, 2005). Although the built up density of the site is low, the adjacent arrangement of houses along the streets gives the feeling of living in a high-density area. The narrow streets contribute to this feeling. It can be interpreted that this connectedness gives the site a distinct neighbourhood identity.

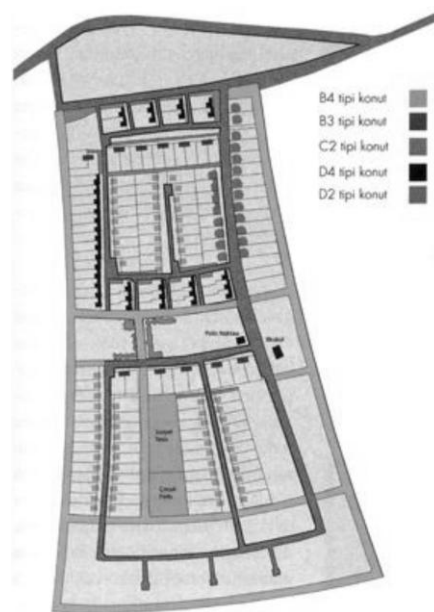


Figure 6. Bahcelievler Housing development site plan 1938 (Kansu 2009, 5).

Although these houses were introduced to promote the modern nuclear family life style as an ideal, extended families inhabited the homes and sustained their traditions because the 1930s was the period when traditional life style was still dominant and familial relationships were still strong. Thus, families were more likely to occupy the house differently than the layout suggested. However, the introduction of the functionally defined rooms has resulted in the integration of western oriented family life style and the traditional ones. Despite this, by the late 1930s, this new housing type has been adopted as an appropriate model of housing for Turkey, interestingly for all social classes (Kilinc, 2012). This might be because they could, unlike rent apartments, offer natural connectedness and similar hierarchical relations between private, semi-private and public areas despite the fact that they did not offer the same spatial and functional organisation at building scale. In terms of street layout, this new type had offered more regular and rigid street layout compared with the traditional network. However, the connection of the each house to the street by a common front garden and small entrance balconies provided the desired level of social interaction and helped develop neighbourhood relationships. Overall, this new housing type was not a direct importation and deviated from its European counterparts;

what is more, they were good at fostering a more common life at both family and neighbourhood scales.

14 Mayıs Houses

14 Mayıs houses are the important housing developments reflecting the concept of the housing in the period of 1950-1980. The settlement was constructed in two stages in the years of 1951-53 and 1958-59; and consisted of two main house types [Fig.11], which have undergone functional, social and spatial transformations until today (Belli & Boyacıoğlu, 2007).

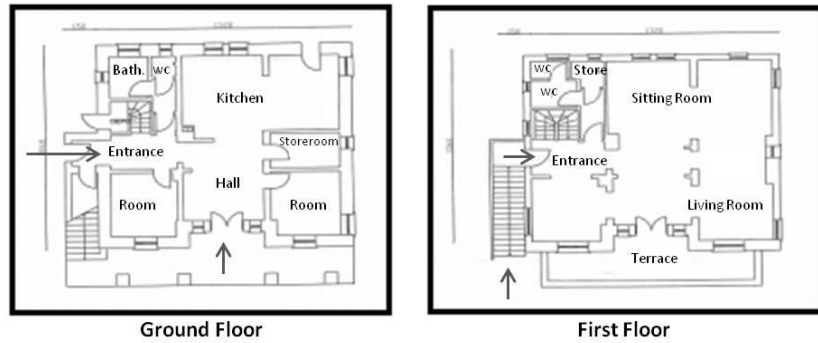


Figure 7. 14 Mayıs Houses Type 1, Ground and First Floor Plans. (Adapted from Belli ve Boyacıoğlu 2007, 721)

The functional zoning in Type 1 is distributed over two floors as in Bahçelievler houses and the function of each room is defined unlike traditional houses. However, the location of the rooms around a central hall reminds the traditional housing layout and shows that the view towards outside is also important for the residents.

Similar to traditional houses, the living room is located on the second floor and the view is extended with the use of the terrace at the front facade, which imitates the projection of the rooms on the first floor like bay windows in traditional houses. Bathroom and toilets are accessible through a separate corridor from the entrance differently from the traditional and garden house types. It is also important to point out that there is still a clear separation between the entrance that is the first contact place to home and the hall.



Figure 8. Type 1 May 14 Houses Garden-Entrance relations (Tanidik, 2005).

Type 2 has two storeys and one flat on each floor accessed through a semi-public staircase, which is a transitional space between public realm and the more private entrance halls [Fig.9-10]. The hall called ‘sofa’ in traditional houses is not an important design element anymore and has turned to a single entrance hall that leads people to the sitting room, toilet and a secondary hall. Private bedrooms and bathroom are reached from this secondary hall, also called night hall. Therefore, the house has a dual usage due to corridors providing alternate routes from different zones within the house.

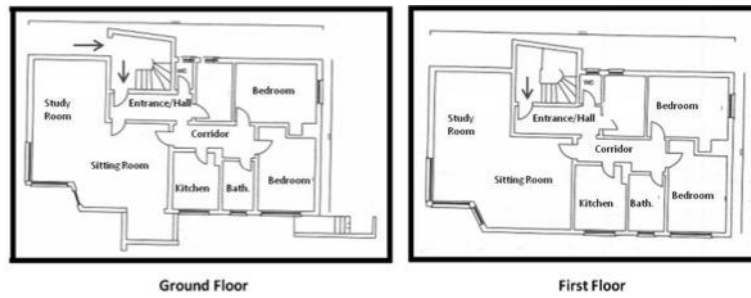


Figure 9. 14 Mayis Houses Type 1, Ground and First Floor Plans. (Adapted from Belli ve Boyacıoğlu, 2007, p.722).



Figure 10. Type 2 May 14 Houses. (Belli & Boyacıoğlu, 2007).

It can be understood from clearly defined different sections within the house that nuclear family life style has been adopted; what is more, personal privacy has become more important than the family privacy which was more important in traditional houses. This also shows how the concept of privacy has changed and how this is reflected by the housing design.



Figure 11. Site Plan (Belli & Boyacıoğlu, 2007).

Both types are located in individual plots with an entrance from the street. While the Type 1 is more protected with high garden walls [Fig.8], the Type 2 is more open to the public [Fig.10]. The whole settlement consists of the linear arrangement of the plots and is low-rise medium-coverage similar to Bahcelievler Housing Development [Fig.11].

Overall, Type 1 has offered both traditional and modern life style characteristics, while Type 2 as a modern version of Type 1 has promoted apartment lifestyle. It is clear that there have been a significant shift from extended families to nuclear families with the introduction of new housing layouts and spatial organisations. Moreover, a transition from single-family housing units to low-rise multi-family housing units has been succeeded in this period. Therefore, this period can be considered as a period when apartment living has been adopted as a life style, which has an impact on both social and family life style.

Apak Housing Cooperative

From the 1980s, apartment blocks have become dominant housing types developed by the increasing number of housing cooperatives (Balamir, 1994). One example is Apak medium-rise medium-coverage housing development completed in 1993.

Each flat consists of a single entrance hall as in Type 2-May 14 houses; however, it is large enough to receive/send guests. This is because it directly opens to the living room, which is the largest room generally, used to host guests. There are three other rooms used as a sitting room, a master bedroom and a children bedroom; and the hall plays a key role as a transitional space between them. There is no clear separation between day and night uses of the house unlike in Type 2-May 14 Houses; however, there is a secondary corridor connecting to the entrance hall via a door and defining the private section of the house such as the bathroom and the master bedroom. Except this private section, the rest of the house is quite integrated, flexible to change and actively used during the day.



Figure 12. Site entrance.

The high integration level provided through the halls within the house also helps to customisation of the space based on the needs. For instance, the living room which was firstly only used to host guests, has been used as a living room nowadays depending on the size of the family and the need for an extra bedroom or a study room. However, this has also caused changes in family relationships and individuals have given more importance to their personal privacy in their own private rooms and have become less socially interacted with other family members which is currently criticised.

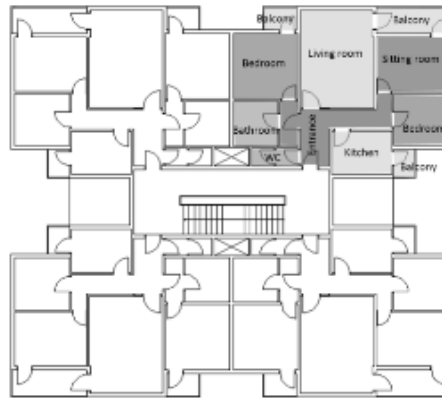


Figure 13. Typical Floor Plan.



Figure 14. The defined spaces between apartment blocks.

The flat also has three balconies one of which connects living and sitting rooms and is larger than the other two. The main balcony overlooking to the courtyard contributes to social interaction within family members and/or guests in summer; however, the close distance between the blocks invades the privacy, which also causes the residents to erect PVC and/or glass panels and blind/curtain systems to protect their privacy. However, the balconies are also important design elements contributing to social interaction with the other neighbours in other balconies and acquaintances passing through the site.



Figure 15. Apak Housing Development Site Plan (www.googlemap.com).

Each floor consists of four flats accessed through a semi-public staircase and the whole block has two entrances on the ground floor [Fig. 13]. The site borders are clearly defined and the access to the site is partly restricted by site administration as a gated community.

The complex consists of identical 8 five-floor blocks linearly arranged in two rows with a courtyard in between [Fig.15]. Each building faces both the street side and the courtyard side, which gives an opportunity of having both environmental and social contact and natural connectedness for residents.

Overall, although this development consists of isolated apartment blocks, it creates the opportunities for social interaction in terms of both site arrangement and house layout. Therefore, the spatial organisation contributes to life style of the residents, however, at the same time invades the privacy and promotes the individualisation which results in changes in family and social relations.

Contemporary period

From the 2000s, the construction of gated communities has continued; however, the new developments are generally high-rise, low-coverage, mixed-use housing developments. One example is 12-floor 'Anatolya İkizleri' (Anatolian Twins) constructed in 2007.

In terms of internal layout, similar to the Type 2-May 14 houses, the flats are rigidly divided into two sections based on the day and night activities. Differently, the entrance is quite spacious and leads people directly to the kitchen, the living room, the toilet and the corridor. The corridor opens to the private section of the house, which includes three bedrooms and two bathrooms. The independence of the sections to each other has resulted in the emergence of a very long corridor, which jeopardises connectedness within the house, and decreases the residents' control over the house. This is because of decreased frequency of use and restricted flexibility of house layout. However, this can be also interpreted as a good design feature for the desired level of privacy.

The balconies are important design elements providing interaction to the outside of the house because of the difficulty in establishing physical contact to the ground floor in high-rise buildings. The balconies are not narrow as in the apartment blocks of the transitional period. Their size is almost close to the average room size and gives an opportunity to host more people.

Similarly to Apak Houses, each floor consists of four flats and the development consists of 2 blocks connecting to each other through a car park and a commercial development. The distance between the tower blocks increases the level of privacy and promotes the primacy of family life. However, social life is restricted by the site development in terms of opportunities for social interaction. There is also no interrelation with nearby developments.

Overall, the introduction of this type has increased the importance given to family life and contributed to introvert life style by ignoring the social context outside and by giving opportunities to host more people inside. Although residents are satisfied with their self-contained flats and their independency, this has been causing important changes in development of societal relations.

Discussion

As can be seen from the evolution process analysed through case studies above, residential areas in Turkey have undergone rapid urban transformation since the late Ottoman Empire period.

In the traditional period, the houses had their unique characteristics in spatial organisation which resulted in rhythmic street layout, dynamic and distinctive view from individual houses, connectedness to nature, appropriateness to family and social life, providing opportunities for social interaction, and hierarchically organised private, semi-private and public spaces for centuries.

The transitional period saw less appreciation of traditional characteristics in massive residential developments, which has caused the lack of vitality and liveability (Oktay, 2004). To tackle with this problem, garden houses offering both traditional and modern housing features have been proposed. However, while each housing block has been designed individually in the traditional settlements, housing has lost its individuality and turned to groups of linearly arranged housing blocks (Erturk&Ozen, 1987). There have been significant changes in housing layouts. For instance, the hall called 'sofa' in traditional houses has been replaced by the entrance-hall combination and has lost its living room function. Moreover, rigid functional zoning has decreased the flexibility and customisation of housing space. Extended families have eventually converted to nuclear families and apartment life has been adopted as a lifestyle. However, despite the incompatibility between the suggested layout and the life style, there were still traditional housing characteristics in early apartment examples. Inhabitants were also open to alter their space usage based on their needs even if they were not offered by the housing developments.

In contemporary period, these changes have become more prominent and standardization has forced residents to adapt themselves to the physical environment rather than the other way around. The opportunities for social interaction in contemporary housing development have been weakened. The function areas have become less connected and independent to each other. There has been a significant shift from living-centred organisation to transition-centred organisation with the introduction of long corridors. Although privacy is still taken into consideration during this period, the impact of life styles on housing design has been weakened. Natural bonding and its contribution to social interaction have also been less appreciated. The housing developments have been individualised and disconnected to their surroundings.

In terms of typological processes, traditional house types were the ones showing continuous transformation and gradual adaptation to the changing life styles. Garden houses can also be considered as a part of a typological process because of offering similarities to the traditional house form or being eligible to be adapted to traditional life styles. The next group of houses can be seen as transitional types showing inconsistency between traditional and the modern; but at the same time offering a new life style. The last two groups of houses are imitated copies and completely broken away from a typological process.

It is clear that typological changes play an important role in adaptation of life styles. However, as it can be seen from the case studies, the gradual adaptation of physical forms has failed to meet the requirements of changing life styles, and housing developments have become less integrated and less reflective over time. Whereas, according to Rapoport (Bretonne, 1979, p.118), the '*good fit between life style and the environment*', and '*very high degree of relevance*' between people and physical environment can only be achieved when it is used by them '*in very appropriate ways*'. Unfortunately, Rapoport's (Bretonne, 1979, p. 114) concept of 'systems of settings' which refers to the perfect fit between people's life style and the physical settings has been weakened in contemporary housing developments. Whereas, 'the continuity of a culture is closely associated with the continuity of its housing architecture' (Tavsan & Sonmez, 2013, p.60). Therefore, it is really important to sustain the adaptability of physical forms to local culture and life styles.

Conclusion

While some elements of urban form are kept alive, the others may be replaced or destroyed by the new ones over time (Oktay, 2002). Given this, the continuity of types has been broken in the process of transformation. Standardization in planning and design practices has caused the destruction of the uniqueness of places (Oktay, 2004). Especially in the last three decades, these rapid changes have caused the replacement of house traditions by new apartment blocks which are built at a massive scale, with little thought given to family structure and neighbourhood organisation (Oktay, 2004).

Erturk&Ozen (1987) state that currently Turkish housing planning which forces people to live in unfamiliar houses is completely dependent on coincidences and affectation. Given this, it is fairly difficult to mention an ideal housing type that contributes to users' satisfaction and Turkish lifestyle. This requires the reinvestigation of typological processes of house types and their contribution to better QoL. This paper is a part of an on-going PhD research, which deals with this problem and will use QoL indicators to measure users' satisfaction in relation to each house type over time. It aims to prove that gradual and constant typological process plays a key role in developing better living environment.

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Athens and military architecture

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Abstract. *This paper describes the relation between military areas and the form of the current city of Athens, as it derives from the main urban plans and their elements during the nineteenth century and the purpose is to show how the settlement of military areas has influenced the construction of the modern city. In addition, nowadays all these buildings have been left to stand derelict and have become a dual challenge for the city: on the one hand, to manage to reuse this important architectural heritage and on the other to succeed in reconnecting these projects with the city. Through a certain number of plans and an urban scale analysis, the objective is to study the projects of these military areas, focusing on the design, the typology and their settlement principles. In other words, the aim is to analyse them so as to understand the process of their construction and their influence on the evolution of the modern city of Athens. What emerges from this analysis is the fact that the early projects of the barracks during the nineteenth century are closely related to the city plans, the urban elements and the history of the city. Moreover, it's important to underline that even in those cases the military buildings have been demolished, many urban voids have been created that have offered new opportunities for the growth and the expansion of the city.*

Key words: Settlement principles, military building, nineteenth century, urban types, urban growth.

Introduction

Athens when it became the capital of the Greek newborn state in 1833 was a small city shrunken to the foothills of Acropolis with no more of 4000 inhabitants (Travlos, 1960) and its urban limits were extended to a point not further than the roman defensive walls of emperor Hadrian. What came after, during the nineteenth century, was a series of plans for the construction of the modern city. The aim was to provide Athens with the aspect of a European capital preserving at the same time the ancient heritage and proceeding with the excavations into the archaeological areas.

Particular attention was given to the projects of military barracks which were considered as important services for the new city. For this reason were constructed remarkable specialized structures that occupied entire parts of the new city and the models that were followed for these projects derive from the European renovated military building typologies.

The attempt made here is to analyse both the relation of the military barracks with the rest of the city and the way these notable urban areas and buildings have influenced and have determined the form and the growth of Athens.

Through an urban scale analysis of the relationship of the individual military building with the urban organism of six examples of military complexes of the city of Athens, the intention is to identify the settlement principles and the relation between the single element/building and the whole plan/city (Figure 1). This will be an important contribution to the study and to the project of reuse of these areas and buildings in the contemporary days and to the reintroduction of their tissue into the present city.

The analysis considers an interval of time between 1833, the first plan of modern city of Athens and 1997, the moment that the Greek Army returned to the municipality large part of the military area of Goudí, a suburb in the eastern part of the city.



Figure 1. A map of Athens with the barracks and the military areas: 1. The building of the royal palace the current Greek parliament, 2. Kleanthis-Schaubert plan, 3. Leon von Klenze plan, 4. Vasilissis Sofias barracks, 5. Cavalry barracks, 6. Officers School in Pedion Areos, 7. The military area of Goudi.

The first two projects have never been realised, as well as the plans of which they made part, that is, the plan of Kleanthis and Scaubert and Leo Von Klenze plan. The third case, along Vasilissis Sofias avenue, concerns the first complex of military buildings constructed in Athens, the next two projects in Pedion Areos are the first to be constructed at a distance from the city centre, while the last case in Goudi was one of the largest military areas of the Attic Basin.

The city planning proposal by Stamatios Kleanthis and Eduard Schaubert

In the first years after the Independence, different buildings had been used to house the Greek Army; for example Villa Ilissia, the present Byzantine Museum, was the School of Army Officers and only in 1900 when it was transferred to the new buildings in Pedion Areos, did the Army returned it to the municipality of Athens (Biris, 1996). The first organized military structure for the Greek capital appeared in the plan of the architects Stamatios Kleanthis and Eduard Schaubert.

The plan was commissioned for celebrating the union of the city with the rest of the country and the transfer of the capital from the city of Nauplia in Peloponnese to the new site. Even if it

had been revisioned many times by many planners, it has influenced dramatically the form of the contemporary city.

The important element of this plan is its triangular shape, which determines the position of the main elements of the city construction: the government centre, the economic centre and the religious-cultural one. The form of the plan derives from the long tradition of baroque urban plans such as the roman trident, the plan for Karlsruhe and Berlin, the plan of Helsinki and of Saint Petersburg (Venetas, 2001). Particular attention was given to the orientation of the triangle so as the future Athenian citizens to contemplate the ruins, the monuments and the Athens landscape through certain interesting views.

What we should notice here is the relation of the military buildings with the royal palace. The military barracks here are the extension of the government buildings and they contribute to the construction of the city, to its elements and to its architectural elevations (Figure 2). They are positioned onto an axis from east to west and perpendicular to this one of the royal palace; the armoury to the eastern and the barracks to the western part of the plan. The barracks with the other public buildings create a round square which in its turn becomes part of a wider system of round squares and wide roads and consequently part of the whole city plan. The complex of the buildings of the military barracks forms also one of the urban gates of Athens, an urban fortified gate. It therefore substitutes the defensive urban walls and symbolizes the fortification of the city and of the royal palace as well.

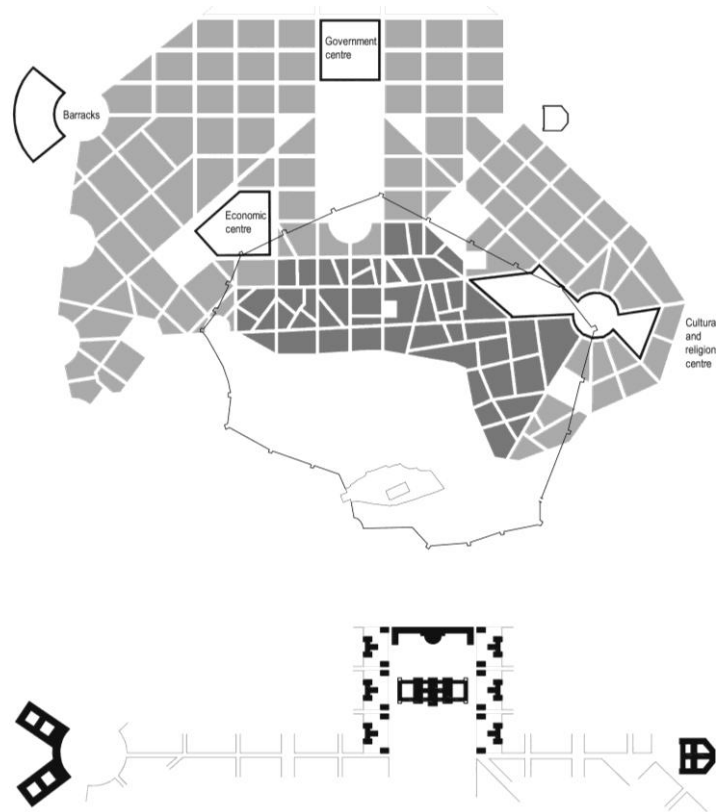


Figure 2. Scheme of Kleanthis-Schaubert plan and analysis of the relation between the military buildings and the royal palace.

The revision of the plan and the new proposal of Leo von Klenze

The plan of Kleanthis and Schaubert is considered too expensive and Leo von Klenze is asked to review it. For this reason he draws up a new plan that keeps the shape of the triangle but

reduces the width of the roads, the number of tree-lined avenues and squares and also decreases the area to be expropriated for the archaeological excavations. He favours in this way one type of continuous and denser construction that, according to him, is more suited to a Mediterranean city (Venetas, 2000). It also considers improper the location of the royal palace and therefore arranges the whole government centre from a central location at the foothills of Pnyka.

Although the royal palace is positioned to the western vertex of the triangle and it is not anymore the central element of the whole composition, as in Kleanthis-Schaubert plan, it maintains a strong relationship with the buildings of the barracks (Figure 3). The group of these buildings creates not only a fortified urban gate but even a kind of propylaea for the new “Othonopolis”; they are arranged symmetrically each to other but in a very dynamic way; while one forms an open courtyard reserved for the soldiers and it is combined with a large internal piazza d’armi, the other part with a more complex volume will be used for the officers.

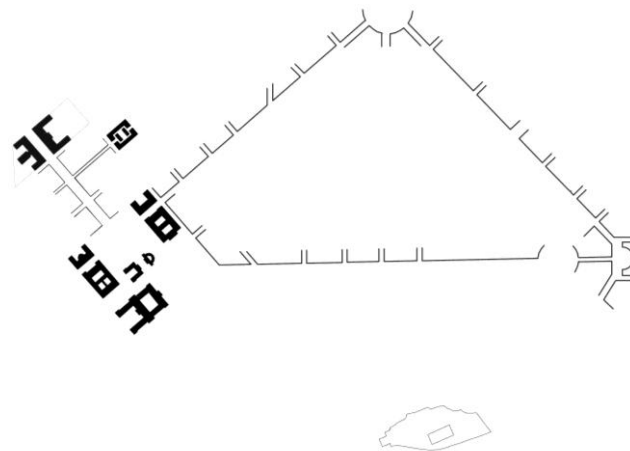


Figure 3. Scheme of Leo von Klenze plan and analysis of the relation between the military buildings and the royal palace.

The route of a visitor to this new city, oriented towards the royal palace, is characterized by a succession of interesting elements; has to pass through the monumental gate/barracks, to walk along the widest tree-lined avenue of the city and to climb up the stairways till the urban government centre of the new Athens.

Once again the plan of Klenze will not be realised and because of the economic difficulties requires further revision. Even if it was not carried out it has affected the same the form of the contemporary centre of the city with narrower streets and less squares. Moreover, this plan and the ideas of Leo Von Klenze for the monumental gate/barracks seems to be in some way the anticipation of its project for the monumental gate of Munich, in Königsplatz.

The plan of Friedrich Von Gärtner and the barracks of Vasilissis Sofias street in 1836

Friedrich Von Gärtner is the reviser of the plan of Leo von Klenze. He maintains the general form of the plan of the city, its density and the character of its streets and squares, but he decides to move the government complex to the east part of the city, on the eastern vertex of the triangle of the plan, near to the foothills of Lycabettos. The previous position of Klenze’s plan was judged unhealthy because of its proximity to the marshy river Kifissos (Biris 1996). He drafts a plan without the squares of the different urban centres, but with only one axis ranging from the royal palace to the round square on the northern vertex of the triangular plan, where are situated the most important public buildings of the university, the academy and the library.

With the construction of the royal palace (1836-1842) begins also the construction of the first military barracks, putting an end in this way to the temporary accommodation of the army, with the settlement of two military complexes along Vasilissis Sofias street, in an obvious relationship with the royal palace (Figure 4). The plan of Gärtner is very essential and because of the limited resources there isn't any intention of designing a great number of public buildings and consequently there isn't any intention of a well-planned military complex around the royal palace. It was thought only a large area at the foothills of Lycabettos as military site, well-connected with the royal palace through the axis of Vasilissis Sofias avenue.

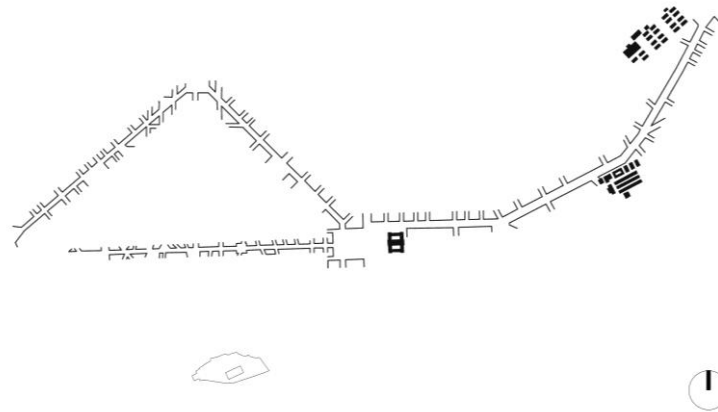


Figure 4. Analysis of the relation between the first military buildings and the royal palace.

Vasilissis Sofias is the contemporary street of an ancient road towards the suburbs of Mesogea, but finished to be almost a country road before the plan of Gärtner. With the military settlements along its axis, the street became in the course of time one of the most important avenues of the modern city.

During the fifties it wasn't necessary anymore for the Greek Army to be in possess of all the military buildings in the area and for this reason many of them returned to the municipality of Athens.

Unfortunately, the municipality decided not to re-use all these important buildings but to demolish them, so as to create space for the construction of a number of other public buildings such as important museums, the National Gallery, the war museum, the American Embassy and the Auditorium, losing in this way a significant part of the architectural heritage of the city.

The barracks of the cavalry in Pedion Areos 1860

The barracks for the cavalry of 1860 in Pedio Areos are the first to be built outside the city and away from the royal palace and it is the first to abolish the established relation between the two main urban elements, the centre of the government and the military centre.

The complex of the military buildings is located in the immediate vicinity, in a distance of about 200 metres of Patission avenue, the important urban axis that connects the suburbs of Patissia and Kipseli with the centre of the city (Figure 5). At the period of its construction the whole region around was a rural area. For this reason the only structures with which it has to be measured were the monasteries and few rural villas and it could be said that its settlement was an attempt of urbanization. From the plans is possible to understand that it was a complex of buildings of interesting volumes and with facades of high civil importance. The succession of architectural elements, such as tree-lined streets, the square in front of the entrance, the facade, the courtyard with its internal parade ground creates in this way a certain number of interesting urban spaces.

During the thirties the barracks was abandoned and in 1944 after a fire it was decided the demolition of the buildings.

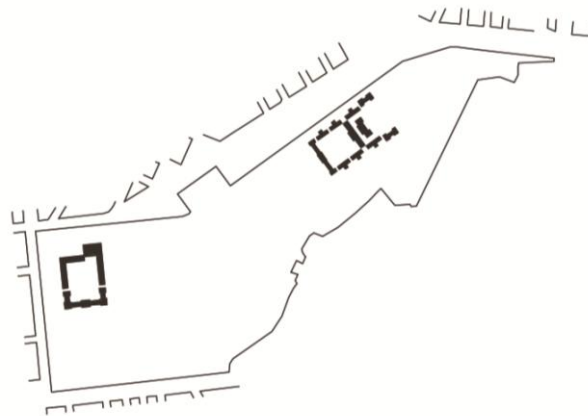


Figure 5. Scheme of the barracks in Pedion Areos.

The Army Officers School in Pedion Areos by Ernst Ziller in 1900

Pedion Areos is a place of great symbolic value for the modern history of Athens; it was a place for military exercises that later became one of the sites for the construction of military barracks and recently became a place of memory for the heroes of the Greek revolution of 1821. In 1860 there were built, as above mentioned, the barracks for the cavalry and from the 1900 until 1904 it was constructed the army officers school designed by Ernst Ziller.

The school was built on a dominant part of the place and with a rich architectural facade of high civil value, which at the same time is contradicted with its isolated position. It is difficult to see in this operation the construction of a temple; in fact it is easier to see an attempt of urbanization of this rural area (Figure 5). The buildings drawn from Ziller are positioned not so far from the other complex of the cavalry, but the two settlements not seem to take into consideration each other. The only common element appears their relation with the natural elements and with the physical features of the ground; both of them are adapted to the course of a little river situated to the north of the site. Ernst Ziller designs eleven buildings, all arranged around an exercise parade ground; the main building of the command, which is the principal building of the whole complex, the school building and other smaller buildings as dormitories for the soldiers.

The case of the Army Officers School is regarded as a successful example of reuse of military architecture in the contemporary city. In 1984 the Greek Army decides to keep only the command building and to return the rest of the complex to the municipality. The architectural complex is considered an asset of high importance and the municipality of Athens decides its maintenance and its transformation into a courthouse.

The part of the project regarding the reconnection of the area with the rest of the city is limited to the creation of a square in front of the main building, as a way to exalt its front, without considering the challenge of a project that aims to combine the different elements, that are present into the green area and to form in this way a harmonious whole. Moreover, it is very important the connection of these elements and of the entire green area with the city.

The military barracks in Goudi

When begins the construction of the barracks in the early 1900s, Goudi is still a rural area where even the road network is rare (Figure 6). In this large area, were constructed several military

complexes, in separate moments and with a different use. Around 1920 were transferred here also the royal stables from the centre of the city.

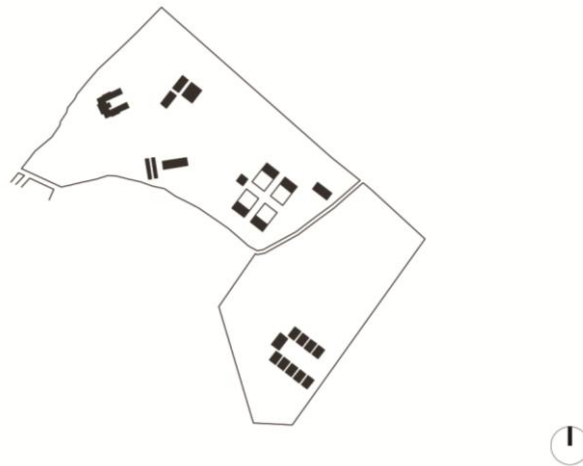


Figure 6. Scheme of the barracks in Goudi.

These isolated military settlements become not only factors of urbanization but at the same time they become the circumstance of the preservation of these areas and of their protection from the division of the ground in building lots and a subsequent dense housing development.

In 1977 it was decided by a decree-law the restitution of an area of 96 hectares and 40 buildings to the municipality that defined their reuse for cultural and sports activities. In the end, only 45 hectares are returned and what still misses is the institution with the law of the Metropolitan Park of Goudi (Polyzos, 2008).

In 2000 started the re-use of an area of about one hectare, consisting of four identical buildings, a parade ground and the green area in front of it. Two of the buildings house the National Glyptotheque, while the other two remain still abandoned. (Figure 7) The complex was inaugurated in 2004 with the occasion of the Olympic Games.



Figure 7. The entrance of the National Glyptotheque in Goudi.

Conclusions

After having examined the most significant cases of military architecture, it can be said that military buildings in the first plans of Athens were built close to the royal palace, maintaining

their relation with the rest of the city. The projects of the barracks are part of a general urban design, characterized by strong relationships between the various elements. While regarding the more recent examples, we notice a weakening of these ties and the construction of introvert and isolated buildings from the rest of the city. In short, the first thing that emerges from this analysis is the fact that the first projects of the barracks during the nineteenth century are strongly correlated with the plans of the city, urban elements and urban history.

Moreover, as it can be seen from the last two areas analyzed, the re-use of military areas of Athens from the eighties onwards have often had positive outcomes. A huge architectural heritage is preserved and is decided to reuse these buildings with new functions, with the arrangement of public institutions and with the creation of large open spaces.

Taking a look on the urban area of Athens it is easy to understand that a considerable number of the urban green areas consist of former military settlements that the army decided to return to the municipality. Although in cases the military buildings are demolished, such as the large complex along Vasilissis Sofias avenue, it was created a large number of urban spaces that have opened up new opportunities for the growth and the expansion of the city (Figure 8).

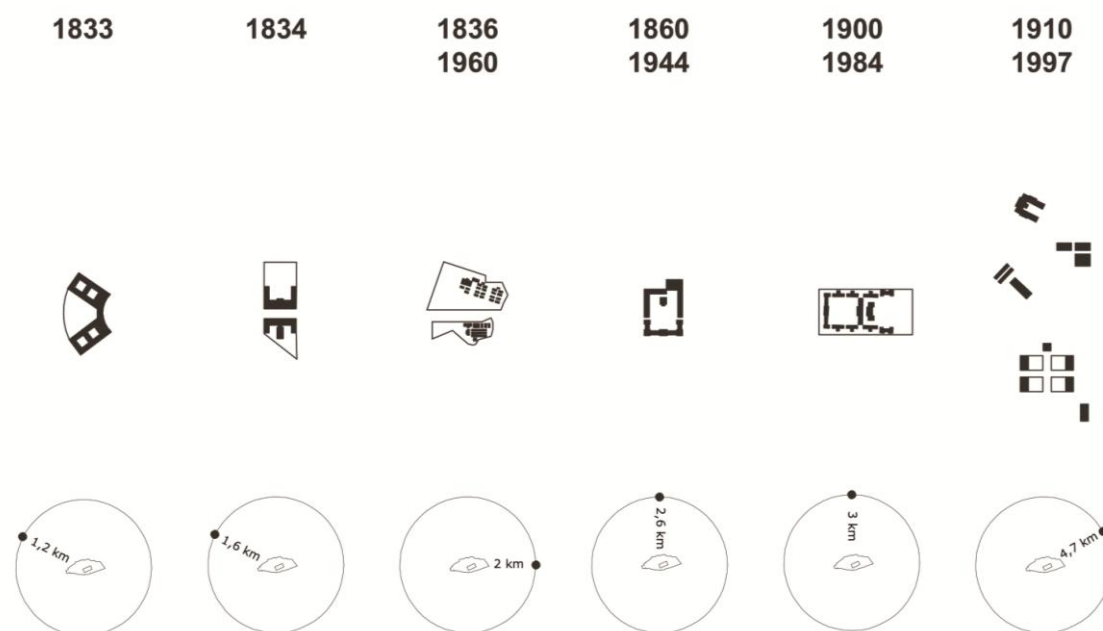


Figure 8. Analogies, differences, distance from the urban centre of the analyzed cases.

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Transformation of urban blocks and property relations: cases from the Historical Peninsula

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Abstract. *Urban form which is defined as the union of streets, plots and buildings, in the historical evaluation of the towns, also represents legal entities which imply tools for urban planners and designers to design, to transform or to conserve the sites. In this context, this study aims to recognize urban form as a product of property relations and investigate the morphological regions in the case of Istanbul's Historical Peninsula by constituting its discussion on basic concepts of M. R. G. Conzen's morphologic analyses of historical towns. The elaboration for the transformations of urban blocks between 19th century Ottoman period, early republican period of Turkey and historical persistence of the urban form up to today are analyzed in Beyazıt, Aksaray and Yenikapı regions in particular. Thus, it is observed that subsequent to the effects of modernization movement on urban form in Istanbul, large-scale physical interventions transformed urban blocks and contributed to changes in property patterns. The dependence between urban morphology and property relations is emphasized in terms of the development of urban form within historical process. Additionally, due to progressing projects in the peninsula, the danger of disidentification of the Historical Peninsula is indicated.*

Key Words: *Historical Peninsula, morphological regions, urban blocks, urban morphology, property relations.*

Introduction

Reproduction of urban space depends on the transformation of urban form in terms of property relations. When urban designers, planners and architects work on built environment, it should be managed by considering historical progress and the two folded influence between form and social activities. Particularly, in urban morphological studies, it should be practiced by getting to the root of the components of urban form. The morphology schools of British, Italian and French, having researchers with different backgrounds, observe the urban form for particular goals through particular methods. The British school of morphology focused on how urban space should be built and why, while the Italian school looks for the answer of how cities should be built. French school emphasizes on past design theories to find out what should be built and what has actually been built. However, as Moudon (1997) points out they all studied on urban form with consideration to historical processes and analyzing the main elements of the city; buildings, plots and streets. Larkham states the importance of recognizing urban form and its components as following: "Understanding the physical complexities of various scales, from individual buildings, plots, street-blocks, and the street patterns that make up the structure of towns helps us to understand the ways in which towns have grown and developed" (Larkham, 2005, p.22). Street, plot and building patterns constitute urban blocks based on their physical and territorial connections. The effects of streets to the plots, buildings and the whole block are also crucial for defining what urban block is. Therefore, urban blocks refer to public and private patterns through these relationships of street, plot and buildings as the components of an urban block (Baş, 2010). In this study, urban blocks with each of its components became the main

subject. Regarding this, transformation of the urban space is clarified through elaborating urban fabrics of three regions in the Historical Peninsula.

Günay (2006) explains that urban form production refers to the two and three dimensional combinations. In order to reorganize or design the parts which indicate identity of urban form, firstly property, as two dimensional, is a need for them to be reshaped or reserved. In this process, the form of private and public space of the city is settled. Therefore, the concept of development rights determines the three dimensional form through property reorganizations. As long as it creates the form and space of the cities, ownership structure and legal establishments like development rights influencing morphology of the urban spaces, indicates significant design problems for designers (Günay, 2006).

In regard to this perception of urban form components, examination of urban blocks from the maps within different resolutions and different historical periods as can be seen in Conzen's studies are recognized in order to clarify the connection between morphology and property relations.

Influence of property relations on urban morphology

The evolutions of the property concept and its enforcements have been changed according to the societies. However it can be seen that the meaning of property refers to particular objects from the definitions. Günay (1999) states that claiming the property only as some objects to own separates it from the main concept substantially. Many theorists construed the concept according to the basis of being private, common or public and a bundle of natural rights or legal enforcements of societies. Property rights are highly associated with the laws, the state, economy and culture. Usufruct, exclusivity and alienability which can be owned by solely one person or can be shared by counterparties are also the rights implicated in property. These rights bring along some permanent relations, which can be seen as the recognition of plots and building blocks surrounded by street patterns in urban space. Evolution of urban space as a product is determined through property relations. Macpherson (1978) explains property relations in the context of Marxian thought as outcomes of significant crisis in history beforehand such as transformations in regimes of countries, and following relationships between land ownership systems. Primarily production relations within economical basis bring property relations. Property relations, in which production and consumption activities maintain, generally influence the space. As well as being the main subjects of property, structures and lands constitute physical expression of urban space. Property relations contain *usus fructus* or *abusus* of space, occupations, possessions, dominations. They also explain the dualities like right or thing, absolute or relative, ownership and possession, private and public, corporeal or incorporeal, movable or immovable (Günay, 1999).

The political power or the state recognizes the property ownerships, therefore legal relations become determinant for organization of urban spaces (Günay, 1999).

Morphological explorations in the Historical Peninsula

Istanbul is the most crucial city in Turkey with regards to social, economical and demographical parameters which have been affecting the city since Byzantium period. With its long historical background, the changes in the morphological structure of Istanbul can provide us to understand what kind of relations among urban planning and urban design practices, socio-economical activities and politics have influence on urban form.

In this respect, Istanbul's Historical Peninsula is taken as the case area. The Historical Peninsula is surrounded by Bosphorus, the Golden Horn and the Sea of Marmara. Transformation of urban fabric in the Historical Peninsula is explored in detail through the cases of Beyazıt, Aksaray and Yenikapı as shown in Figure 1. Beyazıt and Aksaray regions, connected to Ordu

Street which constitutes the spine of the Historical Peninsula ever since Byzantium period. Yenikapı region, having its boundary with the sea, is located next to Aksaray region at the south part of the peninsula.

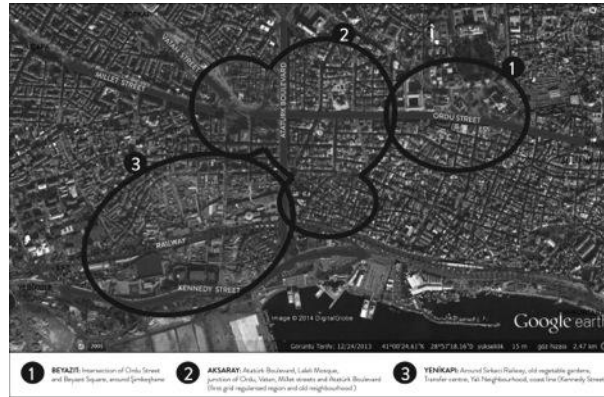


Figure 1. Focused case areas and important transportation axes which become deterministic for the study. 1st region Beyazıt, 2nd region Aksaray, 3rd region Yenikapı.

Beyazıt Square and surrounding

In Roman period (Figure 2), place of Beyazıt Square was Forum of Theodosius which was located on the space between Beyazıt Mosque and madrasah of today. It had a triumphal column in the middle like other Roman forums and it was connected to Mese. There was a triumphal arch which was erected on the west side of the Forum. Also, today's area of Istanbul University (faculty of letters and sciences) had been at the place of three Basilicas of Byzantium. Around the forum, civic buildings like churches were built (Kuban, 1996).

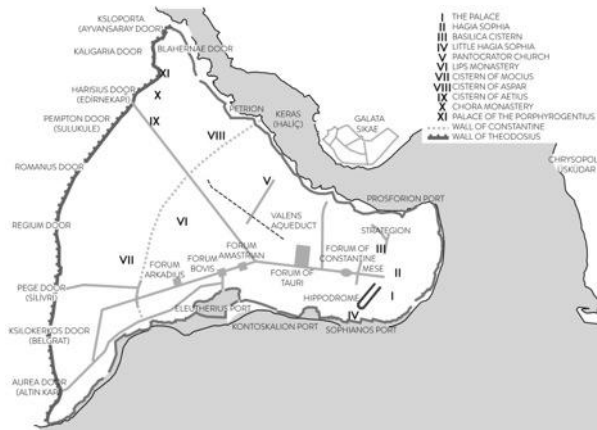


Figure 2. The Historical Peninsula at the Byzantium Empire period.

As Istanbul was conquered by Ottomans in 1453, Old Palace was built at the north side of the forum, where is the highest point of Beyazıt. Mint of Ottoman (Şimkeşhane), bazaar areas and Grandbazaar were formed at this period. In the 1500s Beyazıt Mosque and *külliye* (Islamic social complex) was constructed and the square took a new shape and it became the centre of Istanbul. In the 1800s the Mosque integrated to Beyazıt Square. In 19th century, the square was used as bazaar/exhibition area (Kuban, 1998).

In early republican period of Turkey, Beyazıt Square was designed and planned many times. Between 1923- 1924, a fountain pool in round shape was placed in the middle of the square and tramway line entwined around the pool (Kuban, 1998). Later, motor vehicles dominated the area. In 1933, the Old Palace building was given to Istanbul University. With the plan of Prost in 1937-1938, traffic flow was removed from Beyazıt Square and it began to serve as a public square again. In the beginning of the 1940s, the faculty of letters and sciences of Istanbul University was built. The building became a new morphotype with its huge size and architectural style in the urban fabric.

The significant changes in these areas were seen in mid 1950s. In the years of 1956-1957, known as Menderes period in Turkey, Divanyolu (Ordu Street) was expanded from 9,5m to 30m. That development in the spine of the Historical Peninsula brought the destruction of many historical buildings like Şimkeşhane and Hasan Paşa inns as well as several urban blocks (Kuban, 1998). Moreover, with the expansion of Ordu Street, Beyazıt Mosque, the bath, and some other commerce buildings began to stay in upper level whereas Ordu Street was developed in lower level. After that, new commerce and business buildings began to build up in the area. In the 1960s, several projects for Beyazıt Square were added to the agenda. Especially after 1980, urban design competitions were organized for the square. Transformations in urban fabric of Beyazıt can be observed from Figure 3.

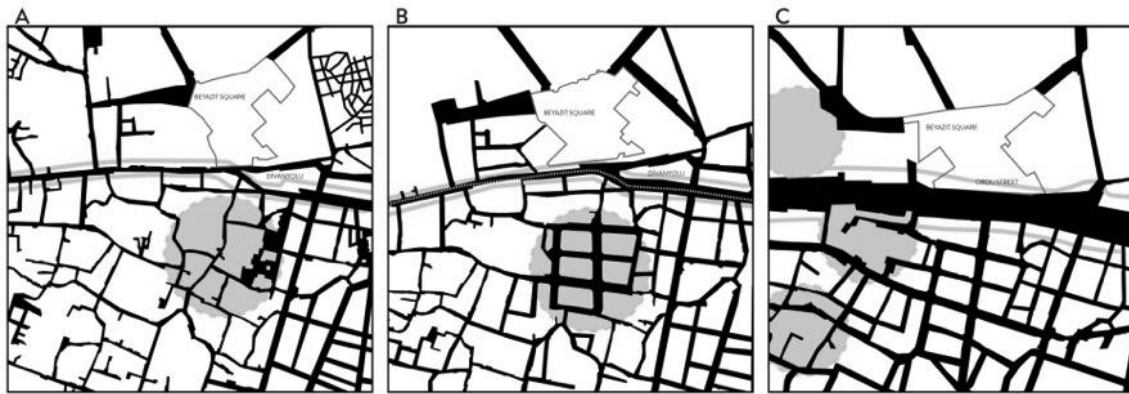


Figure 3. Changed regions marked in street pattern maps of all periods in Beyazıt. A) based on map of 1875 B) based on map of 1935 C) based on map of 2011.

Widening Ordu Street and destruction of historical buildings

In 1470s, old Mint of Ottoman was built in the place of Şimkeşhane. Educational facilities and shops were added to Şimkeşhane in 1700s. Since the mint was moved to Topkapı Palace in those years, Şimkeşhane had begun to be used as an inn. Next to Şimkeşhane, Hasan Paşa Inn was constructed in 1740. Şimkeşhane was abandoned after the fire in 1826, although it was repaired in 1867. During the Republic period, as well as some other buildings and building blocks, the north parts of these buildings were demolished (see Figure 4) in order to expand the road connecting Beyazıt-Aksaray; Ordu Street, in the years of 1957-1958 (Gül, 2012). This caused a significant change in the buildings' physical structure. The courtyard of the buildings began to face Ordu Street and Beyazıt Square.

In the mid-1960s, it was decided that the rest of Şimkeşhane building was to be used as a public library, so its restoration was finished in 1976. Archaeological findings of Forum Tauri from Byzantium period were exhibited in front of the building. Since 1981, the building has been serving as public library of the city of Istanbul, still having an open green space with the archaeological exhibition.



Figure 4. Building blocks destroyed in widening of Ordu Street, based on Pervititch map of Beyazit.

Aksaray: fires, regulations, boulevards

Aksaray region was located at the east end of the Mese in Byzantium period. It was near Forum Bovis and today's Aksaray Street was around Amastrian region. Aksaray was an important trade centre and transportation node since it was on the most primary road of the town and it was quite close to Theodosius Port (Kuban, 1998).

After Ottomans settled the city, this region lost its commercial utilization. Aksaray was populated by the people coming from the city of Aksaray of Anatolia. Thus, the region was named as Aksaray and it was filled with residential buildings in 17th century. Aksaray was one of the most important regions during Ottoman period because of being at the junction of main transportation axis of the town and the huge green areas. Kuban (1998) identifies Aksaray as a meeting place for Muslim and Christian communities around the region. He also claims that Murad Paşa Külliyesi, Pertevniyal Valide Sultan Mosque and Laleli Mosque are the most significant buildings which represent Ottoman identity in Aksaray (Kuban, 1998). This region serves as a model for very urban fabric change in the Historical Peninsula of Ottoman's. In 1856, more than 650 buildings were burned and destroyed in the fire of Aksaray (Çelik, 1993). With the code of 1856⁴⁴, the expropriations were brought to the agenda in case of the regulations such as street widening. Therewith, based on new urban policy of Tanzimat, Mustafa Reşit Paşa, who especially believed in regulation of urban blocks with geometric orders after the fire near Beyazıt Mosque in 1826, tasked Italian engineer Luigi Storari in order to regulating post-fire Aksaray (Pinon, 1998).

Storari reorganized the organic urban fabric of Aksaray as a grid pattern (see Figure 5.B) as it was expected from the authorities supporting modern changes in the urban pattern. Storari's work grounded on existing substantial axes in the direction of north-south (Unkapanı-Yenikapı direction) and east-west (Aksaray Street). He endeavored to widen and straighten the streets in those directions. Determining the main artery of the region as Aksaray, he expanded the width of the street to 9.5 meters. Since Storari gave the importance to those axes, he strengthened them with 7.6 m and 6 m wide parallel and intersecting roads (Çelik, 1993). Pinon states that in order to comforting existing narrow roads, Storari cut the corners of the urban block boundaries at the important intersections by describing them as; "The four cut planes define peculiar lozenge-shaped crossroads" (Pinon, 1998). Indeed, the grid plan of Storari was not regularized

with perfect angles and great shaped urban blocks, instead, size of the new urban blocks were similar to pre-existing ones. Although there was not a major change in building sizes, through the cut planes and removing cul-de-sac forms of organic urban fabrics as a result of grid system, some buildings got smaller (Çelik, 1993).

The fires that ended up with the destruction of neighborhoods leded the authorities to provide Street Construction Code in 1863 that was aimed street regularizations based on widening, straightening or leveling. Considering pre-existing street networks, it was decided to prepare new plans. While expropriations were practiced for street widening in that process, allotment of lots for property owners were implemented. Pinon states that: "Aside from indicating that they should be proportional to the original parcels, no official requirements for the new designs are mentioned. But neither is design left to private discretion, since public authority controls the overall organization and allocation" (Pinon, 1998, p. 56). In 1882, including regulations about street widening and opening, planning fireplace maps, the heights of the buildings and land ownership, the first construction law of Ottoman Empire (Ebniye Kanunu) was introduced (Tekeli, 2011). As seen in the case of Aksaray, other urban fabrics destroyed in fires begin to be formed in grid systems based on this law.

Aksaray was regularized for the second time after the 1911 fire which brought along the design of the largest urban block of the peninsula. Andre Auric who took the helm of Infrastructure Department of Municipality of Istanbul in 1910, emphasized on need of large boulevards minimum of 32.5 meters in order to improve conditions of health, security and infrastructure services. He also supported the idea of transforming military properties (like barracks) to park, public square and garden areas in the city. In Auric's proposed street network plan for Istanbul, Aksaray region had a great significance (see Figure 5.C). A square, which was located at the intersection of the roads coming from Beyazıt and Theodosian doors, was proposed by him. In Auric's plan, in addition to aesthetics, infrastructure service and open space systems were tried to be developed through geometrical urban block regulations (Gül, 2012). Two wide diagonal streets interrupted the urban blocks entailed truncations principally as Pinon (1998) claims. Streets were organized in hierarchical order. Even though urban blocks were generally defined in same dimensions, in Aksaray example expand of urban blocks varied between minimum 20 to 30 meters, with a maximum 30 to 70 metres (Pinon, 1998). Gül (2012) states that lately the proposed boulevard axes between Aksaray and Yenikapı became one of the important traffic roads of modern Istanbul. Those urban fabric regulations with widened roads in grid layouts for modernizing also became the roots of subsequent changes in urban form which has been mostly seen as expanding the roads.

The first apartments of the Republican period were constructed in the urban blocks which were formed as a result of the orthogonal street system. Aksaray and especially Laleli region, became the neighborhood of mid-classes of the society (Kuban, 1998).

In the early Republican period, in 1937, when Henry Prost charged to make the plan of Istanbul, based on Haussmannian idea of urban planning, he focused on transportation network of the city by considering population rise and automobile usage (Tekeli, 2011). In Prost's plan, the part of Atatürk Boulevard between Aksaray and Yenikapı was already built according to Auric's plan, and created the spine of the traffic plan. The boulevard coming from Yenikapı and reaching the Golden Horn connected to Beyoğlu region through Atatürk Bridge. Gül (2012) explains that, despite having the extensions of Atatürk Boulevard in cadastral maps of Pervititch in 1936, it was not exactly practiced till Prost's plan due to the economic inadequacy of that time. Width of Atatürk Boulevard increased to 50 meters and it was integrated with several squares from different parts of it.

In the middle of 1950s, urban planning approach of was predicated on the connection of commercial and administrative regions via large roads. Regarding the developments on Ordu Street from the east side and Millet and Vatan streets from the west side with Atatürk Boulevard in north-south direction, Aksaray became the most significant region by being at the intersection of the most important transportation structure of the Historical Peninsula (Gül, 2012). In order to provide construction of expanded roads, a great number of destruction executed in the region

as in other urban regions of Istanbul. Those construction activities also caused the decrease of resident population in the region and the deformations on the urban form. Several historical buildings were destroyed.

New connections and highways brought rising population along. Therefore, as a major point of the peninsula, Aksaray began to be shaped with apartments with commercial activities in ground floors after the 1960s. At the end of the 1960s and the beginning of the 1970s, with the construction of viaduct in Aksaray, at the junction of Atatürk Boulevard and the streets of Vatan and Millet destroyed Aksaray Square and a complex motorway network was built in the middle of the Historical Peninsula. Also Valide Sultan Mosque fell behind the raised roads and lost its spatial effect in time.

Kuban (1998) claims that historical core of Aksaray was destroyed, because transportation systems was planned by highway engineers and urban conservation concept and consciousness did not developed in those years. Widening of Ordu Street caused the expansion of commercial areas to Laleli region. After the 1970s, residential areas disappeared and Laleli was transformed to a region of commerce and tourism. Old apartments are turned into mid-class hotels and commercial buildings (Kuban, 1998). In the 1990s, after bus terminal of Istanbul moved to Topkapı, especially in Aksaray-Laleli region, a major development of hotel management was seen. Thus, as a sub region of business, that region has continued its commercial utilization.



Figure 5. Changed regions marked in street pattern maps of all periods in Aksaray. A) based on map of 1847 B) based on map of 1875 C) based on map of 1935 D) based on map of 2011.

From the port to the transportation node: Yenikapı

During the Byzantium period, Yenikapı was at the region of Theodosius Port which was the major port of the city. Port of Theodosius was settled in the mouth of Lykos River. It was the trade point with Egypt's wheat carrying ships. As well as residential areas and bakeries, it is said that a few dockyards were existed in that period (Kuban, 1996).

After Ottoman's conquest of Istanbul, the shrinking port area - due to the deposition of soils coming from Lykos River - began to be used as dockland area in 1500s. As the port area became smaller in the 1700s, relationship between the port and the sea began to fall. Hence, the character of the region came to a change. The area remained inside of the city walls was called

as Küçük Lagna Bostanı (small Lagna garden), as for the areas outside of the city walls called as Büyük Lagna Bostanı (big Lagna garden). Yenikapı remained as vegetable garden area until 19th century. The only neighborhood, which is called Yalı neighborhood today, in Yenikapı was built by a group of Armenians in 1760s, after the debris of construction of Laleli Mosque was filled the area and stone barriers against the waves from Marmara sea were built. The location of Yalı neighborhood is at the intersection of Atatürk Boulevard and the coast road.

In 1846, the Armenian Church Surp Tateos Partoğomeos was built in the neighborhood. Urban fabric of the region was composed of rectangle urban blocks in grid layout with attached wooden or masonry buildings having a bay window. According to Prost's plan, in the Republican period, Yenikapı train station would have been an international one, bringing along a modern development on the Yenikapı port.

As seen in previous regions in the study, the most destructive changes in the history of Istanbul took place after the 1950s. In Yenikapı, with the construction of coast road; Kennedy Street reaching from Sirkeci to Florya, the shore line was filled. Therefore, the connection between Yalı neighborhood and the sea was broke off.

After 1980s, large-scale projects - which have resulted in various transformations and problems in urban form and urban life - began to come up because of the planning goals of Istanbul in the global scale. In Figure 6, development of coastline of Yenikapı can be seen based on illustrated maps.

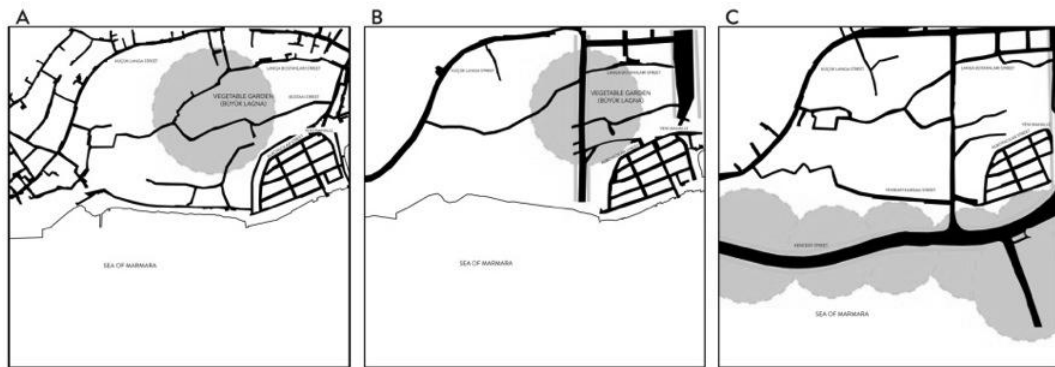


Figure 6. Changed regions marked in street pattern maps of all periods in Beyazıt. A) based on map of 1875 B) based on map of 1935 C) based on map of 2011.

Although in the 1990s, conservation decisions were constituted in the historical towns in Turkey particularly, the rising population of metropolis of Istanbul and its urban problems required new transportation solutions. Today, in order to solve the transportation problems of the whole city, Yenikapı is determined as the biggest transfer centre of Europe being at the Integration of subway of Taksim-Yenikapı, subway of Aksaray-Airport, IDO and Marmaray as the biggest transfer centre of Europe, and an exhibition area is proposed for archaeological findings that came to light through excavations of the projects. Moreover, a new (filled) square is constructed on the Marmara Sea. The square is coming from IDO port to Samatya Training Research Hospital, as a 715000 m² filled meeting, demonstration, exhibition, and concert or expo area, approximate for 1 million people (Figure 7).

These projects incompatible with the identity of the peninsula have been influencing the urban form of the Historical Peninsula as well as Yenikapı region. As a result of being the major transportation node of Istanbul, the movement of the whole city will be the carried by the Historical Peninsula. With the new filled square project, from and silhouette of the Historical Peninsula was largely changed by a man-made for the first time. Yenikapı may be excluded from the world heritage site of UNESCO. Also, the lands of the peninsula will become open to change as a result of property relations. Thus, conservation of the peninsula will become

impossible and a significant transformation in the urban fabrics of the Historical Peninsula becomes unavoidable.



Figure 7. Yenikapı Square as fill area changes the form of the Historical Peninsula, 2014 Google Earth image.

As a consequence of these three regions of the Historical Peninsula elaborated above are examined regarding transformations of building blocks according to the maps of 1935 and 2011, in order to see the effect of the property relations on building fabrics.

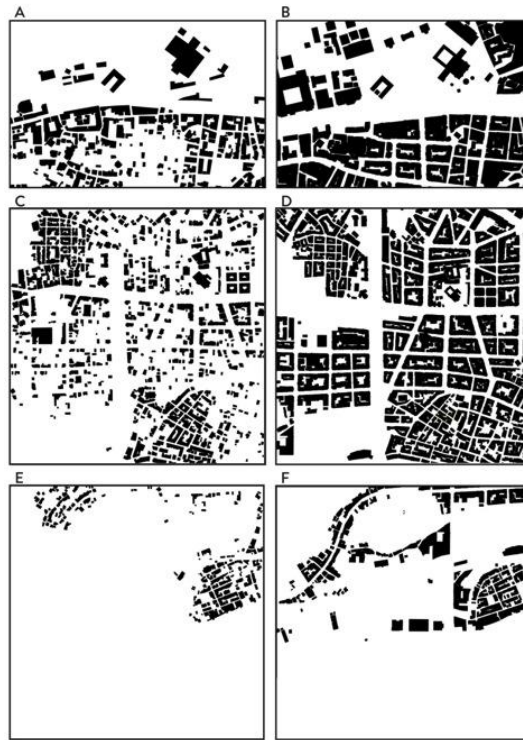


Figure 8. Change of building blocks. A) Beyazıt (1935) B) Beyazıt (2011) C) Aksaray (1935) D) Aksaray (2011) E) Yenikapı (1935) F) Yenikapı (2011).

Practice of morphological regionalization

The morphological approach of Conzen mainly centered on historical development of town plans. Whitehand asserts that: “In this way the landscape becomes an ‘objectivation of the

spirit' of a society in a particular locale" (Whitehand, 2009, p.8). Having same identical features in terms of evaluation of urban forms, morphological regions can be founded in town plans, building fabrics and land and building utilizations (Conzen, 2004). This analysis method generally involves four hierarchical morphological regions which are grouped by Conzen; the old town as a whole is described as first order, town quarters represent second orders whereas street, neighborhood or precinctual units are third order, and smallest building groups of a dominant period or morphotypes are fourth order. In this respect, the number of hierarchical levels can be discussed according to the study area. Especially in historical towns, number of orders can be increase or decrease considering structural changes or mergence in the towns (Conzen, 2004). Recognizing this classification of Conzen, the method is practiced on the analysis of land ownership patterns and town plan analyses of the case study areas.

Town plan analysis

Conzen defined the main determinants of urban landscape in three parts: the town plan (or ground plan), building fabric (the 3-dimensional form) and land and building utilization. This tripartite division of urban landscape contains the conceptualizations for examining the process of urban development. He asserted that the persistence of the townscape determinants differentiated in time. With the strongest persistence, town plan constitutes from urban block components: street networks, building blocks and plot patterns (Conzen, 1960). It indicates the analysis of areas delimited according to their ground plan. Each town plan analysis is created in order to draw hierarchical morphological orders. Since the first order shows the old town as a whole and the second orders show main plan units, in our study scale, the third and fourth regions are emphasized as well as predetermined second orders. In addition to this, first and second degree conservation areas are indicated with morphological regions.

The Historical Peninsula of Istanbul as a whole constitutes the first order because of its persistence as a multi-level urban fabric beginning from Byzantium period till today inside of the city walls. Primarily walls of Theodosius are taken as the region boundary. In second phase, according to urban development directions, urban fabric configurations, major structural divisions, historical process and the regions within definite identities are considered. Consequently, 15 regions are founded inside of the first order whereas 4 other second order regions are identified outside of the city walls where filled coast areas are, as can be seen from Figure 9.



Figure 9. Morphological reigons of the Historical Peninsula (First and second orders only illustrated).

A base map in scale 1:5000 is used for settling the first draft of the first and second regions. Subsequently, several maps of different periods are superposed, in the same scale in order to determine the technicality of the orders. The map showing significant urban development in Byzantium, Kauffer map of 1789, 1914 map that was drawn in scale 1:25000 for showing urban

blocks, the general street network map of the years between 1925-1950, and Google earth maps of 2005 and 2014 years are used as base maps.

Focused study areas in this study are determined as Beyazıt, Aksaray and Yenikapı regions as stated before. In this way, third and fourth orders of these areas' morphological regions are analyzed in a closer scale.

In this analysis, the insurance maps of Pervititch that were created in 1935 and last base map (2011) of the Historical Peninsula that is obtained from the municipality are superposed in order to observe urban block changes from the early Republican period to early years of 21st century.

Beyazıt: Beyazıt Square next to Ordu Street and other linked urban blocks are analyzed by emphasizing the changes in urban block components from 1935 to 2011 (see Figure 10.A). Buildings built before 1935 and buildings built between 1935 and 2011 are dissociated. Streets are classified based on building before 1935, between 1935 and 2011 and also physical changes between reference periods. General land use of buildings according to 2011's data is also defined. As distinct from Conzen's analysis, lost structures which have historical significance (based on Historical Peninsula conservation plan analysis, 2011) are indicated.

According to the map, it is seen that especially built environment around Beyazıt Square, at the north side of Ordu Street is constructed before 1935. On the other hand, south side of Ordu Street is mainly constructed after 1935. Moreover, the most significant change in urban pattern is seen at Ordu Street itself. Expansion of the street created new borders of neighbourhoods beside it.

As a result of this analysis, morphological regions in Beyazıt are defined (see Figure 10.B). Considering proposed orders for Historical Peninsula, second, third and fourth orders of morphological regions are determined. Since second orders represents urban quarter with main plan units, it only seen as passing through Ordu Street by dividing study area into two. Within third order regions, urban blocks are grouped according to historical persistence or change. Also, layouts of urban blocks and land uses are considered. Therefore, within the study area boundary, approximately 16 different regions of third order are founded. Inside of these regions, some specialized buildings or building blocks are referred to morphotypes which indicate fourth order. Building block size, grand physical changes or any significant differentiations among other urban blocks became determiner of fourth order as can be seen from the map. In this sense, faculties of Istanbul University are bounded based on its huge block size, as well as Şimkeşhane and Hasan Paşa inns are bounded because of significant change in blocks.

Aksaray: Town plan analysis of Aksaray (see Figure 11.A) also indicates urban block components which are built before 1935 and after 1935. According to the analysis, high density of the buildings built before 1935 are mostly gathered around Laleli Mosque and south part of the area. This region is the end of Ordu Street. From this point, the spine of the peninsula goes into division as Vatan and Millet streets. The most remarkable change between 1935 and 2011 is founded as the junction and viaducts in the area. As well as the street is expanded, Atatürk Boulevard, which extends in north-south axes, is connected to other streets with the roads in different layers. Construction of Atatürk Boulevard affected urban blocks, especially at the north side of the peninsula, and it is concluded with many urban block destructions. Except for that, general layout of the urban pattern is constituted before 1935 as can be seen from the analysis.

In morphological region analysis (see Figure 11.B), a second order line is seen as splitting Aksaray from Yenikapı region. Building blocks around Laleli Mosque, Valide Sultan Mosque at the west side of the map and the old neighbourhood at the north side are taken as third order regions as well as urban blocks in grid system or specific areas with a dominated land use. In the fourth order, old specific structures in third orders and great buildings are considered. Also, some archaeological structures such as Myralion church and its old forum area form Byzantium are taken as morphotypes.



Figure 10. Beyazıt. A) Town plan analysis B) Morphological regions based on town plan.

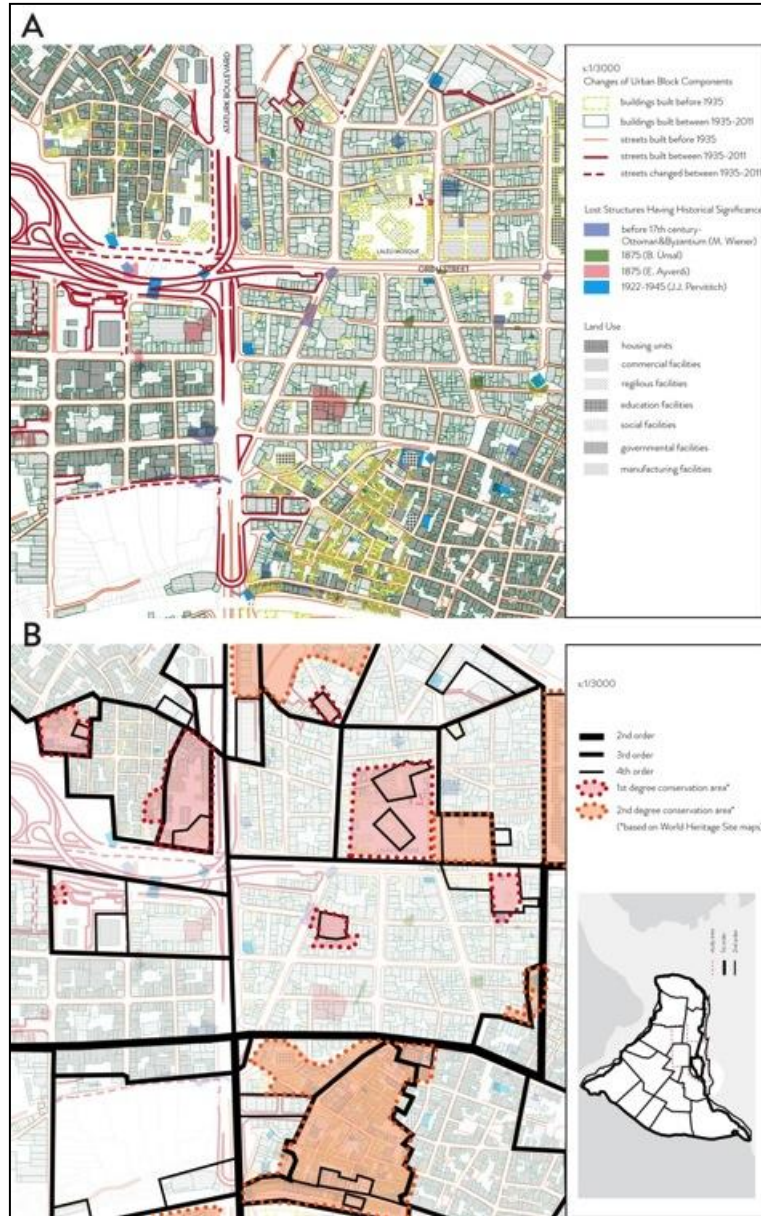


Figure 11. Aksaray. A) Town plan analysis B) Morphological regions based on town plan.

Yenikapı: In Yenikapı region, town plan analysis (see Figure 12.A) indicates that buildings built before 1935 are mostly founded at the south side of the map, in Yalı neighborhood. As a quarter with housing units, street network is also built before 1935 as can be seen from the analysis. Conspicuously, the coast side and the road system on it are constructed between 1935 and 2011. The rest of the buildings and roads occur as the structures built after 1935. In this map, based on Wiener's map, the walls of the Historical Peninsula are especially taken as historical lost structures.

In morphological analysis of Yenikapı's town plan (see Figure 12.B), principally walls are taken as the borders of morphological regions. These also represent the first order of the Historical Peninsula by being the main boundaries of the old town, as stated before. Subsequently, urban fabric in Yalı neighborhood, coast side, and empty areas (without settlements) constitute third order regions. Intersected conservation area on Yalı region is also founded in this third order region. Isolated buildings in empty regions are taken as fourth orders.

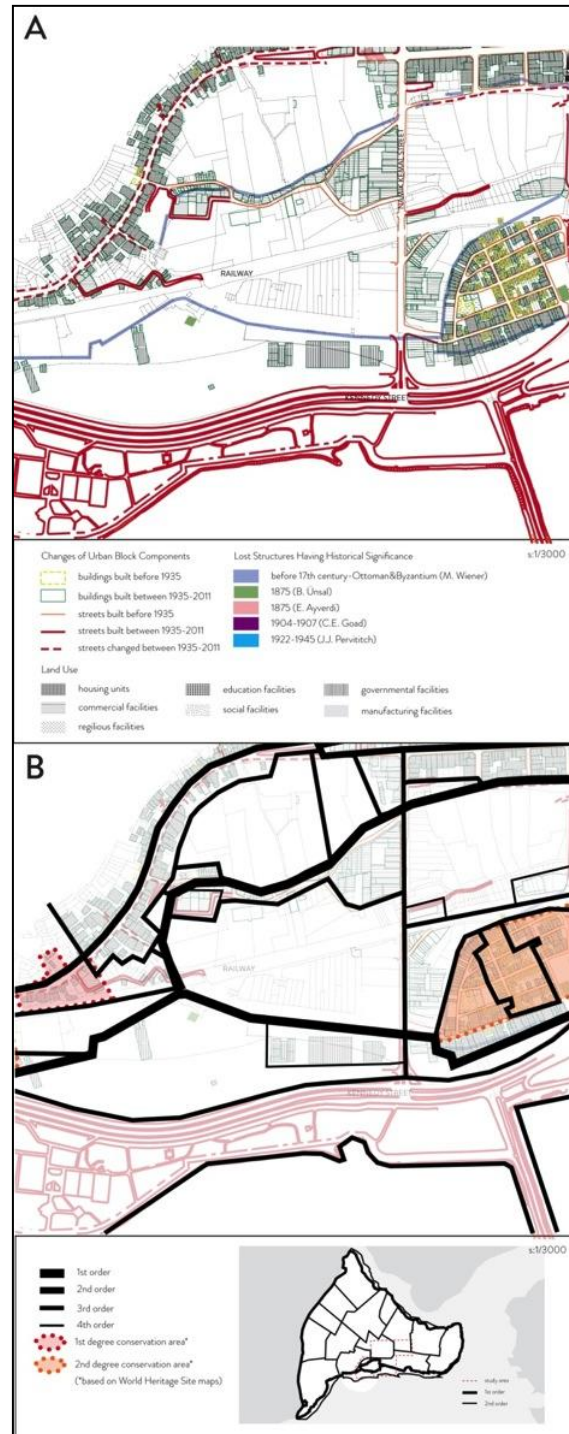


Figure 12. Yenikapı. A) Town plan analysis B) Morphological regions based on town plan.

Ownership patterns

Streets, buildings and plots require the examination in terms of property relations. Hence, the ownership pattern of the study areas is analyzed. Public, common, private, private foundation and foundation management classifications are determined and the patterns are created. As can be seen from the following maps; a great majority of the study areas contain private ownership patterns. Around Beyazıt Square, foundation and public lands can be seen. In Aksaray, except

for religious facility areas with foundation ownership and common parcels at the Yenikapı region, dominance of private ownership can be seen again. As the base of this study, land ownership patterns are considered as another complex to understand with morphological regions. The regions are determined based on dominance of an ownership type and illustrated as third and fourth orders since the ownership's of the lands has the direct effect on the formation of urban blocks (See Figure 13 and Figure 14).

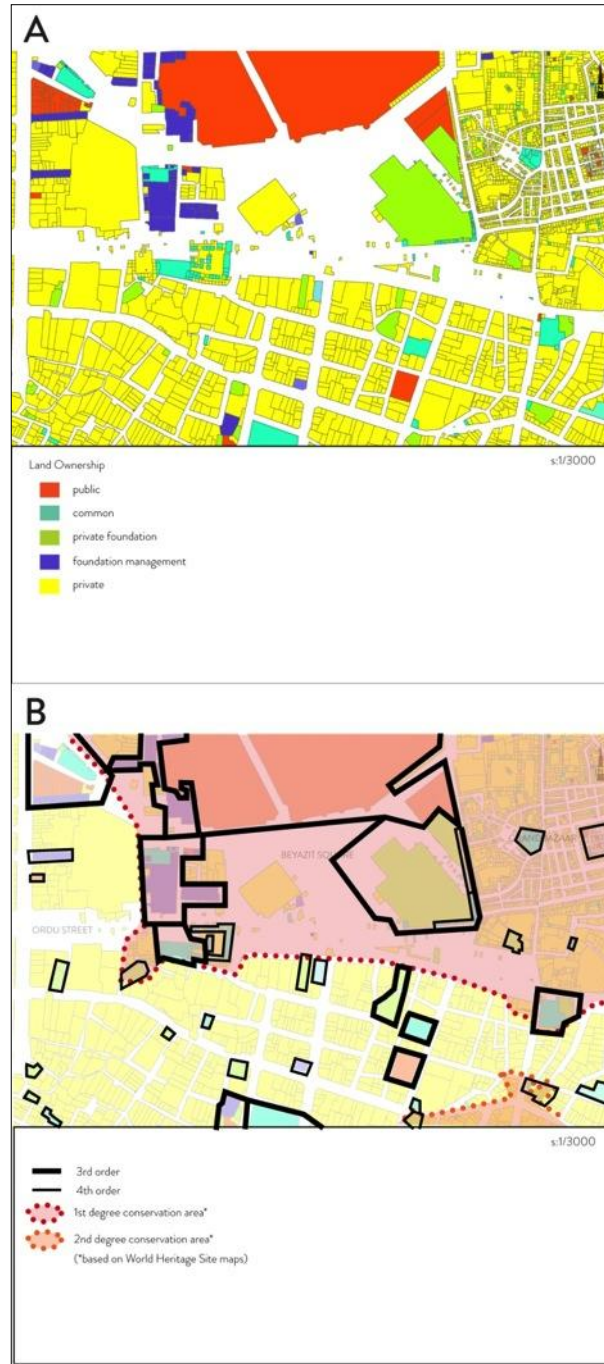


Figure 13. Beyazıt. A) Land ownership analysis B) Morphological regions based on land ownership.



Figure 14. Aksaray and Yenikapı. A) Land ownership analysis B) Morphological regions based on land ownership.

Conclusion

The connection between property relations and the morphological transformations based on form, time and resolution of different components is revealed through the research of urban/form changes according to definite planning approaches and political grounds in the study areas of Beyazıt, Aksaray and Yenikapı within historical process.

The Historical Peninsula's organic urban fabric, which constituted through Islamic politics with privacy concept and perceptivity of no private property, came to change through grid urban

block systems which were practiced in the modernization period of the 19th century. The configurational changes began to be seen with the destructions of great fires, legal interferences and regulations by providing property relations.

After 1950s, as planning policies of the government formed according to the changing economical system and lifestyles, construction of large street systems caused major destructions in old urban fabrics. During those periods, several characteristic units of the Historical Peninsula were demolished, and with the construction codes, expropriations were executed in the urban blocks which indicated complication for widening and opening new roads. With the rising population of Istanbul, destructions in the Historical Peninsula are tried to be prevented by conservation plans. However, conservation and restoration studies fell short. Besides, the form and character of the peninsula was damaged due to the wrong conservation and restoration practices of local administrations, renewal projects and coast filling projects.

In the cases of Aksaray, Beyazıt and Yenikapı, even though they are all the parts of the whole old town, counts of identified morphological regions based on town plan and land ownership analyses (showing same or different features) are tabulated (Table 1) as following:

Table 1. Number of morphological regions in the case areas of Beyazıt, Aksaray and Yenikapı.

Study Areas	Morphological regions of town plan analyzes	Morphological regions of land ownership pattern
Beyazıt	second order: 2 -partly third order: 16 regions fourth order: 9 regions	third order: 14 regions fourth order: 23 regions
Aksaray	second order: 3 -partly third order: 20 regions fourth order: 19 regions	third order: 29 regions fourth order: 44 regions
Yenikapı	second order: 2 -partly third order: 17 regions fourth order: 4 regions	third order: 14 regions fourth order: 13 regions

As a result of the difference in the areas of each study cases, in the morphological regions of town plan analyzes, the areas contains the delimitation lines of second order regions, which are determined within a larger scale in the whole Historical Peninsula. Therefore, at least 2 second order regions can be seen partly from the focused case areas and indicate major plan units of the old town. Especially in the case of Aksaray, identified regions seem higher than other study areas. Yet, third order regionalization gives approximately the same results. This can be seen in morphological regions of town plan analyzes of the areas around 20 regions; which indicate 20 character areas. For example, in the case of Beyazıt, 4 of the 16 morphological regions based on the town plan are showing the same character features while the others require distinct considerations. In Aksaray, 20 character areas and 6 of the regions, which represent built environment formed after 1935 with commercial utilization, can be discussed as reflecting character areas with the same identity; whereas the regions that are illustrated for Yenikapı indicate varied character areas. As well as the town plan, in the results of land ownership analysis, the fourth order regions are the evidence that in the studied parts of the Historical Peninsula, there are numerous morphotypes and building fabrics which can be the sign of complexity of the town or oncoming changes for some areas.

The complexity of the Historical Peninsula, indeed, requires a more detailed research in terms of determining morphological regions. Regionalization can be discussed by different participants in a joint study. Through this method, variety of character areas in a historical town can be ascertained. Although these regions can vary according to the planners or designers, similar regions can be recognized in general terms.

In order to prohibit the process of the system which makes the conservation of the old towns a tool for new identity formation, legal enforcements showing its spatial outcomes within property relations in detail of urban fabric must be built in a serviceable way, considering the identity of the historical towns from morphological structure to the socio-political stratifications. Thus, conservation studies in the historical towns should be managed in urban block detail by considering property relations subject to urban planning and design policies, and morphological regions based on a series of morphological analyses.

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The transformation of the urban block in the European City

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Abstract. *The research focuses mainly on the European cities' urban form and social characteristics by analyzing the element of the urban block in five historical periods. The aim is not to analyze the whole history, but to focus on specific periods and case studies that show the metamorphosis of the urban block. European cities are diverse in several scales but meanwhile they are linked in a common urban development. By studying examples from the Greek Polis, where the urban blocks are created by organized city planning focused on the grid, to the urban block of the medieval city, where different built structures can be seen, to the compact blocks of the industrial Berlin, to the large blocks of Transvaalbuurt in Amsterdam, where the traditional urban block opens up as well as Le Corbusier's modern city and the refusal to the traditional closed block, the reader will be able to understand the significant vital role of the urban block in the urban tissue. These case studies are examined, analyzed and, in the end, illustrated in diagrams based on indicators that show spatial and social characteristics of the blocks. Thus, one can observe urban transformations and social changes of the European cities always in comparison with the historical framework.*

Key Words: urban block, European cities, urban transformation, urban form.

The urban block as one interconnected system of social and spatial relationships

Plots - as the two dimensional space - and buildings - as separate individual component parts - fit together and create a three dimensional space; the urban block. Groups of urban blocks, surrounded by streets or public space, create the urban layout. On the other side, what makes the urban block special is its social-cultural aspect. What is important to realize is that the term 'urban' instantly refers to urbanity, to city and not to rural areas, to specialized ways of production and services, to the urban way of life. Meanwhile 'block' refers to the utilized form, which is perceived rather as a certain three dimensional shape. Given these points the combination of 'urban' and 'block' is associated to socio-economical as well as morphological parameters, defining what the 'urban block' is and what it is not. After all being a part of the city characterizes the distinctive nature of the urban block. These socio-economic features are the communication language between people and the built environment. Overall, that exceptional attribute gives to the urban block its social character.

Manuel Castells in his book *The City and the Grassroots: A Cross-Cultural Theory of Urban Social Movements* examines the city as a social output and how history relates to a socio-cultural context (see Castells, 1983). What is important to stress in this point is his theory concerning the consistent relationship between spatial and social aspects of urbanity. "Urban is the social meaning assigned to a particular spatial form by a historically defined society." (Castells, 1983:302) Within this thesis Castells achieved to express the complexity of relationships in cities. The same features can be found in relation to urban block; it is an element which creates relationships between the user and the built environment.

On the basis of these considerations, a contemporary definition of the urban block is proposed; it can be defined as one interconnected system of social and spatial relationships.

Typologies of european cities and case studies

When people think about european cities, they mostly have in mind cities in Germany, Italy or Spain, due to the fact that in these countries, the original historical city nucleus (often planned during medieval years) still exist in their initial urban form. For this reason, it is essential to point out that this paper attempts to prove that european cities are not only those who were built during the medieval years.

The special characteristic which connects all of the european cities together is the historically defined culture related in an inter-mutual european identity. Another issue is that they are linked in a common urban development, even if they have been effected in different ways, time frames and circumstances. Nevertheless, european cities are diverse in several scales; geographical, national, institutional, economical, etc. This diversity is also translated to the urban morphology but to the social character of the cities as well.

A brief review will be followed for each historical period respectively. Next, the case studies are examined, analyzed and in the end illustrated in diagrams based on the four layers of the urban block; the street, the plot, the building/s and the open space. Meanwhile each layer consists of indicators (see table 1), which serve as parameters and focus points of the analysis. The case studies were chosen within four criteria; the examples chosen should have been built, next they should show typical and general rules of planning, they should also be highlights in history or last, they should have influenced the european city development. But all in all the examples are accepted as ideal models for each time frame and are already well documented in the relevant literature, which is the primary source for the investigation.

Last, to avoid any confusion, I need to clarify to the reader four important issues. First, when valuable information was missing or was vague, there was the necessity to estimate values based on different input parameters and assumptions in order to obtain a complete image. Secondly, when it was not possible to estimate, in the end no indication is illustrated. Next, all the examples are explained in relation to the specific timeframe of the analysis and not to their present state. Last, all the calculations, such as dimensions and coverage, are fairly accurate but not exact.

Table 1. The indicators of urban block in relation to the four layers and spatial and social characteristics

Layers	Spatial characteristics	Social characteristics
Streets	1. Layout	1. Main orientation/function (pedestrian, car, mixed, etc.)
	2. Orientation of the street network (north-south, east-west)	2. Accessibility/circulation (to housing, to commercial, etc.)
	3. Hierarchy of streets	3. Use (public space, transitions space, etc.)
	4. Dimensions	
	5. Greenery	
Plots	1. Dimensions	1. Land tenure distribution (private or mixed with public)
	2. Space distribution	
Building/s	1. Architectural principles (form, roof)	1. Users (social status, age/family status)
	2. Materials	2. Uses (housing, commercial, mixed, etc.)
	3. Orientation (north-south, east-west)	3. Time (who, when, for what?)
	4. Floors [FAR; calculated as the building's total floor area (Gross Floor Area, GFA) divided by the net size area of the plot]	4. Ownership vs. rent
Open space	1. Dimensions	1. Users (public, inhabitants)
	2. Density [The total open space in the urban block is measured as Open Area Coverage (OAC) and the total built area as Built Area Coverage (BAC)]	2. Activities (recreation, transition space, etc.)
	3. Greenery	3. Ownership (public, private)

Greek Polis

Each Greek Polis was independent and had its own rules and norms of governance. Only men had right to land tenure and each one owned the same size plot with the facsimile house as the others. They were also the only ones who participated in politics. Women were excluded from the society and slavery was a typical phenomenon of the time.

Hippodamus of Miletus was the most famous ancient urban planner and usually called as the “inventor of city planning”. The Hippodamian system of the orthogonal rastered layout was his invention and it is called after his name. He was responsible for planning the city Piraeus (now a municipality of Athens) and is claimed to have also designed Miletus and Rhodes, due to the similar orthogonal planning system.

Urban blocks in Greek Polis were settled in the private sector. The use of the orthogonal grid for housing (oikos – in greek οἶκος) was the easiest way to offer everyone the same area of land. Kevin Lynch observes: “Defense, order, and a rapid and equitable allocation of house site and access seem to be the principal motives.” (Lynch, 1985:16) Commercial and housing were the main activities taking place in the block, whereas the open space was used for gatherings and meetings. On the other side, community and public facilities, like the theater, the gymnasium or the Agora (Market) were clearly separated from the urban blocks.

The case study selected for this period is Priene, a city in Ancient Ionia. This example fulfills all the criteria and meanwhile Priene is “the most extensively excavated Hellenistic city in Asia Minor and an excellent example of Hellenistic architecture”. (FHW, 2012)

Case study: Priene

Priene was built around 370 BC, probably planned by Pytheas, the second most famous greek architect after Hippodamus. It was located southwest of ancient Ionia on a slope, today at the province of the district of Aydin in Turkey. Built in four levels, the city had 4.000 inhabitants.

The street network consisted of six horizontal main streets faced east-west and secondary vertical ones faced north-south, which created the orthogonal urban grid. Plots were equal (207.60 m² each) and the built area was equal as well. Each block had 8 orthogonal plots, each sized at 8x23 meters. Main streets were oriented for transition and trading activities. Inhabitants accessed their houses from secondary streets.

The urban tissue is a repeated image of urban form and architecture; equal blocks, houses and streets. The inner courtyard (40 m² each) is used as an atrium and was only accessible to the inhabitants for gathering, meeting and leisure purposes. Moreover, it was arranged in the middle so as to be accessed from all the rooms and served for natural ventilation of the house as well. The buildings for trade and storage were one floor high while housing was two floor high, so that living spaces gained sun exposure due to orientation and to the inclined surface.

The historical reception of Priene shows that the city was always considered as an ideal type of Greek Polis. Wolfram Höpfner, notes: “The high point of classical urban planning is Priene. This is the only case where the city can be considered as an enormous work of art.” (Höpfner, 1997:39)

Medieval City

After the fall of Roman Empire, many cities began to be deserted, while others were being destroyed by barbarians. During that time, Europe faced an urban growth and new urban settlements were built for trade purposes and craft industries; a polycentric and differentiated settlement pattern emerged. This pattern was consisted of specialized cities based mostly on trade. For this reason, the medieval city as we know it today has a relative homogenous image through the cities of Europe. Some, as Benevolo, consider it to be the base of the so called

European City (see Benevolo, 1980); following the argumentation of Max Weber, it is the base of European culture and the Western society because of the emergence of rationalism, capitalism and bureaucracy (see Weber, 1986).

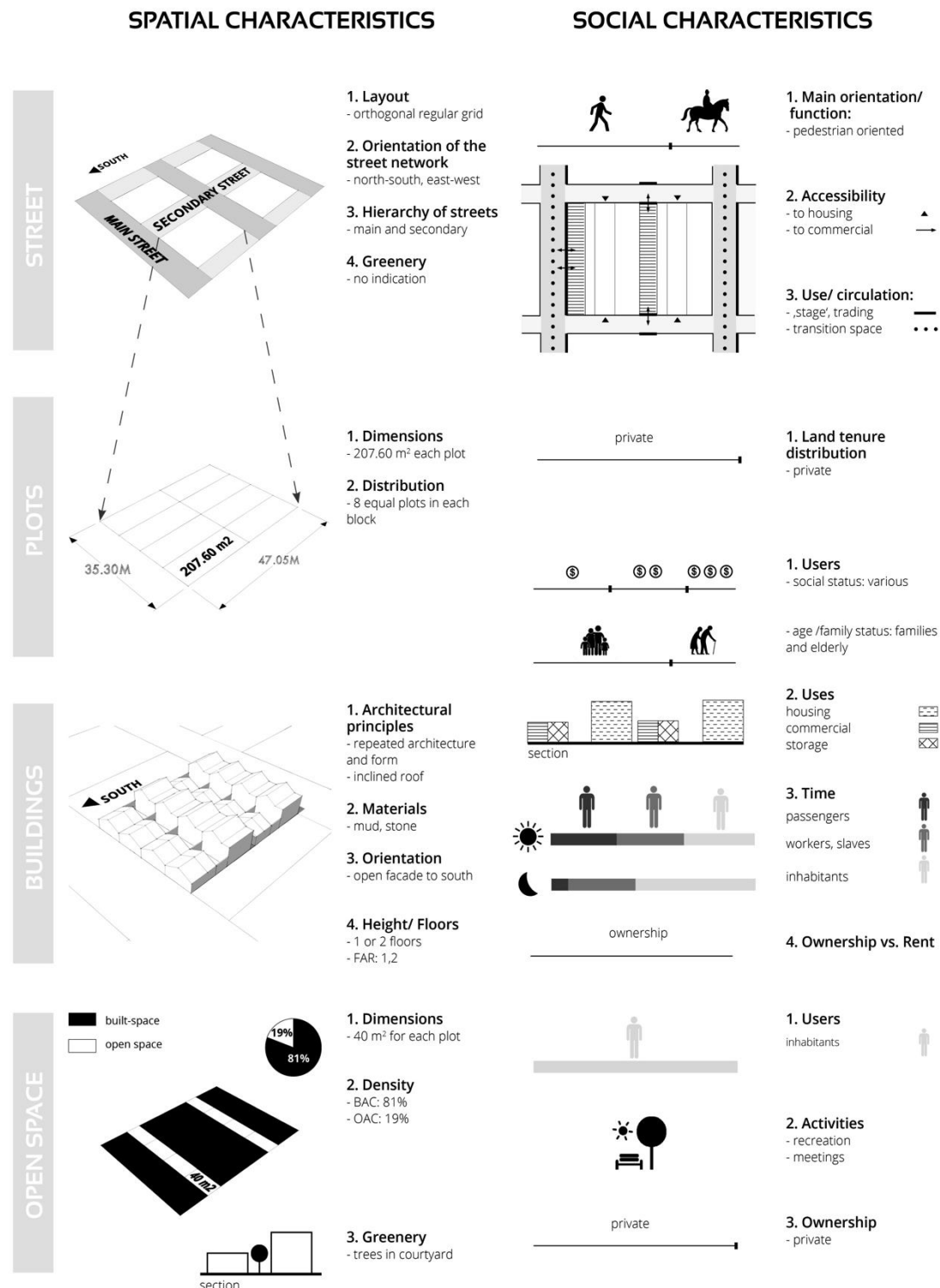


Figure 1. The urban block in Greek Polis. The case of Priene (based on Fischer 1920, Höpfner and Schwandner 1986, Höpfner 1997 and FHW 2012).

The most typical characteristic of the medieval city planning was the clear division between city and landscape. This division was also made possible because of the surrounding walls/fortification, which protected the city of future invasions. In many European old city centers that were not damaged during the wars afterwards, the medieval core is still visible in the urban layout. Another fundamental element of planning was the central location of representative places, such as main streets and squares with a cathedral, the dominating landmark of the city. The square around it became the most important market place, whereas open space was usually occupied by trade.

Other basic principles of medieval planning were compactness and narrow street network. The emerging layout was a labyrinth of irregular streets radiated from the central square and polygonal urban blocks with organic forms. Streets were used as transition and trade space; therefore, the division of the plots was of a great importance. Plots were small but elongated so that as many merchants as possible could have a front to the street.

The building forms were also different creating many variations of urban morphology. The individual plot with the house was the element which finally formed the urban block. "The irregular building lines of medieval towns testify to the varying status and power of the individuals involved". (Saalman, 1968:30) Furthermore, another typical medieval characteristic is mixed use; not only in the city, but inside the urban block as well. Different activities could be seen next to each other, inside the block, creating a mixture of working and living. There was also a social mixture of users such as merchants, craftsmen, bourgeois, and clergymen (see Hilberseimer, 1955:93).

For the period of medieval times the case study of Sagunto in Spain is chosen. Sagunto might not be a commonly known example for a medieval city, but it can be compared to other European cities, because of its convergent development that can be seen in the Roman background, the economical and socio-cultural characteristics and its urban layout.

Case study: Sagunto

Sagunto was founded and walled by Celtiberians around 500 BC. The town prospered because of the trade relations with Greek colonists and the Roman Empire. In spite of the destruction, the Roman influence can be still seen today at monumental expressions like the ruins of the Roman circus, the reconstructed Roman theatre and the castle on top of the hill, around which the old town is arranged. In 1098 the Moorish occupation caused a re-flourishing of the town (Ibáñez, 2012). The Moorish dominance was disrupted by the recapture by the Spanish troops (Reconquista) and was followed by a period of comparatively stagnation in medieval times. Nevertheless, there was a peaceful coexistence of Jews, Moors and Christians and a diversified social structure within the borders of the fortifications, which channeled growth enough to cause that densification typical for medieval towns.

Even though in the 19th and 20th c. warfare resulted in the destruction of the built environment, the urban tissue stayed persistent. The preserved urban fabric is characterized by a sequence of small squares, connected by curved streets that form urban blocks, which embed housing with small courtyards and churches. The aforementioned differentiated social structure within the medieval city can not only be found in the spatial separation of crafts and services, but it is also exposed in the built environment. Two different types of parcels, houses and connected ways of living can be distinguished; the Gothic house and the court-house.

The life in the Gothic house is organized along a vector going from the street to the inside of the block (see Figure 3). The first floor is meant for manufacturing purposes and main living room, while the second floor has secondary rooms for example for servants. On the contrary the life in the court-house is organized circularly around an inner court (see figure 3). The first floor is an entrance floor with stables, but it is not generally meant for living. It is a representative floor, which could be accessed through a main staircase located next to the inner court. No manufacturing function is found in the building, but some trade or commercial activities may be

present. In comparison the gothic house, it appears to be a more simple building for the working middle class that allowed for manufacturing and could be gradually expanded inside the block for needed additions. Meanwhile, the court house is a representative building for the upper class, with better living conditions. It uses the full plot size at once and incremental expansions for subsidiary buildings are not possible or needed like in the gothic house (de Armiño, 2012).

The chosen urban block is centrally located, its urban context is characterized by curved streets, main squares and churches and it contains the 'puerta de la judería', the gate to the Jewish district as well. It has a representative scale and combines both types of the described houses.

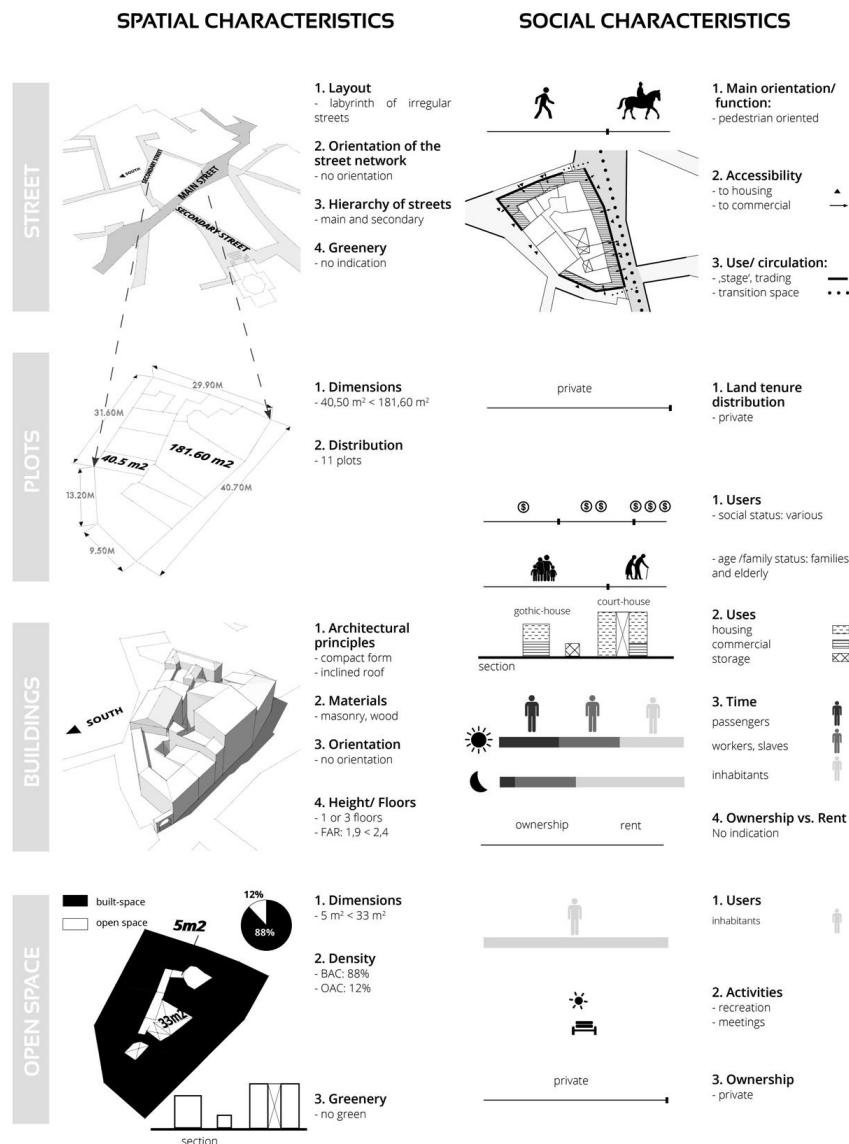


Figure 2. The urban block in Medieval City. The case of Sagunto (based on de Armiño 2012 and field study).

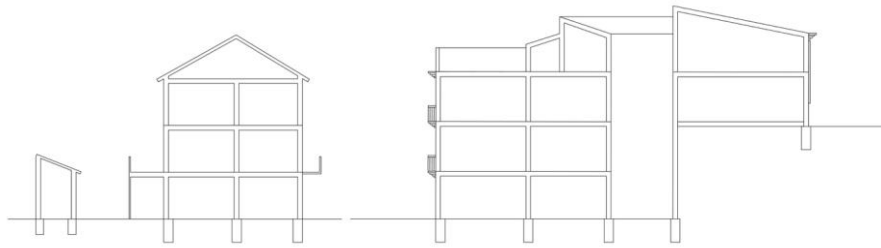


Figure 3. The gothic house (left) and the court-house (right).

Industrial city

Industrial revolution became the reason of the first mass rural migration in the history of urbanization because of the many work opportunities offered by factories and big companies inside the cities. The medieval city at that time had limited – if any – space for new housing and, in parallel, there was a remarkable population increase. Lack of housing was the main issue of that time and therefore city planning aimed to create adequate housing in the cities. As a result, cities grew up rapidly beyond the walls in order to accommodate the industrial workers and their families.

The unpredictable increase of the population led to compact cities where the car became dominant in the streets. Problems like the lack of water supply, bad quality of living and pollution due to industry in cities caused the negative aspects of the industrial city, i.e. spread of diseases, unhealthy environments and poverty. Concerning the housing planning issue, cities conformed with the return of the grid. The use of gridiron planning goes along with the rationalism of modern time and the increasing influences of scientific theories. Orthogonal planning of streets and blocks was, at that time, the easy and quick solution. The city layout became regular and strictly organized once more, with almost equal plot division. Kostof notes that this era projected the “modern metropolis as a limitless, gridded city extension of stringently regulated private development”. (Kostof, 1991:151)

The urban blocks were closed with a rectangular or squared perimeter whereas inside there were courtyards. The buildings were similar in type and form, relatively high (four to six stories), compact and mixed-use at the ground floor. It is essential to point out that one can observe a repeated image of the urban tissue outside the inner medieval city.

The case study chosen for the industrial city is Berlin; a typical example in the relevant literature and a historical urban extension in Europe. Berlin’s present urban layout is the result of the industrial era.

Case Study: Berlin

Berlin was the capital of the Kingdom of Prussia during the industrial revolution with a high population and economic growth at the time. Berlin became the center of Germany and a concentration magnet for new settlers from rural Germany.

In 1862 the Land Use Plan of the Environments of Berlin (Bebauungsplan der Umgebungen Berlins) is proposed by James Hobrecht, the chief of the urban planning police (Baupolizei). Hobrecht was an advocator of social mixture and through his plan he offered “a foundation for the development of both working-class as well as bourgeois districts.” (Bodenschatz, 2010:20) The plan proposed a circulation network with wide streets (25-39 m), radial streets which led to the centre, and a ring road. The streets surrounded big urban blocks with rectangular or orthogonal shape. The urban planning police issued in 1853 building regulations (Baupolizeiordnung) concerning the construction of housing in the blocks. These regulations regarded an authorization of up to six floor apartment buildings with a maximal height of 22m

and a minimum courtyard area of 5,34 m x 5,34 m.

Tenements were generally built by large landowners or private companies known as Terrangesellschaften, the forerunners of housing associations (Wohnungsbaugesellschaften) or today's real estate developers, which "used the building grounds to the greatest possible extent" (Sonne, 2009:6). As a result the urban blocks were built extremely compact with small courtyards, creating the phenomenon called as Mietkaserne (tenements); „the perfect matrix of slum landlords and abusive congestion" (Kostof, 1991:152).

The urban planning police in 1897 issued building regulations which were by far a better version of those in 1853. The example selected here illustrates these kinds of blocks. Berlin Block is a typical example of compactness and high density with open spaces that had no greenery often used for meeting places for the inhabitants or for crafts and workshops.

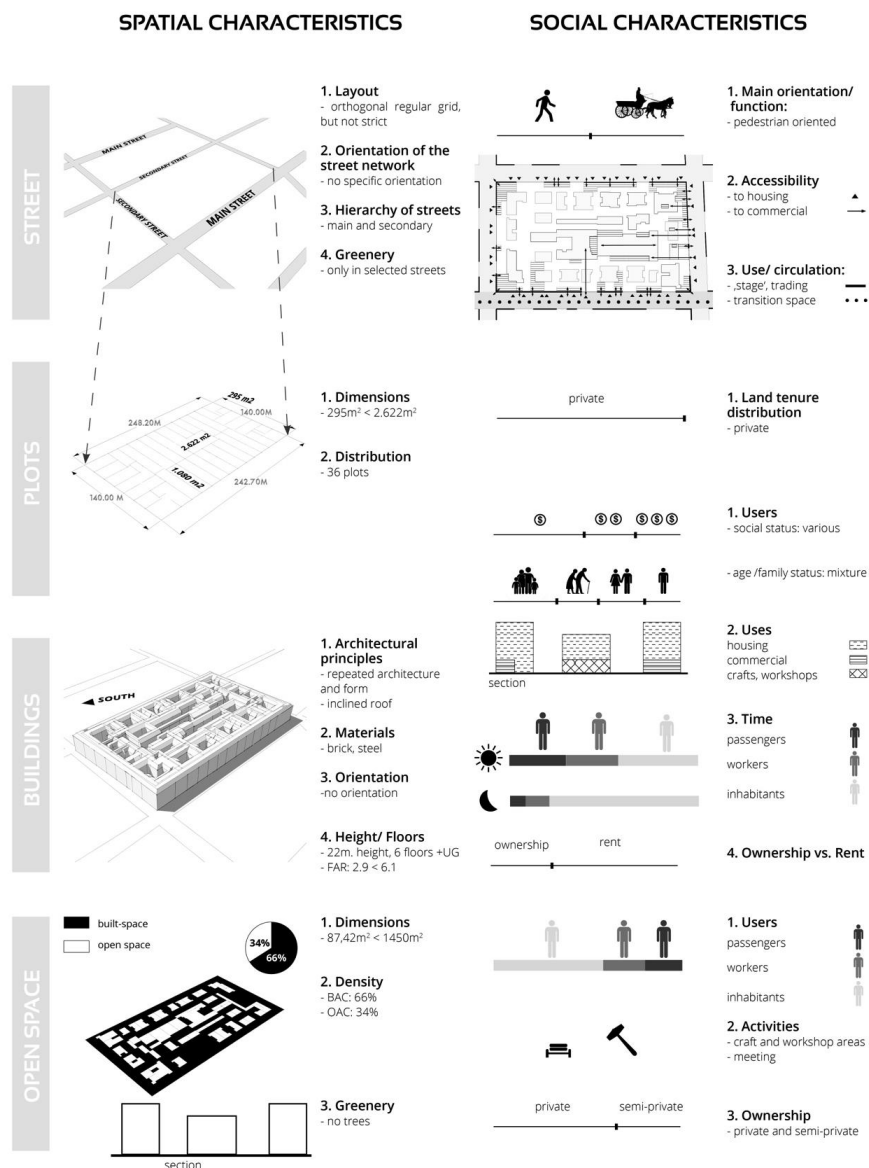


Figure 4. The urban block in Industrial City. The case of Berlin (based on Stübgen 1907, Hegemann 1988 and Reitzig 2005).

Modern City, early years of 20th. century

During the early years of 20th. c. began a systematic criticism of the industrial city, under the pressure of a radical immediate action that seemed to be of need after the first World War. Hence, the modern city appeared as the medicine of the unhealthy city. The goal was to improve the quality of living away from the industries and propose plans which promote the symbiosis of living and working in nature.

Ebenezer Howard was the founder of the movement of *Garden Cities*, also called satellite towns or “self-reliant communities” (Kostof, 1991:76). Closed and perimeter urban blocks were disintegrated. The plans of Garden Cities show an irregular city planning, where greenery seems to be the most important urban element. Few main roads, sprawled housing buildings facing cul-de-sacs and a parkway, which separated the commercial activities were the basic principles of the urban tissue.

Meanwhile, in the rest of Europe many extension plans were designed because of the ongoing rapid urban growth and new transportation technology. Centres were overcrowded and there was a mass need of housing. The solution was to expand quickly in the periphery. Hausmann’s monumental “modernization” of Paris during 1853 and 1870 influenced later extensions plans in other countries, such as the Netherlands, Germany, etc., where one observes wide streets, big urban blocks and similar facades on the buildings.

In late of 19th c. the evolution of social housing occurred in Vienna. “Vienna was again the first city to establish a competition for workers’ housing as reformed urban blocks.” (Sonne, 2009:74) The perimeter closed urban block with greenery in the inner open space (Hof) was the typical characteristic of low-cost housing for the working class. Later, the same planning principle was adopted to all the new structures for social housing, the so-called Gemeindebauten (municipality social housing complexes), and a new housing model occurred, the so-called socialist „socialist neighbourhoods“ (Sonne, 2009:78).

The case study selected for the urban block of early years of 20th. c. is the superbloc of Transvaalbuurt, in Amsterdam. This example illustrates the first intension of modern planning to propose open blocks in the city’s layout (see Panerai, 2004); a revolution, which influenced many social housing projects in Europe.

Case study: Transvaalbuurt, Amsterdam

After the approval of the Housing Act in 1902, which proposed loans to housing associations and supported the development of controlled housing production, the city of Amsterdam started to realize subsidized housing developments. Susanne Komossa observes that “the notion of ‘public housing’ as a social ideal and a task for social reform was born” (Komossa, 2010:63). The largest public project was the extension of the south part of the city by Hendrik Petrus Berlage. Berlage made an initial plan in 1905 but in the end it was not implemented. Finally, his plan Plan Zuid (Plan South) in 1917 was accepted by the city of Amsterdam, which consisted of a new ring railway, orthogonal regular grid, wide streets and mostly long perimeter superblocs (50mx200m) for social housing. What we have already examined in the urban extension plans of industrial city, can also be observed in the case of Berlage; “a clear structure of the new quarters, a clear-cut separation from the old development and a station opposed to the old city” (Panerai et al, 2004:70).

The selected urban block is the superbloc Transvaalbuurt designed by Hendrik Petrus Berlage, Jan Gratama and G. Versteeg. Transvaalburt is a social housing complex built between 1903 until 1931.

The layout of the buildings shows the tendency to split the superbloc into smaller urban blocks. In this case, the superbloc has been divided in six smaller perimeter blocks which are connected with secondary streets and open spaces. „This hybrid urban form was transformed into urban standard in the south of Amsterdam” (Sonne, 2009:91). The block has turned from a large elongated closed superbloc to a combination of smaller open blocks. Green spaces

located inside the blocks were accessed by the public community. As Komossa notes: “the public realm became the collective realm” (Komossa, 2010:66).

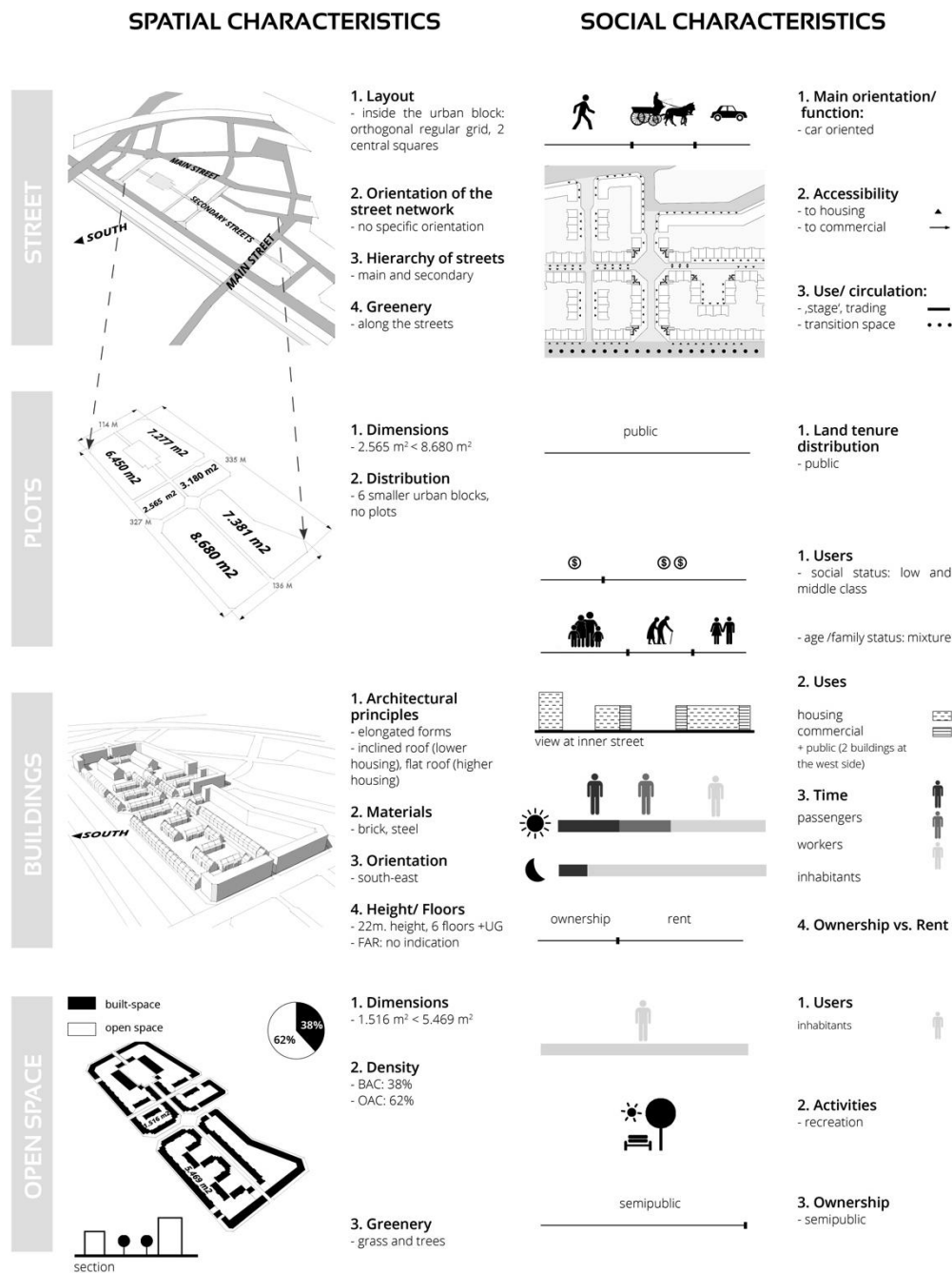


Figure 5. The urban block in early years of 20th. century. The case of Transvaalbuurt (based on Sonne 2009 and Komossa 2010).

The buildings which face the main streets are higher, whereas the lower buildings are located at secondary streets and along the canal. These continuing facades was a typical characteristic of early modern planning, showcasing the important of the street walls. Komossa explains: “The composition of the façades emphasized the continuity of the street walls and the urban space rather than the volume of the actual block, and this was accentuated by having façades that were

identical in height.” (Komossa, 2010:71)

At first glance Transvaalburt seems to be a large housing complex with a modern urban layout. Although the inner area of the neighborhood had more of a village character, by observing the dimensions of the united buildings one can conclude that the urban set is the city. Transvaalbuurt is like a small city, a combination of metropolis and town (see Sonne, 2009:88-91). To sum up, this kind of blocks are the highlight of early modern planning due to the fact that they integrate spatial and social characteristics in a great balance.

Modern City, middle years of 20th. century

This period refers to clear division of activities and to the contradiction against the traditional compact - mixed use city. Buildings were sprawled in the open space but in the same time they were highly dense in height. Green spaces were located through the buildings and streets dominated the city layout as the car became the essential transportation means of mobility.

Ernst May together with other architects at that time e.g. Walter Gropius, Bruno Taut, Otto Haesler, etc., were representatives of the so called *Neues Bauen* (New Building) movement. Ernst May's new plan of New Frankfurt for social housing in 1925-1930 is a typical example of modern urban planning in Germany. “May created a synthesis between the environment of the garden cities and the vocabulary of modern architecture” (Panerai et al., 2004:108). Housing was constructed in rows which were repeated, so as to be built fast and to form a continuous image of the urban blocks. New residential districts (Siedlungen) show the homogeneity and the functionalism of the new urban blocks, whereas an obvious denial to compact mixed-use closed perimeter block. The modern model of housing proposed a new urban development based on healthy sprawled identical housing and “on the affirmation of an internal logic, independent of the contextual conditions of the site.” (Panerai et al., 2004:110).

During the same period in 1924, Le Corbusier, the pioneer of modern movement, wrote the book *Urbanisme*, a contentious manifesto about city planning. He expresses his disagreements concerning traditional cities, which represent disorder, chaos and danger (see Le Corbusier, 1971). He proposes plans for the contemporary city, where linearity, street network, open space and mass housing are the main planning principles. (see Le Corbusier, 1971). Some years later in 1943 *The Charta of Athens* was published and until today it remains one of the most controversial documents of the modern movement concerning the functions of modern cities. The suggested model of urbanism is quite a contrast to the importance of the historical city, and promotes architecture instead of urban morphology. The core idea of the document splits the city into zones and four basic functions i.e. dwelling, recreation, work and transportation.

Unité d'Habitation has been chosen for the last typology of the urban block for one essential reason. It is the perfect example of decomposition of the traditional perimeter block and a newborn type of urban form.

Case study: Unité d'Habitation 1947-1952

By studying on the example of Unité d'Habitation one can not refer anymore to a composition of several elements but only to a predominant characteristic: the building or the solitaire. Scholars like Panerai describe that Le Corbusier's planning represents the “negation of the city” or “the death of the urban block”. (see Panerai et al, 2004:121) Le Corbusier believed that the materials of urbanism are the technical possibilities of the machinist era and the nature, especially the 24-hour solar cycle. Moreover, he accredited the primary role to the architect-urban planner, who is the regulator of the new modern city.

In his book *Urbanisme*, he notes the planning principles based on which he built Unité d'Habitation: “It is a simple matter to build urban dwellings away from streets, without small internal courtyards and with the windows looking on to large parks; and this whether our housing schemes are of the type with “set-backs” or built on the “cellular” principle”. (Le

Corbusier, 1971:163)

Unité d'Habitation was designed to house 1600 residents in 337 units in 18 floors with an accessible public roof terrace; 165 m long, 24 m deep and 56 m height (see Fondation Le Corbusier). It is a monolithic high built unit, set-back in the middle of the plot, west-east oriented and based on pillars which form a pilotis. Open space is full of trees, greenery and walking paths, whereas parking areas dominate the urban environment.

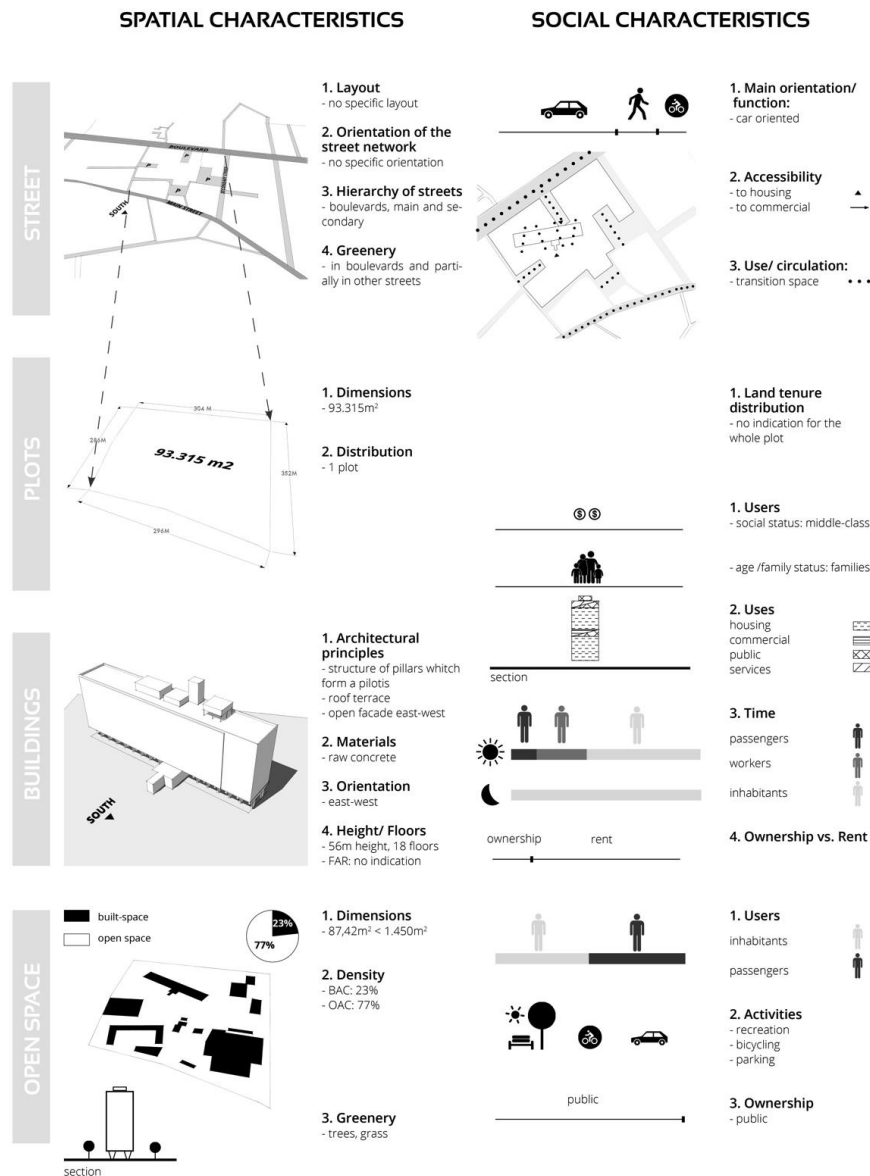


Figure 6. The urban block in middle years of 20th. century. The case of Unité d'Habitation (based on Panerai et al 2004, Janson and Krohn 2007 and Fondation Le Corbusier).

The urban block is totally opened; it has lost its traditional urban form and its interconnected social characteristics. The building is a part of a large urban block, where solitaires are seemed to be accidentally arranged in the plot. Spatial characteristics and social qualities are packed into a solitaire, into “a building that is a town” (Krohn in Janson and Krohn, 2007:7). Panerai and his colleagues observe another interpretation of Unité d'Habitation; the vertical urban block. “The traditional elements of the block are cut up, rethought, reorganized in that new unit, which appears to us as a vertical urban block, where all relationships are inverted and contradicted”

(Panerai et al, 2004:117-118). Public facilities like kindergarten and nursery are incorporated in the building as a mixed-use functional structure. Other facilities like commercial, post office or gym are located inside the unit as well. This small dense city, hidden inside a concrete megasilhouette, is like a secret place, which only the inhabitants know about it.

Conclusions

The first impression revealed by the comparison of the analyzed case studies is clearly the obvious difference in size. While greek polis and medieval city are still defined by a comprehensible dimension for the human observer, from then onwards the urban block has grown to an object of the implemented plan. Step by step the human scale was replaced by a hardly at once perceptible, a rather elusive urban element.

Additionally, the remarkable change in terms of density can be emphasized after comparing the diagrams of built and open space. The formerly clearly prevailing build-up area decreased in a gradual manner, while the open space became a larger and better useable part of the urban block - firstly within the block, and in modern times as a surrounding of the solitaires. This effect was accompanied by an increase of plot size, the improvement of techniques and materials as well as the resulting enhancement of the building typologies and the expansion of the urban block itself.

What is essential to point out is the transformation of the morphology of the blocks. Until the timeframe of the industrial city, urban blocks were formed by a closed perimeter space subdivided in plots. In the early modern city, the block is formed by a large collective unity of elongated buildings or smaller open blocks, where the inside of the block "becomes a passing place, accessible from outside" (Panerai, 2004:130). Until this point in history, urbanism was defined by the adjustment of the buildings inside the urban block as the main element of the urban fabric. This process of space production was replaced by the free standing *solitaire* in later modern city; the block is dissolved. The building, as a product of an architectural model, stands in an undefined space with no contact to the streetscape by setting back.

The historical comparison shows the persistence of mixed uses within the block until the separation of working and living since the late industrial revolution and the rise of social housing. This went along with a decrease of the importance and liveliness of residential areas by their functional separation. However living conditions were improved, although through focusing on the middle class, even the urban poor gained. Additionally the change of transportation systems caused an increase of quality of life. In contrary, this led to the emergence of transition spaces within a build environment that was not planned as a socio-cultural space of interacting individuals.

All in all, spatial aspects are based on the limits of the environment, the technical possibilities and the social, cultural, political and economical conditions. In a continuous change the interaction of requirements and opportunities promote the transformation of the build environment. Due to this belief, social and spatial characteristics are perceived as complementing and interacting to one another.

Although the examples of Priene, Sagunto, Berlin, Transvaalbuurt and Unité d'Habitation represent a long timeframe of the history, the research shows straightaway that urban forms have not transformed in the way that social relationships have changed. The metamorphosis of the forms of the blocks follows a relative normal process, whereas the alterations of social characteristics are always consequences of other complex relationships and systems in the city (e.g. economical aspects). In the final analysis, the five case studies showed that european cities have similarities, but also differences, in both their morphological and social character.

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Morphology and structure of road crossings of the modernist urban ring of Viana do Castelo in the City's General Plan

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Abstract. *The consolidation of both the medieval walled perimeter of the village of Viana (1258 to 1374-75) and consequent urban sprawl, resulting in its five suburbs (Moreira 2005 : 22-23), in the following centuries, led to a new ovoid shape. This happened due to either contagion or "technical culture" when designing the XVI to XVIII centuries streets and buildings centered on constructive sets of convents/monasteries and their Renaissance churches - the urban convent ring (Moreira 2005). In addition to this, the family mansions built on open ground and the lack of major geographical obstacles reinforced their growth and progressive urban spread along both ends of a main east-west axes (from São Vicente, along Rua da Bandeira, to Campo d'Agonia, through the former São Sebastião street), allowing the circulation of people and the establishment of trade, and thus, resulting in a wider relationship with the countryside and the outside world (Lopes et al 2013; Veloso et al 2012). It is this space made up of streets and urban buildings alongside the crossing of Minho's railway line (1877-78) that makes sense not only to the city planning (1848) but also to its map. Even before the railway line was built there was already an "urbanist sense" which led to a morpho- functional pattern expressed through the urban quarters which are defined by the street crossings, where access to drinking water has enabled the settling of people, houses, events and above all a better local circulation and contact with the surrounding areas. Our proposal is an analysis of the study and interpretation of the modernistic urban network, ex ante and ex post, of Viana do Castelo city.*

Key Words: *Modernist city, streets and blocks, road standard, urban plant*

Introduction

According to Saint Augustine, *cities are men and not the houses*. And in the case of the Viana do Castelo city this idea applies in full because its genesis is thought out and planned in the context of our founding of the nation, by charter of King Afonso III project, constituting a new ex urbe, from 1258 - 1262, County (Vila da Foz do Lima) with an original settler and then a mayor, both appointed by the royal power. Because that village now has its fortnightly Friday, granted by King Dinis, since 1286, and after getting walled requested contributions to its residents and those of neighboring counties, in 1374, the urbanity of Viana was consolidated and was projected this coastal territory north of the river Lee, and it progressively turned to the sea and sea trade in the following centuries.

The town of Viana in XIII - XIV centuries and has an inside perimeter of this ovaloid an orthogonal urban grid, usually led by the intersection of two main axes arruados and today are the Great and St. Peter Streets in east-west direction, and the Aurora Streets of Lima and Gago Coutinho, from north to south, and these converging at Largo João Tomás da Costa. Later in medieval outer zone and the urban plant sets new raster blocks but now contained by the union of architectural spaces of convents, monasteries and churches around that seem to foster care and health care material and spiritual to Viennese or wayfaring men, and that will generate another urban area, called about urban convent (Moreira 2005: 28-31).

This post medieval metropolis is thus an urbanized area, projecting around a corpus of political and administrative power and, above all, physical defensive structure and control all movements of goods and people on land transit from south to north or vice versa, as the sea into the ground and along the Lima valley. The territory north of Lima and our ocean front has

become safer with this póvoa of people, which started surfing because there were great concerns that drew navigation and mercancia, running with all its vessels to the northern provinces and islands, and achievements of Portugal, as tells us Frei Luís de Sousa in *Vida D.Frei Bartholomeu dos Mártires* (C.A.F. de Almeida, 1987: 77).

But this context of urbanity in growing with time and centered in this village, will be resumed and strengthened after about 257 years with the extension of this metropolis and its relational connection Roqueta Tower (1515), for, after so many years and then this place is well bastions in 1652 and 1700, the Fortress of Santiago da Barra is the emerging stage of the reputation of Viana, according to the civil conflict Patuleia and this result is a city under D. Maria II in 1848.

The modern and landscaped city of Viana do Castelo (1880-1910, 1911-1927, and 1928-1974) *ex-post* process to the passage of railway line

The urban period between 1793 and 1878 is the transformation of the metropolis, in general, in the anchoring of the old urban fabric with peripherals and surrounding blocks, generated by the street layout ordained between the center and the religious buildings and stately homes of the nobility, both military and civil, and wealthy merchants. It is *ex ante* process of Viennese city, a small outbreak of works and qualifications of its urban heritage stemming from the early port improvements (1867-1904) and urban public space intralocal movement (1891) and passing to other cities. Urban areas in the entrance of this period is shown in plan dated 1756 (Lopes et al, 2012: 115), where the old wall has the oblong shape to contain in its interior space orthogonal urban blocks, perpendicular and narrow streets because they were 3 feet wide and some less (d'Alpuim et al, 1983: 20), these blocks shredded into urban lots, usually 5.5 x 17.7 m, front and depth, respectively (Baker 2003: 63), but with an urban design with or determined by the regularity of relation to two main axes crossed, according to the cardinal points and its extremes were the ports of entry or exit from the village.

Moreover, this period is justified by the urban consequences of the demolition of the medieval walled fence (c. 10 mx 2.2) from the royal authorization - D. Maria I, 1793 and until passage of the path line iron- through opening of the first metal bridge roadrail the country on the river Lima (1878), two trays, in 1882 to reach the train station to the Viana (d'Alpuim et al, 1983: 51), ligand the city of Porto to the international border of Valencia.

With this new urban area, dictated by the train rails and flanked by granite embankments or walls in stone, there is an urban form that can configure a double combination (internal and external) urban networks, and the orthogonal radio- concentric, the latter forced or perhaps disguised by the natural relief that the Viennese metropolis is generated and expands. Constructive and demographic growth of the village of Viana develops in connection to the historical center located at its periphery religious centers, or by constructive consolidation of pre - existing blocks either by new streets cobbled paths and then the stone walls of this (the Eirado in 1814, and the tower and arch of Mercy/St. Peter, 1816). Is this outbreak and urban improvement that dictated the constitution and internal organization nine districts (1829) this Village by the Viennese councilor (d'Alpuim et al, 1983 : 31), as well as the first public garden (1846), the source of the current chapel of Saint Catherine, in the so-called ' Dízima the dogs ' area, and palm trees in old picture postcards. Most authors describes the modern city in the period between 1880 and the 40s century. XX, and to signal the following period and since the '60s, called post- modern city where most reference is planned and according to urban ideals enshrined in the Charter of Athens (1933) urban interventions. But the Viennese urban modernism show up subperiods of socio - economic and institutional context dictated by promoting urban infrastructure associated with the political regime and the then ruling power. Hence the appointment of three contexts - the constitutional monarchy; the first Republic and the New State (Lopes et al, 2012).

In the first context is given relief to riverside open spaces and conquered the estuary from the marshland of Argçosa to dock Castle Bar with its public landscaping (1882-1911), about 78 acres, as the yards and squares in front of important buildings, house Quesados (1878), the CP (1882) station, Sá de Miranda (1885) Theatre, garden Ferdinand (1888-90) and also to the urban streets, with emphasis on connecting the city to Mount St. Luzia, via paved road (1890-91). In the second context stresses the influence of infra - structure implemented in your district hinterland, where the first hydro-electric use of Lindoso (1915-1922) and the creation of modern urban interventions of the republican regime, under cover of law and specific regulations particularly through new plans for urban improvement (still anchored in Dec 10, 1865), social housing (Dec. No. 16005, 1928) and the implementation of urban plans (Dec No 24802, 1934). It was thus that sued the urban development of the resort of Mount St. Luzia, the opening of a new avenue of Fighters (1917), the construction of the funicular St^a Luzia (1923), the commercial extension to the Dock (1924) the qualifications of the public garden (1936-1940). But it is in the 40s and following the scheduled and more constructive urbanization was felt at the fabric of the city, through the following cases : the plan of Architect João Faria da Costa to St^a Luzia; the plan of Architect João Aguiar, for the District Flag (1943) ; the plan for opening avenues D. Afonso III and Américo Tomás ; the plan of Architect Paulo Cunha, for the sea port (1944) ; and the plan of Architect Gennaro Godinho, for the National High School (1946). And also the establishment of new urban neighborhoods generally dictated by lack of response to economic and social needs of the urban population, such as the renowned neighborhood - garden (1939, 1959), the Bairro dos Pescadores (1949-50), Quarter of Welfare (50), and Neighborhoods of Mercy (1968), adjacent to the old Technical School and the other in the streets of Santiago and General Luis Rego sector.

Analysis of urban and public space postmodernist: the network of streets, intersections and urban blocks

The development of public space within the boundaries of the historic center of Viana do Castelo is full of representative architectural examples from the 60s and subsequent decades. This diversity and mixing various epochs that mark the image, identity and history of Viennese urbanity, allows to understand and observe the evolution and development of its space and urban structure in the specific case, the post- modernist era.

In addition to this amount and diversity of architectural forms dispersed by city knitted Lopes et al, 2012: 125-128), are notorious three (3) urban spaces of dimension and relevant scale compared with other urban area, which occupied the existing gaps in urban structure height. And our focus is centered on the shaft adjacent to urban road - rail zone.

The first is located on the so-called "dry river" near the current shopping center ' Viana Station ' (2003). In this area, confusing urban design, partly due to the existence of the railway crossing and consequently, were built multi - residential building construction and aesthetic very similar. This area of high topography, connecting the city with the lowest elevation to high elevation, grew buildings with high volumetric which together have shaped the road structure and adapting to the requirements and limitations of terrain features. Its urban form is confusing, however routes crossing this area are important pathways in communication, transmission and interrelationship of people and goods in the public space, allowing the enjoyment of the center to the periphery and vice versa. This area stands out the building known as building Makonde" whose structure adjacent urban space designed at the time, recently allowed the opening of a new link from the city to the west (the Campo d'Agonia).

The second area identified is located on the block where the Hotel is located Rally (1970), and the facilities of the PSP, the Public Security Police, near the overpass of Sto. Anthony (1985-86, one of the main access roads to the city). This block is a block large compared with other urban fabric. This is because your inner" core", is filled with extensions of the buildings that make up the front of the street or urban front. Are generally warehouses which are activity

along with the rest built area occupies a considerable part of the urbanized area of the city. Have been the route of the railway line and the proximity to this equipment dictated the scale of this block? Easily observed through the architectural styles present, we are facing a consolidated urban structure whose concerns of the postmodern era, in our case, it supplanted the need to deliver quality public space environment, specifically through the implementation of buildings public character whose duties correspond to the needs of the time they were constructed (60, 70 and 80). As an example we highlight the petrol pump however demolished to make way for the aforementioned park hotel, the Palace Cinema (1947) that so many generations of Viennese welcomed, now transformed into an office building, the Garage - Car, currently the Peugeot brand, with its facade clearly designed to serve and reflect their function, and others. This area, in our opinion, deserve in the future, depending on its urban developments and their potential interests, an urban planning study to better linkage with the remaining area of the city, contributing to improving urban enjoyment between center and periphery.

The third area is located near the Eiffel bridge access and deployment of existing buildings created a garden space, today transformed into a “roundabout” (2004). The structure of this area is characterized by the presence of large building volume and primarily residential in character, with the exception of the then Hotel Afonso III (1971), now transformed into a multi - residential building.

These three areas, which are characterized by curiosity absorb three distinct areas, the road connecting the center with the periphery in different directions, breaking the continuity of the urban environment that is experienced in the remaining image of the city, contributing to the visual diversity of environments observed. When you traveled or crossed, these areas reflect the spirit of the age in which they were designed. The streets have wider than existing streets profiles (Table 1). The walks are wide and airy. The scale of the city suddenly becomes, grows, envelops us, but do not affect the relationship with the rest of the urban structure, by contrast, entranham in such a natural way that sometimes this becomes perceptible change in the composition and diversity the urban fabric, which is the transposition of the medieval urban scale to urban scale modernist and post - modernist.

It is interesting that these areas are signposted along the road crossings of particular relevance to the urban structure of the city of Viana do Castelo. Are these crossings on the line iron (c. 7.30 meters Profile - Iberian gauge), essential for the flow of traffic from the inner city to the outside and vice versa. Crossings are made through the tunnel (eg Sto. Antonio) viaduct (eg dry bridge) and another under the Eiffel bridge as larger example to link the riverside urban marginal, first on the road Papanata after the park represented by Limia - urban park (60), and then the Plaza de Galicia, the Hotel park (1972). These crossings were up adapting to the characteristics of the motor and needs of pedestrians and we can consider them and interpret them as new doors of access and greater mobility to the inner city. These crossings and we also brought new roads that generally have adopted guidelines perpendicular to the dominant axis of which include the Flag Street which crosses the city from west to east. These new arteries counteract the movement of the pre -existing urban fabric, and are geared towards the River Lee, allowing a more effective approach to the town with this environmental structure and natural environment.

Conclusion

The cross-section of the railway line Minho is the end of the century, nineteenth, 7.30 meters, and this value can be compared with the reference and modernist urban streets of the city of Viana do Castelo, in other words, be your triple, the Iberian gauge railway, iron, value - system for tracing the modernist highways because the Warring Avenue, with c. 22.00 meters in profile, is its largest representation (Lopes et al, 2013). We have then in the study and analysis these two benchmarks here propose a default value or reference to correlate and distinguish the modernist streets of the city of Viana do Castelo, according to its time of construction and function in

urban morphology/plant city. And the figures in Table 1 should highlight groups of modernist Viennese streets of the city, if we associate with sectors or areas of urban intervention, either from home or another function as well as intra and/or inter urban mobility.

Table 1. Cross-sectional dimension of modernist streets in the city of Viana do Castelo.

STREET LAYOUT (reference or place names)	meters	STREET LAYOUT (reference or place names)
Av. 25 de Abril (ângulo sudoeste garag. Auto-Lima)	13,45	Muro da Linha de caminho-de-ferro (sul)
Estrada da Papanata	9,96	Muro da Escola Primária do Carmo
Av 25 de Abril (Old Fábrica das Boinas)	12,59	Linha caminho-de-ferro
Old Rua do Liceu (west)	13,00	Rua João Rocha Páris
Rua João Rocha Páris (west)	12,97	Rua João Tocha Páris (east)
Ângulo sudoeste do Liceu	12,92	Muro de casa sul Bairro da Previdência/Liceu (Blue)
Rua José Espregueira (south)	9,07	Rua José Espregueira (south, old Fáb. das Boinas)
Rua José Espregueira (north)	9,02	Rua José Espregueira (north)
Abertura nascente do Viaduto Stº António	22,90	Angulo Bairro da C.P. (northwest)
Casa do Horto Municipal	15,01	Muro do Bairro da CP (north)
Bairro-jardim (poente), Rua V.N. Cerveira	8,24	Bairro-jardim (poente), Rua V.N. Cerveira
Bairro-jardim Nascente), Rua Ponte da Barca	10,05	Bairro-jardim (nascente), Rua Ponte da Barca
Bairro-jardim (norte), Rua de Valença	9,86	Bairro-jardim (norte), Rua de Valença
Calçada de Valverde (south)	7,68	Calçada de Valverde (south)
Rua Ernesto Roma (poente)	7,87	Ângulo da Igreja da Ordem Terceira
Confluência c/ Estrada de Stª Luzia	8,33	Calçada de Valverde (north)
Estrada de Stª Luzia	9,80	Casa do Dr. Simões
Edifício do Elevador de Stª Luzia	23,39	Muro da Linha acesso Estação da C.P.
Av. 25 de Abril	19,20	Av. 25 de Abril, Externato D. João de Brito
Av. 25 de Abril, Sport Club Vianense overpass	14,80	Av. 25 de Abril, Sport Club Vianense overpass
Av. 25 de Abril, Somartis	9,55	Casa da família Sá (Av. 25 de Abril)
Rua Moisés Alves de Pinho (south)	9,94	Rua Moisés Alves de Pinho (south)
Rua Domingos José de Moraes (south)	10,10	Rua Domingos José de Moraes (south)
Rua Bernardo Abrunhosa (south)	9,91	Rua Bernardo Abrunhosa (south, ex-GAT/CIM A.Minho)
Rua de S. José (north), c/ Av. 25 de Abril	9,62	Rua S. José (north), c/ Av. 25 de Abril
Entrada do Sport Club Vianense	9,55	Rua de S. José (east)
Av do Atlântico, E.S. Monserrate (southeast)	23,00	Av. do Atlântico, bloco residencial S.C. Misericórdia
Bairro dos Pescadores, Rua de S. Pedro	8,50	Bairro dos Pescadores, Rua de S. Pedro
Rua de Monserrate	10,84	Rua de Monserrate
Rua Dª Amélia de Moraes	8,00	Rua Dª Amélia de Moraes
Rua G. Luís do Rego/Antiga Casa Paroquial	6,70	Rua Gen. Luís do Rego
Rua G. Luís do Rego, Bairro da Misericórdia	10,48	Rua Gen. Luís do Rego (south-west)
Serviços Centrais do IPVC, Rua G. L. do Rego	8,25	Lar da S.C. Misericórdia, (east)
Serviços Centrais do IPVC, Rua G. L. do Rego	10,03	Lar da S.C. Misericórdia, (west)
Av. Conde da Carreira, Casa Melo Alvim	19,90	Av. Conde da Carreira, junto da Rua dos Rubins
Av. Conde da Carreira, Palácio dos Wernecks	18,91	Av. Conde da Carreira, Casa-torre do Sr. Valença
Teatro Sá de Miranda (north)	12,20	Rua Major Xavier da Costa (north)
Av. Rocha Páris (northwest)	13,13	Av. Rocha Páris, junto do Largo/Casa de Stº António
Av. Afonso III, Casa do Dr. Ribeiro da Silva	17,79	Muro da Linha da C.P.
Av. Afonso III, Gab. Arqº Valdemar Coutinho	16,63	Muro da Linha da C.P.
Av. Afonso III, stand da Volvo	15,00	Muro da Linha da C.P.
Rua Abel Viana	36,08	Muro da Rampa da ponte Eiffel
Av Luís de Camões	16,38	Limite do Jardim público
Rua Martim Velho	15,32	Edifício Jardim (west)
Rua de Aveiro (east)	14,06	Rua de Aveiro (east)

Thus propose three distinct groups of streets, by association or proximity in the case made the following reference: those with a profile close to the values of the Iberian gauge c. 7.30 meters; those with a profile close to the value of 15 meters; and finally bringing together the values of c. 22 meters.

This analysis and proposal articulated here is a way of testing for a first explanatory zoom urban diversity contained in each Portuguese city and its internal organization to serve the human community that inhabits it or enjoys.

But in the concrete values identified arruado own profile relate to urban reality of the site and taken to measure its contingency ownership or management interests present there - the public and private space heritage. Hence a typological sort of sketched (and “postmodernist”) modernist streets of the city of Viana do Castelo and confirmed in further studies and analysis.

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Urbanization in the Brazilian hinterland's 'forgotten century': growth patterns in Planaltina

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Abstract. *This paper examines the patterns of urbanization in Planaltina, a town founded during the period of economic slump in Goiás state comprised between the decline of gold mining in the late eighteenth century and the construction of the new state capital, Goiânia, in the 1930s. Laid out on a rough grid sometime after 1811, this town belies several key concepts of the "canonical" Portuguese-Brazilian city, such as site selection, lot proportion, and density: it was built by a valley, with wide and shallow lots having ample side yards, and its houses are often misaligned. These features are compared with preceding and contemporary towns in central Brazil, highlighting general changes in urban patterns during the pre-industrial nineteenth century throughout the region, as well as aspects unique to the case of Planaltina. Changes in regional highway networks, the introduction of the automobile and of the aeroplane predictably influenced the growth of the town. Starting in the early twentieth century, infill begins to occur, with lots being subdivided either lengthwise or breadth wise, as well as changes in the historic centre brought about more recently by the demographic and economic effects of planned extensions to the city.*

Key Words: Small towns, Urban growth, pre-industrial cities, Brazilian Highlands, Planaltina

Introduction⁴⁴

This paper examines the patterns of urbanization in Planaltina (Figure 1), a town in the Brazilian state of Goiás founded in 1811 and presently part of the Federal District (Figure 2), 35 kilometres⁴⁵ from the nation's capital, Brasília. Its initial configuration and subsequent growth challenge several assumptions regarding urban form in colonial and pre-industrial Brazil. It also sheds some light on a period of the hinterland's urban history that has received little systematic attention: that comprised between the end of the eighteenth-century gold rush and the modernization brought about by the railway and Beaux-Arts urbanism in the 1920s.

The following discussion begins with an account of the history of settlement in the Brazilian Central Highlands, followed by that of Planaltina. The description of the morphology of the town is organized according to its three structural elements: public space network, land subdivision, and building typology. From this, a reconstruction of the urban growth of the town through time is attempted.

Settlement of the Brazilian Hinterland

Territory and Frontier

The first recorded Portuguese expedition through the central highlands of South America took place in 1580. By the second half of the seventeenth century, successive slave raids, dubbed

⁴⁴This research was made possible thanks to a faculty research grant from the University of Brasília, as well as a research contract with the Instituto do Patrimônio Histórico e Artístico Nacional (National Heritage Institute, IPHAN), through the company Ábaco Arquitetura & Design Ambiental.

⁴⁵Distances are given overland.

bandeiras, had made the region well-known to the Portuguese, though not yet linked to any administrative unit (Vianna, 1961–1975, vol.II.2, p. 75) Around that time, small farmers from São Paulo had established rural settlements in south-eastern Goiás (Holanda, 1981–1989, vol.I.1, p. 293) Eventually, the bandeira of Bartolomeu Bueno da Silva found gold in 1725 on the site of Vila Boa, and in 1744 the Captaincy⁴⁶ of Goiás was established by the Portuguese crown.

Goiás was settled mostly along two highways—mere mule paths—connecting the western frontier to the Ocean, both running preferably along terrain ridges (Barbo, 2010, p.175): the Estrada do Nascente (easterly road) ran through Vila Boa, the seat of government of Goiás, then forked at Meia Ponte into the north-easterly Bahia Road and the Southern Road (Figure 3). From these, the North of Goiás could be reached only by means of oft-shifting footpaths descending the sharp rim of the plateau, so inhospitable to the Portuguese—and even to most Indians—that it was home to hunter-gatherer communities up to the late nineteenth century (Bertran, 2011, p.49)

The gold rush in Goiás lasted up to the 1770s (Bertran, 2011, p.252) Afterwards, a few mining towns disappeared altogether, but most declined or stagnated. Goiás experienced a more severe and longer lasting form of the economic slump that followed this decline (Furtado, 1977, p.107) This situation led to the widespread understanding of the nineteenth century in Goiás as being a ‘century of silence’ (Garcia, 2010, p.11) Indeed, at the beginning of the nineteenth century, Goiás was the least populous diocese in Brazil (Simonsen, 1937, v. II, p. 328)

Urbanization

Except for Meia Ponte - a commercial crossroads - in its heyday, no settlement in the Province⁴⁷ of Goiás before the twentieth century exceeded a population of 10,000. Vila Boa topped at 8,000, while the third largest town, Santa Luzia, had a mere 3,000 inhabitants; most other sites numbered in the hundreds. Even then, the towns’ populations could hardly be called ‘urban’ by modern standards; French botanist Auguste de Saint-Hilaire recorded that: “a few menial workers and merchants excepted, all of the inhabitants of Santa Luzia work the land, and come to town only on Sundays and holidays; thus, during the week, no one is to be seen in the houses nor on the streets”. (Saint-Hilaire, 1848, p.14)

Most towns in Goiás had in common the usual settlement and urban design pattern of the gold-mining, colonial arraial (village). The characterization of such sites has long been the subject of controversy in Brazilian Urban History. Historian Sérgio Buarque de Holanda’s famous essay comparing the gridiron plan of Spanish colonial towns with the seeming ‘unkempt’ character of Portuguese towns (Holanda, 1971), had a strong influence on the popular view of these sites as haphazard clusters of houses clumped around streams or hillsides. Historical and morphological research since the 1960s, however, stressed that, though lacking geometrical regularity, arrais were planned and regulated. Far from being arbitrary, their street pattern typically followed hill ridges affording control over their surroundings.

Because of this, lots would be rather deep—one such plot in Santa Luzia is over a hundred metres long. Urban lot frontages could measure as little as 2.5 meters, although widths from 4.5 to 8.5 meters were most common. This meant a prevalence of party wall houses, particularly in larger towns and cities.

⁴⁶ An administrative division of Portuguese colonies.

⁴⁷ The 1823 Constitution of newly independent Brazil renamed the captaincies into provinces, establishing provincial legislatures.

History and Growth of Planaltina

Precedents and Physical Setting

The post-gold rush economic slump began to revert in the 1880s. The whole Centre-West region of Brazil experienced then significant economic progress, doubling its population as well as its per capita income (Buescu, 1978, p.233). Growth during this period was driven mostly by the expansion of cattle ranching. This development preceded by several decades the arrival of the railway in Goiás, a conventional hallmark of modernization in Brazil, which only reached the state⁴⁸ in 1912. Even then, progress on the railway was sluggish: ten years later, construction had all but stopped at present-day Pires do Rio, more than 200 kilometres south of the state's southernmost major town, Santa Luzia.

It is in this context that the small community of Mestre d'Armas began to thrive. It was located near the highest plateaus of the Central Highlands, at an altitude of 950 metres, where the legendary junction of the nation's three major watersheds had attracted early explorers. Ragged mountains lie to the north-west, locking out the north of Goiás but for the gorge of the nearby Maranhão River. To the south, the wide and flat basin of the São Bartolomeu River runs into a rolling valley leading to the southern provinces. A sharp plateau rim to the north-east separates the area from the hinterland of Bahia.

The whole region was natively covered with altitude savannah vegetation. In the mid-eighteenth century, much of this savannah was ripe for pasturing, due to the invasive spread of an African grass. This landscape is regularly interrupted by rainforest outgrowing perennial river banks. Local climate is altitude tropical, with rainy Summers, while in Winter days are hot and nights are cold.

The old colonial highway remained the main regional thoroughfare, running through the village of Corumbá, 150 kilometres west of the site, towards the northern edge of the plateau, up to Couros, the closest urban centre, just 40 kilometres to the east. The other branch of the highway ran much further south, through the town of Santa Luzia 90 kilometres away with no direct road to Mestre d'Armas at the time.

By the time of the earliest known record of the local toponym, in 1773 (Bertran, 2011, p.289), the site was already inhabited⁴⁹ and known to take its name from the nearby stream, possibly named after an early settler in 1751 (Bertran, 2011, p.369). The earliest sesmarias⁵⁰ or land grants in the area were established from 1741, even before the closest towns (Bertran, 2011, p.307).

Founding and Village Growth

In 1810, the owners of three sesmarias in the Mestre d'Armas area provided for the establishment of an expiatory chapel on their lands. The dedication is recorded to have taken place on the 20th of January, 1811. Even though the chapel was founded five kilometres south of the Bahia Road—the exact position of the highway shifted through time—the area was a likely passage between the latter and the Southern Road, along a series of smooth valleys. This passage did not remain unexploited for long, and in 1838 a trail was opened linking Couros to Santa Luzia through Mestre d'Armas (Castro, 1986, p.20).

⁴⁸Republican Brazil borrowed the name 'states' from the United States in 1891.

⁴⁹The Portuguese word *sítio* can ambiguously mean 'site' or a small farmstead. The latter is more likely in the document cited.

⁵⁰A *sesmaria* was a title to a vacant tract of land granted free of charge by the Crown or the captaincy. By the eighteenth century, it had been standardised to one league in width by three in depth, requiring adjacency to an established highway. Actual dimensions varied, however, since non arable stretches of land were typically discounted from measurement. The system was extinguished in 1850.

It is known that by that time the site was no longer a cluster of farmsteads, but a proper village: a record of that same year reads that the provincial legislature was successfully petitioned for the arraial of Mestre d'Armas to be annexed to the town of Couros, leaving the jurisdiction of the more distant Santa Luzia (Castro, 1986, p.21). This suggests that the site of the chapel, comprising a stretch of land one league in length by half a league in breadth (around 18 square kilometres) donated to the Church, had been partly subdivided into urban lots. Further, it indicates that the pre-eminence of the former gold town, Santa Luzia, was waning at the edges of its territory. Conversely, the nearby town of Couros was then establishing itself as the most active trading centre in eastern Goiás.

Heyday and Decline of Planaltina

On the 19th of August, 1859, Mestre d'Armas was erected a district of Couros. In 1880, it was belatedly granted the corresponding parish status (*freguesia*).⁵¹ Accordingly, the chapel was enlarged, and a pillory was built next to it. At that time, however, Mestre d'Armas was still not considered important enough for its parish to be regularly curated, according to the Province Almanac for 1886.

Finally, on the 19th of March, 1891, the state legislature incorporated Mestre d'Armas as a town (*vila*). The incorporation may have been an acknowledgement of Mestre d'Armas's growing importance, so much so that it was beginning to overshadow its older neighbour, Couros—now known as Formosa. Indeed, the 1910 Almanac (Azevedo, 1910, p.171–172) has no entry for Formosa, but does have one for Mestre d'Armas. The latter is described at length and said by the author to have around 1,000 inhabitants and as many in its rural jurisdiction. This number is highly unusual in pre-industrial Brazil, where 80% of the population lived in the countryside; it is more characteristic of a thriving commercial town. This entry describes the town as having some one hundred houses built on five streets and two squares. This structure supports twelve craft shops and four stores.

Mestre d'Armas did not cease to grow during the first half of the twentieth century, even though it did not catch up on the industrialization process of the 1940s. Known as Planaltina since 1917, the town gained nation-wide fame when, on the 7th of September, 1922, the cornerstone of the future nation's capital was laid on a hilltop ten kilometres from the town. It was the first town outside the old state capital, Vila Boa, to have a power grid, in 1925, as well as a telephone line. In 1935, it was the first location outside the brand-new state capital, Goiânia, to have a functioning airfield, and was identified as a possible stop on a planned link between Belém, in the far north of Brazil, and Buenos Aires. Hosannah Pinheiro Guimarães, a Planaltina native, rose to become deputy governor of Goiás in the 1940s. In 1938, the century-old trail that linked the northern and southern highways was replaced by an unpaved road suitable to motor traffic. By then, the main east-west highway had already been diverted from its colonial course, so that it ran through the centre of the town.

The construction of Goiânia from 1932, however, heralded a time when the agricultural and ranching South became the political and economic power-house of Goiás. Planaltina suffered from this change in the economic make-up of the state. Its urban population growth halted at a mere 2,000 inhabitants, whereas previously small villages were surpassing 10,000. All of the public buildings in Planaltina were either finished or abandoned by 1942.

The construction of the nation's capital, Brasília, dealt the final blow to the prosperity of Planaltina, its urban area ending up within the borders of the new Federal District. The new motorway bypassed the town altogether. The attraction of Brasília stifled commercial and manufacturing growth, while migrant workers began to settle in large numbers in Planaltina, soon outnumbering the locals. The historic centre of Planaltina (Figure 4) is nowadays drowned

⁵¹In Imperial Brazil, the establishment of parishes by the Church typically corresponded to the creation of districts by the civil authorities, for census purposes

in a dormitory satellite town of over 100,000 inhabitants, while the pressure of the real estate market and the enduring fascination with modernity threaten its architectural heritage.

Morphology

Site

The location where the future town of Mestre d'Armas was to be established does not seem an evident choice. The town of Couros already fulfilled, since the late eighteenth century, the necessary commercial and administrative functions for the area. Additionally, Elias Manoel da Silva, historian in the Public Archive of the Federal District, claims that the more usual halt for cattle herders was at Lagoa Bonita, some seven kilometres to the north and closer to the highway (Silva, 2012, p.1). Both the Mestre d'Armas Stream and its affluent, the Córrego do Atoleiro (slough brook), which enclose the site on the east and south, respectively, are shallow and have a small output. This results in swampy banks, especially around the Mestre d'Armas (Cruls, 1947, p.128–129), and water that is unsuitable for drinking. Archaeological evidence, however, shows that such choice of site for construction, near heavily wooded river beds, was common throughout the area, and that builders avoided both the exposed plateau rims and the ridges where roads ran (Barbo, 2010, p.178).

Transportation seems to have played a significant role in the choice of site. Though not straddling the highway as a typical commercial town would, the location is no more than an hour's walk from the thoroughfare. Moreover, it lies at the centre of a triangle formed by the Lagoa Bonita cattle halt, the watershed known as Águas Emendadas, and the junction of the Mestre d'Armas Stream with the São Bartolomeu River. Though not the Golden Lake of legend stuff, Águas Emendadas is crucially the most convenient passage to the north of Goiás in the area, leading directly to the distant (570 km) town of Natividade, former county seat of the North. The São Bartolomeu forms a rolling valley due south of Mestre d'Armas: a prime location for cattle ranching and smooth passage towards the south. Most of the site has a gentle slope, between two and five percent, while near the church the slope goes up to eight percent.

Public Space and Monuments

The historic centre of Planaltina has three public squares, each with its hallmark public building. The São Sebastião Square, around the old chapel, is the original core of the town. The old elementary school, demolished around 1980, used to stand on one side of the Salviano Monteiro Square, just one block north of the chapel. The local historical museum opened in 1982 in the house formerly belonging to the mayor who was the namesake of this square. The Padre Marcigaglia Plaza stands at the easternmost edge of the historic centre. A huge parish church was under construction there in the 1930s, but work stopped when one of its walls collapsed shortly thereafter; it was then razed, and the present church was built on the same spot in 1980. The former town council building (Casa de Câmara e Cadeia) and the town hall are set on simple street corners.

On the southern part of the historic centre, a cluster of four large blocks is defined by streets of irregular width and alignment (Figure 5). The single east-west street, Treze de Maio, follows an almost imperceptible ridge in the terrain. The four north-south streets are very imperfectly aligned with the contour lines, while one of them, Quinze de Novembro Street, bends to conform more precisely to the terrain.

To the north and west of this cluster are seventeen rectangular blocks of a more even shape. These blocks are defined by streets which are of an even width, and laid out in a still imperfect, but more carefully orthogonal, grid.

In 1921, one or possibly two north-south avenues, broader than the other streets, were opened. The creation of Salvador Coelho Avenue, bounding the historic centre on its western

side and roughly following a contour line, is documented (Castro, 1986), whereas that of Marechal Deodoro Avenue, on the opposite side of town, can only be inferred from the formal similarity. Additionally, Floriano Peixoto Avenue, an east-west avenue as wide as the previous two, delimits the southern edge of the historic centre and may also date from this time. The lots placed along its northern edge do not conform to its alignment, for which the only references are a ridge in the terrain and the perpendicular intersection with Quinze de Novembro Street.

Finally, a street deviating from both prior grids was opened in 1938 as the start of the road linking Planaltina to the south, bypassing the former link through Santa Luzia. It was formerly known as Rua da Palha (Thatch Street), suggesting that this suburban development was lined with the town's poorest houses. The opening of the road seems to have been accompanied both by the extension of the existing orthogonal grid, and by the planning of a new street grid perpendicular to Rua da Palha, as testified by two buildings defining this new grid. A number of rectangular blocks were laid out in a 1966 master plan, entirely enclosing the historic core in a shell of sorts, of which the outer rim was to be a string of large free-standing public buildings.

Land Subdivision

Lot shapes in Planaltina are very different from the canonical image of Brazilian colonial towns. Instead of being narrow and deep, with attached or semi-attached houses, lots in Planaltina are often wide and shallow. Because an intense process of land subdivision occurred in the 1980s and 90s, most information on lot size was gathered from the 1966 master plan drawing (Figure 6).

The four blocks near the chapel used to have very large lots with irregular shapes, often encompassing the entire depth of the block, a very unusual feature in traditional Brazilian urbanism. Lots across most streets surrounding these blocks may have been part of the original subdivision, since their width is consistent with that of the lots inside the blocks.

A very different pattern of lot shapes begins north of Treze de Maio Street. These lots are much smaller and seldom extend the entire depth of the block; this can be known to be the original layout of the northern subdivision because lateral lot lines do not line up. The northern lots, therefore, are extremely unusual in that they are often wider than they are deep, a feature seldom seen in any traditional urbanism anywhere in the world.

A third, more conventional, subdivision scheme emerges on the eastern and western ends of the historic centre. There, lots adopt deep, though not very narrow, shapes. As noted before, at least the western part of this subdivision is known to have been established in 1921. On the eastern part, the earliest documented construction is the town council hall, built somewhere between 1926 and 1932, suggesting the subdivision was created in the 1920s as well.

The 1966 master plan introduced a new pattern of land subdivision, with strictly rectangular blocks harbouring much smaller lots intended for single-family affordable housing. Surrounding these blocks was a string of large lots for public and institutional buildings in the modernist, fully detached, fashion—not executed in its entirety. Demographic pressure and economic hardship striking the town's traditional families contributed to systematic subdivision of the traditional lots for the past thirty years (Figure 7). The result is that the present-day pattern of land subdivision has become more conventional throughout the historic centre, with lots much deeper than they are wide.

Building Typology

Only a handful of nineteenth-century buildings remain standing in Planaltina, the oldest reliable date, besides that of the chapel, being 1896 for a small house near the chapel. Until the early 1920s, all buildings conform to the standard aspect and distribution of Brazilian colonial houses (Figure 8): one-storey adobe buildings having a central corridor with either single rooms or suites of rooms on either side, and a common room at the back. Walls are whitewashed or, more rarely, painted, with the wood frame either left unpainted, or covered in pastel colours. Roofs

are invariably hipped and without gutters; their structure is unsophisticated. These houses are invariably aligned with the street frontages.

In 1926, the first known example of a transitional housing type was built on the newly opened Salvador Coelho Avenue, a former clinic locally dubbed “Blue House” (Figure 9). It consisted of a standard colonial layout with two side porches leading directly to a much enlarged and dignified common room at the back. It was later enlarged with the addition of an indoor kitchen—traditional kitchens were set up beneath an open lean-to in the backyard. That building was also innovative in that it displayed a classical façade in stuccoed and painted fired brick, topped with an attic hiding the roof. This pattern echoes eclectic house plans and façades built in larger cities since the second half of the nineteenth century, and attested in the state capital in the 1910s. From then on, eclectic and art deco features become common in new buildings. The most iconic examples are the eclectic town council building, completed in or before 1932, and the art deco town hall, inaugurated in 1942.

The rise of the transitional housing types thus occurs at the time of the last two urban extensions. This is also the period in which Planaltina experiences a spur of modernization, receiving a power grid in 1925 and a telephone network possibly a few years earlier—both being the first in the state outside the capital. This did not, however, mean the disappearance of the colonial housing type, which continued to be built at least as late as 1965, with a curious mix of traditional roofs and adobe walls, together with prefabricated steel doors and windows.

Following the 1966 master plan, a standard house design was proposed for poor families to build for themselves. It has a compact shape with gable asbestos or metallic roofs over fired brick walls, with or without a concrete frame. The interior, free plan usually accommodates a living room at the front, kitchen and bathroom in the middle and bedrooms at the back. More recently, two-story contemporary houses, large commercial buildings and flats have been transforming the skyline and density of the historic centre of Planaltina. Despite the current prevalence of narrow lots as a result of recent subdivisions, contemporary single-family houses will be detached whenever possible, even if this means leaving only the narrowest of passages on either side. They will also have front setbacks, often used to accommodate grade changes, and garages at the front. Despite all these changes, it is remarkable that a few recent houses still retain the traditional compactness of volume and hipped roof shape of their older counterparts.

Proposed Reconstruction of Urban Growth

The urban development of Planaltina since its beginnings in the early nineteenth century, up to its replanning as a satellite town of Brasília in 1966, can be tentatively divided into four stages.

In 1811, a small chapel was dedicated to Saint Sebastian on the left bank of the Mestre d’Armas Stream. As reported by Bertran, burials were taking place within the chapel grounds since 1812 (Bertran, 2011). Then, behind the chapel and away from the stream, an irregular grid of a single east-west street and three north-south ones was laid out, defining four blocks with large and irregular lots. This first step gave rise to the earliest urban settlement, recognised as an *arraial* (hamlet) since at least 1838. At this point, a road was opened from Couros to the north-east to Santa Luzia in the south-west, running through Planaltina at an unknown location; the present-day single bridge over the Mestre d’Armas Stream was certainly not the only crossing over the shallow, swampy bed in the nineteenth century. The original chapel is the only surviving building that can securely be ascribed to this stage. It was enlarged with the creation of a sacristy, consistory, and a new apse, when the settlement was elevated to a parish in 1880. In the following year, a pillory was erected next to the chapel, signalling that the São Sebastião Square remained the town’s most important public space.

At an unknown date, but certainly not later than the 1890s, this settlement grew with the establishment of a regular street grid to its north and east. The most trustworthy terminus *ante quem* for this extension is the reported construction date of buildings around the second square of Mestre d’Armas: 1895 for the present-day Casarão Hotel, and 1899 for the Historical

Museum, formerly the home of Mayor Salviano Monteiro Guimarães. In the twentieth century, the Salviano Monteiro Square became the main public space in the historic centre, where most civic celebrations were held. Considering this major role played by this new square, the fact that the pillory was built on the old square in 1881 suggests that on that year the urban expansion either did not exist or was still at a very early stage. This yields a fairly precise date range, circa 1880–1895, for the extension of the urban grid. Still, in 1910, the state Almanac reports only five streets in town, indicating that this new grid was still barely in its beginnings.

This second grid was extended around 1921, with the creation of two north-south avenues bordering the town on either side as well as an east-west avenue on the southern edge of town. The only documented public construction before that date, however, is the creation of a new cemetery a couple hundred metres south of the historic centre, in 1893. On the eastern Marechal Deodoro Avenue were sited the two largest public buildings of Planaltina. The first is the town council building, arguably built somewhere between 1926 and 1932 on the intersection of the avenue with Treze de Maio Street, the main street in the first stage of urbanization, leading directly to the old chapel. The second is the new parish church, begun in the 1930s, razed in the 1960s, and completed in 1980. The western Salvador Coelho Avenue held the old post office and notary, the largest grocery store in town (built in the first quarter of the twentieth century), and Planaltina's only medical clinic (1926) and pharmacy (1938). Between the avenue and the stream was built the town's power relay station, in 1925. Until 1966, whatever little construction occurred in Planaltina was almost entirely bounded between these three avenues, with the town hall (1942) likely spurring more northerly growth.

In 1938, the road to Ipameri spurred a south-west vector, with both a fledgling extension of the existing grid and the indication of a new grid aligned with the road. Even in such a small town, wealth distribution can be detected in the remaining housing stock. The largest and wealthiest buildings were concentrated on the western side of town, particularly around the two main squares; the far eastern Marechal Deodoro Avenue and Rua da Palha concentrated the poorest and smallest houses. In response to the strong demographic pressure following the construction of Brasília, Federal District government architects designed in 1966 a plan for the extension of Planaltina with single-family affordable housing blocks as well as a modernist string of free-standing public buildings intended to shield the historic core.

Final remarks

Despite the paucity of historical documents, morphological analysis can suggest a reconstruction of the growth patterns of the town of Planaltina. This reconstruction is a step towards filling the gap in the historical knowledge of Brazilian urbanization in the nineteenth century. It suggests that, even though written and oral records may be lacking, some information can be gathered regarding the stages and chief features of the urbanisation.

These possibilities notwithstanding, significant restrictions remain, due to the nature of such vernacular settlements of the pre-industrial era. Assigning dates to the historical events described cannot be done with morphology alone. Urban and architectural patterns are long-lasting, and older patterns often overlap with newer ones for long periods of time—thus, the earliest eclectic plans and fired brick structures are attested in Planaltina in 1926, but adobe houses with a colonial plan remain in use at least until 1965. All things considered, it is hoped that this example of mixed historical and morphological analysis can be extrapolated to other vernacular sites where the lack of systematic documents has so far hindered research on the origins and growth of Brazilian towns.



Figure 1. Streetscape on Goiás Avenue, Planaltina, early 20th century. Author unknown, holdings of the District Department of Culture.



Figure 2. Location of Goiás state and Planaltina.

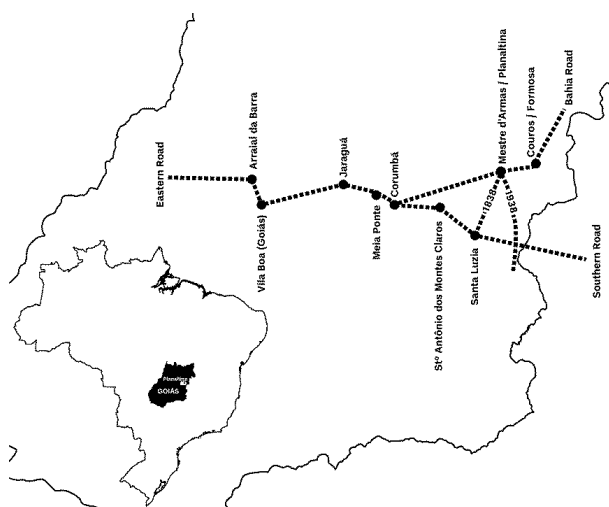


Figure 3. Highways through Goiás, 1736--1938. Redrawn after a map by Ana Laterza.

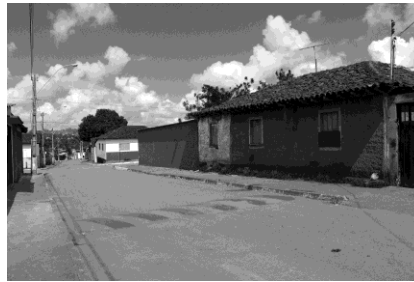


Figure 4. Streetscape on Treze de Maio Street, Planaltina, 2012. Author: Pedro Paulo Palazzo.

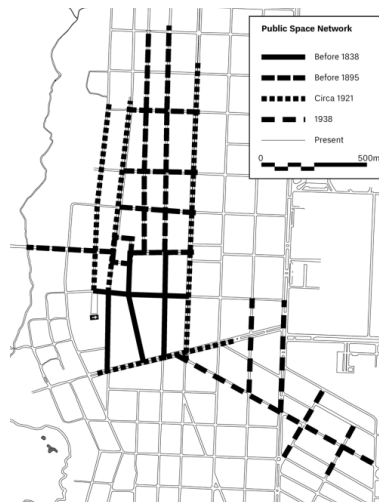


Figure 5. Historical development of the street grid in Planaltina.

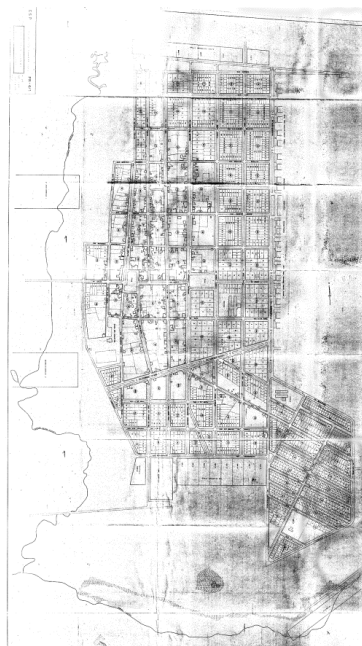


Figure 6. Master Plan for Planaltina. Author unknown, 1966, holdings of the District Department of Culture.



Figure 7. Parcel map of Planaltina as of 2012. Updated by the author after the 1997 survey by the District Department of Urban Development.

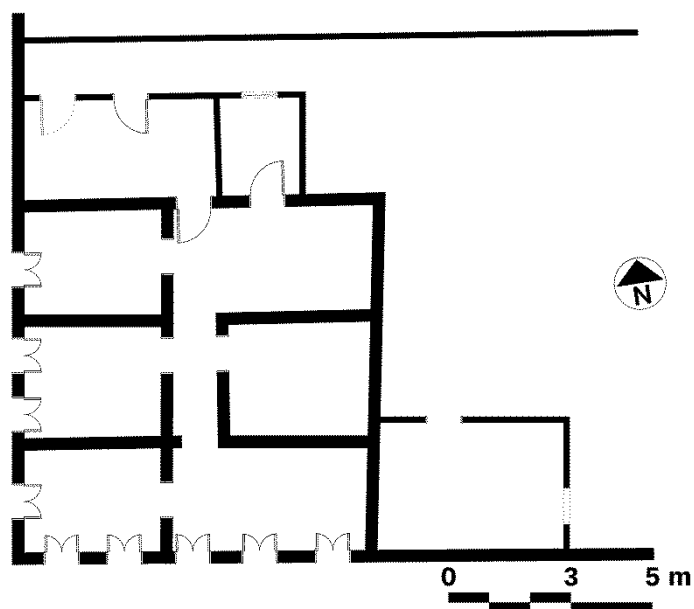


Figure 8. House of Dona Negrinha, Planaltina, ca. 1896



Figure 9. Left: Blue House, Planaltina, 1926; Right: Salviano Monteiro House, 1899. Author unknown, ca. 1935. Holdings of the District Department of Culture.

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Hermann Jansen's *Grünstreifen* in Ankara and their transformation

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Abstract. *Urban open spaces have been considered an integral part of urban space in modern urban planning theory and practice. A comprehensive urban development plan considering the green spaces as such were prepared by Prof. Hermann Jansen for Ankara, capital of Turkey, in 1932, after he won the development plan competition in 1928. Jansen proposed an extensive green space structure that provided pedestrian access to every part of the city and to the greenbelt as well. In the 70 years following the approval of the plan, this green space structure has been modified in various ways and transformed to uses other than its original purposes. The purpose of this paper is to trace the modification of this green space structure in general and to analyse the transformations of one component of this green space structure, here called Güven Park-Tandoğan green strip, some parts of which still remain. The modifications will be analyzed with regard to the primary objectives of the State, the insufficiencies of the legal system, the actions of the landowners, and the decisions of the Development Directorate.*

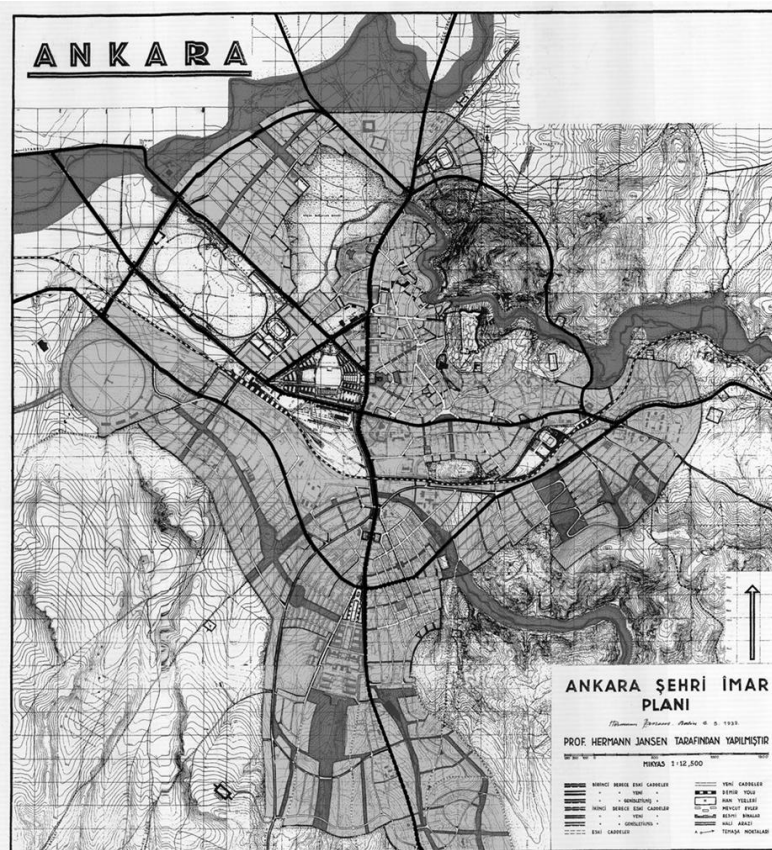
Key Words: Hermann Jansen, Ankara, green space structure, urban open spaces

Introduction

The fate of Ankara, an Anatolian city with a population of 20.000 in 1920s, changed with becoming first the command centre of Independence War and later becoming the Capital of the Republic of Turkey on 13th of October, 1923. The objective of the new Republic was to develop into a Western modern nation, and accordingly the policy of the Republic was to develop on every front into a fully fledged modern nation employing social, economical and spatial policies as well. To realise this vision, planned urban development, transportation, and industrialisation projects were initiated and run by the state, spreading over the country. The role of Ankara, as the new capital in this scenario, was to be the stage where the practice of the new social order, that is modern urban life, would be performed. This necessitated the transformation and development of Ankara from a small Anatolian village into a modern capital. New governmental offices, housing for bureaucrats and officers, new schools and universities, open and green spaces, and an urban plan that would guide their development were urgently required. To accomplish these tasks and to overcome the lack of local planners and architects to plan and guide the urban development of the new capital, foreign planners and architects were employed.

Lörcher was the first foreign professional to prepare a development plan for Ankara. The plan was put to immediate use, directing the first developments of Yenışehir (New City) area from 1925 to 1928. The only green spaces in Ankara in 1928 were Millet Bahçesi (Nation Garden) in Ulus and Havuzbaşı in Kızılay. The development plan of Lörcher was soon found insufficient from the points of the population projection and the insufficiency of planned area (Yavuz, 1980: 5). To obtain a new plan, an invited international development plan competition was announced in 1928. The experts invited to the competition were Hermann Jansen, Joseph Brix and Leon Jausseley (T.C. Ankara Şehremaneti, 1929; Tankut, 1993: 66-67). Hermann Jansen's proposal for Ankara was chosen as the winner, and from 1928 to 1938, the urban development of Ankara advanced according to Jansen's development plan approved in 1932.

that would serve as stages of representation for the new regime were readily implemented, those that would serve for everyday public use have been modified in the course of urban development or have not been implemented as Jansen has proposed. A green space having the quality of “everydayness” can be defined as a highly accessible, multipurpose green area, which can be used directly or indirectly on a daily basis for purposes other than organised events and sports. The “everyday” components of Jansen’s green space structure lacked the functional and spatial qualities to act as spaces of representation of the new regime, and have been modified for the most part. The green and open spaces of the plan which were employed as stages of representation of the power and achievements of the new Republic, or were directly designed as stages of representation, were given priority for implementation. The reasons behind this selective implementation and modification process can be summarized as follows: The importance and the role attached to the green spaces by Jansen have not been understood; the amount of the green spaces were found excessive and their implementation too costly by the development administration; and lastly, the state bureaucrats and the officers in urban development were involved in land speculation.



**Figure 2. Güven Park-Tandoğan green strip in Jansen's 1932 development plan
Jansen's Ankara Development Plans and the Green Space Structure.**

Jansen proposed an extensive green space structure composed of four types of green spaces,⁵² and integrated it into the larger urban structure. The components of this green space

⁵²The classification of the components of the green space structure is summarized from Burat, S. (2011) "Yeşilyollarda Hareketle İstirahat": Jansen Planlarında Başkentin Kentsel Yeşil Alan Tasarımları ve Bunların Uygulanma ve Değiştirilme Süreci (1932-1960) İdealkent Kent Araştırmaları Dergisi. Sayı 4, Eylül 2011. Ankara.

structure are:

Green strips (Grünstreifen): The green strips compose the backbone of the green space structure starting from the gardens of houses, maintaining pedestrian access through and to the periphery of the city, connecting first the green spaces with each other and with the residential quarters, and also letting the streams flow through the city. (Figure 3)

Central green spaces: There are three subtypes of these green spaces: i. Hippodrome and sports fields, ii. Urban parks, iii. Scenery parks and excursion spots. (Figure 4)

Allotment Gardens: Located nearby the workers' dwellings, these gardens and agricultural plots were reserved for fruit and vegetable gardening for the sustenance of the workers' families. (Figure 5)

Greenbelt: The city depicted in the development plan approved in 1932 is surrounded with an agricultural greenbelt (Jansen 1934a, 1936, 1937). The valley bottoms, and the lands around Çankaya, Dikmen, Keçiören, Etlik and Mamak settlements surrounding the city were reserved for orchards and vineyards.

According to Jansen (1936, 1937), the most important part of the green space structure was the green strips, starting from the front or back gardens of houses, reaching to schools, neighbourhood sports fields, markets and the Ministries Quarter, extending to the outskirts of the city and turning into scenic pedestrian roads in the agricultural greenbelt. These green strips, flowing throughout the city, was forming a network alternative to the street network, which was to be used by motor vehicles and pedestrians as well. For him, walking was not only a mode of transportation, but it was also the best form of exercise for the modern urban man.

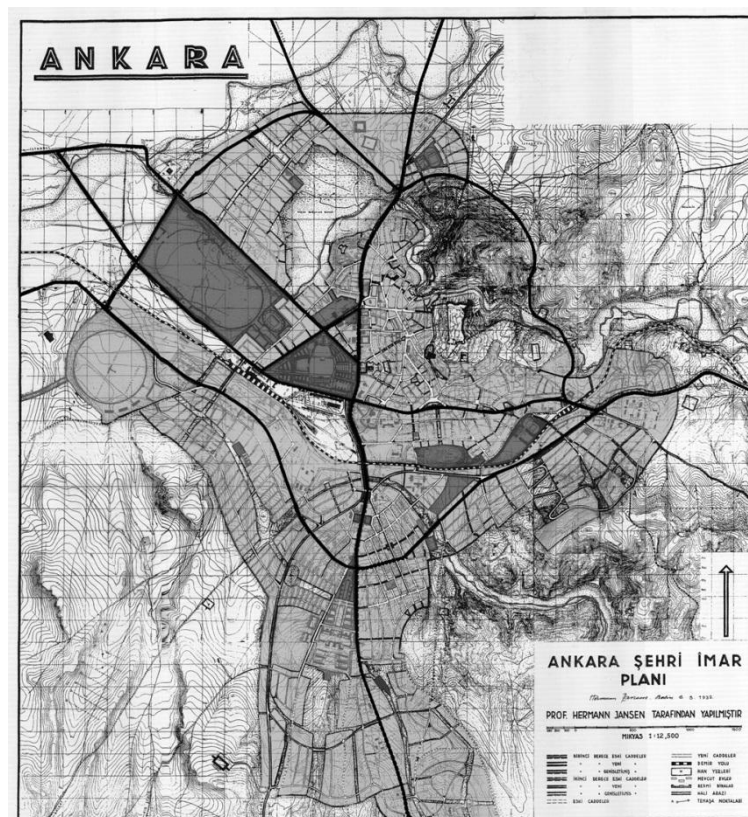


Figure 3. The green strips.

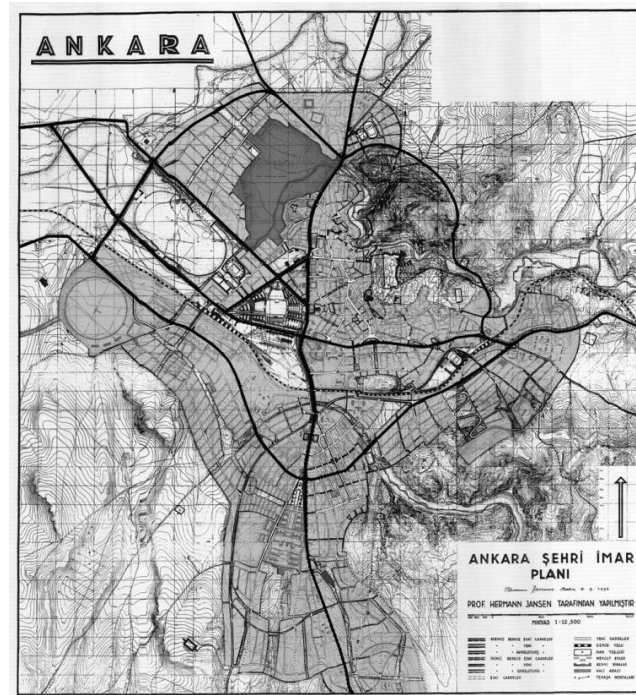


Figure 4. Central green spaces.

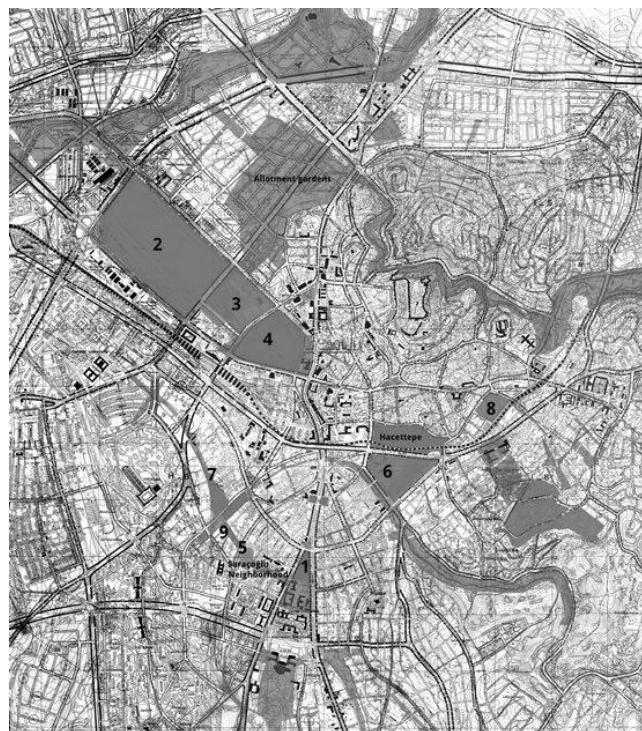


Figure 5. Allotment gardens.

The Urban Development and the Implementation of Green Space Structure

The first open space implemented according to Jansen plan was the Hippodrome (project by

Paolo Vietti-Viola), construction of which took two years to complete, from 1934 to 1936. Güven Park, opened in 1935, a park located in Kızılay, constituted the northern part of the Government Quarter spreading to the south of it and provided entrance to those approaching from the north of the city. May 19th Stadium and Gülbahçesi were both put to service in 1936, followed by the Seğmenler Park in 1938. Gülbahçesi and Seğmenler Park were the only nonrepresentational green spaces in this sequence, both of which were beyond the 1932 plan boundaries, close to the Presidential Palace. These parks are still present today. Gençlik Parkı (Youth Park) was the last park to be implemented until 1950s. Development of Gençlik Parkı took five years, between 1938 and 1943, and it was a very significant urban open space, positioned between Yenışehir and Ulus, the new city and the old city. As Uludağ (1998) puts it clearly, Gençlik Parkı was designed to introduce modern forms of recreation to the residents of both the old city and the new city (Yenışehir). Its location was therefore crucial, allowing easy access to the locals, the new comers, and the public officers. Considering the global economic crisis, the Second World War going on at the time, and the burden the cost of the park brought on the government budget, it must be stressed that the government was determined to create a park of this size (260.000 m² in the original design, of which 35.000 m² consists of a lake) and this character.

It was decided in 1952 by the Development Directorate that the development plan prepared by Hermann Jansen had become obsolete and a new development plan was needed for planned development of Ankara. After the preparations, an international planning competition was announced in 1954. The development plan prepared by Raşit Uybadin and Nihat Yücel won the competition and the plan was approved in 1957. The implementations from this year on have mainly been made according to this plan. A juxtaposing of Uybadin-Yücel development plan and Jansen's green space structure proposal illustrates the fate of the remaining parts of the green space structure. (Figure 6)

Maltepe Green Belts (as stated in the plan competition specification) cover an area amounting to 150.000 m² and have not been implemented (Ankara Belediyesi, 1954: 87). Out of these green belts, only four parks have been developed.

Neither the workers' housing, nor the allotment gardens located by the workers' housing were implemented. They were replaced with a light industry zone by the 1957 development plan.

Hacettepe, an excursion spot highly valued by Jansen to be saved as is, was developed into a health complex by various modifications between 1957 and 1967, resulting with one of the largest hospital campuses in Ankara. The hospital spread not only over the green space but also over several neighbourhoods that had an outskirts character at the time, which can be taken as a reason for replacing Hacettepe with a hospital (Cantek, 2006: 178).

Kurtuluş Park, one of the large parks in Jansen plan, was opened to use in 1960, after the development between Yenışehir and Cebeci neared completion between 1944 and 1956 (Altaban, 1987: 133). The construction of İnönü Stadium, which was a part of the sports complex in Cebeci, was completed in 1967, but the school and the sports field that Jansen had proposed as parts of the sports complex, was opened to development.

The legal and administrative structure needed to implement and manage the agricultural greenbelt that was defined in the plan report published in 1937 (Ankara Şehremaneti, 1937) and the 1/10.000 scale Ankara and Environs Plan have not been formed. The greenbelt has been considered a forestation area instead of an agricultural area, and its rather belated execution resulted in a set of scattered forestation areas encircling the city.

Starting with the announcement of the new development plan competition in 1954, six parks from Jansen's green space structure were opened to use by 1959, and twelve more parks between 1960 and 1969. By 1970, the population of Ankara had reached 1.236.152.

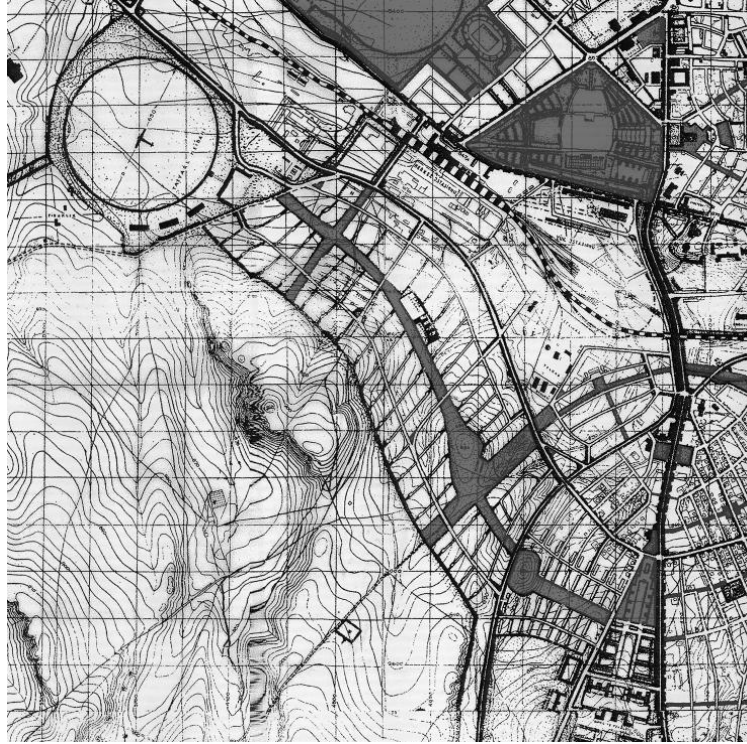


Figure 6. Juxtaposing of Jansen's green space proposals and Uybadin-Yücel's green space proposals. 1. Güvenpark (1935), 2. Hippodrome (1934-1936), 3. 19 May Stadium (1936), 4. Gençlik Parkı (1938-1943), 5. Özveren Street Park (1956), 6. Kurtuluş Parkı (1960), 7. Ördekli Park (1964), 8. İnönü Stadium (1967), 9. Semih Balcıoğlu and Umut Parks (1967).

Güven Park-Tandoğan Green Strip

Construction of Devlet Neighborhood, which started in 1944, was the first intervention that destroyed the continuity of the Güvenpark-Tandoğan Green Strip. Lack of housing was an important problem in Ankara and developing mass housing for the officers was a project since 1933. Jansen developed several alternative schemes for housing for the same site that the actual mass housing was built upon. The difference between Jansen's alternatives and the implemented scheme of Paul Bonatz was that Jansen's alternatives kept Güvenpark and the green strip extending to East connected. The implemented plan by Paul Bonatz, also a German architect, on the other hand, destroyed that connection. Even though the implemented layout employs courtyard gardens, the connection between Güvenpark and the rest of the green strip lost its direct connection. This modification of Jansen's green space structure marks the start of a series of modifications.⁵³

The second and the third modifications took place in 1953, with the opening of the Şehit Gönenc Street and allocation of the Maltepe Mosque, followed by the Ayla Street development in 1954. Turgut Reis and Süleyman Bey Steets, two segments of a single street, cut through the parks as well. Since I have not come across a document containing information about their exact

⁵³ Güvenpark is not included in this analysis, even though it is a part of the overall green space structure. Güvenpark is an important part of the Ministries Quarter according to the original configuration of Jansen, a park symbolizing the War of Independence and being an arena of political protests, laden with different layers of meaning. It is also the largest green space in the city center, making it also an everyday green space. Having these qualities, the park has been modified in the past and is still a target for further modification, even development, and is a separate research topic in itself.

development date, I assume that they were constructed in or around 1953, with Şehit Gönenc Street.

In 1956, a gas station was allocated to the north of the Maltepe Mosque, bordering the Gazi Mustafa Kemal Boulevard, one of the most important traffic arteries. Hürriyet Primary School was constructed in 1956, the only plan modification made according to Jansen's proposal for school grounds. Also, 1956 was the year a park in this region, Özveren Sokak Park, was opened.

The last two plan modifications were the development of a workers' housing in 1958, and its replacement with sports fields later in 1970, none of which were realised. The final modification was made to allocate Maltepe Market in 1960. Later, in 2008, the market was replaced with an underground shopping mall called Malltepe (Mall-Hill).

To summarize, starting with Saraçoğlu Neighborhood development in 1943, Güvenpark-Tandoğan Green Strip was modified until 1960, diverging from the green pedestrian spine Jansen had visualised. It was converted to provide space for structures and amenities such as streets, a mosque, service buildings of district municipality, a gas station (that is replaced with a light rail station in mid 1990s), a car park, and a market (which later turned into an underground shopping mall) (Burat, 2008: 104-126). The green spaces left after all these modifications made to the green strip were four parks, which were opened to use between 1964 (Ördekli Park) and 1967 (Umut and Semih Balcıoğlu Parks). These parks cover an area of 26.000 m² out of the 150.000 m² of the original proposal of Jansen (Çankaya Municipality) (Figure 7).



Figure 7. Parks realised from Güven Park-Tandoğan green strip.

The Dynamics of Modification and Implementation

To understand the demand for urbanisation and the need for housing development and government building in Ankara, some figures about the population increase must be given. Squatter developments caused by migration from the rural areas to the cities began as early as 1935 in Ankara (Tekeli, 1980: 91). After the end of the Second World War, migration to cities

from the rural areas took place all over the country. By 1950, the population of Ankara had reached 290.000, almost reaching the 50 year projection of the 1928 development plan competition, which was 300.000 (Altaban, 1998: 47). Population of the city rose from 74553 in 1927 to 122720 in 1935, to 157242 in 1940, to 226712 in 1945, and to 228536 in 1950 (Tekeli and Güvenç, 1987). The number of people employed in public administration was 4920 in 1931, rising to 11836 in 1938, and to 24620 in 1946 (Altaban, 1987:31). While the population increase ratio for Turkey between 1927 and 1950 was 53.5 %, the rate was 206.5 % for Ankara. Today the population of Ankara is over 4 million. (Figure 8)

Against this backdrop, an evaluation of the implementation and modification process of the green space structure is offered below, taking into consideration the priorities of the republic, the legal and administrative problems, and land speculation.

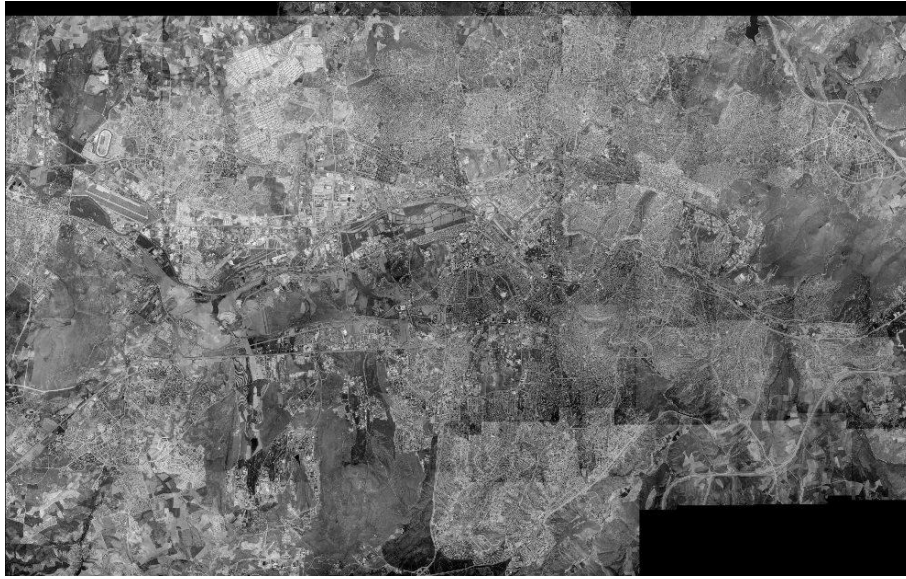


Figure 8. The limits of first three development plans of Ankara and the present macroform of the city (Consecutively from inside out, Lörcher, Jansen and Uybadin-Yücel plan).

Priorities of the State

The production of the green spaces was carried out primarily according to the preferences of the Republic. The implementation sequence of the green spaces put forth that the green spaces produced prior to 1954 were of representational character, conforming to the modernity project of the Republic. According to this project, parade grounds and spaces for celebrations and ceremonies were urgently needed in order to create a nation state and to adopt the contemporary lifestyle and manners and to create a middle class (Tekeli, 1998: 4-11; 2000: 320-321). These representational open spaces provided grounds for celebrations and demonstrations on important days, national holidays, for organised sports events, which all displayed the power and the practices of the new Republic. Production of the components of the green space structure proposed by Jansen started with the construction of Hippodrome in 1934, and ended with the opening of Gençlik Parkı in 1943. Other than Gülbahçesi and Seğmenler, all the green spaces produced until 1943 served as spaces of nation creation and the stages to demonstrate the model of leisure and recreation practices of the modern citizen. The celebrations and the processions at the national holidays were held at the Hippodrome and the 19 May Stadium. 19 May Stadium was also the venue for the national and international sports competitions (Bozdoğan, 2001: 75). Güven Parkı, which was a part of the Ministries Quarter, narrated the Independence War and introduced the actors and the qualities of the new social order with the Emniyet (Security) Monument (Batuman, 2002: 52-53). Meanwhile, Gençlik Parkı (Youth Park) was a new place of

entertainment for the middle classes, as well as a place for the locals of Ankara to observe and to learn this new life, entertainment and recreation practices and to transform themselves into the new citizens sought by the Republic (Yılmaz, 2006: 213-219). In contrast to the importance given to the production of the representational spaces by the Ministries, the development administration fell short for the production of everyday green spaces proposed by Jansen. The green strips, sports fields and squares, neighbourhood sports complexes, all destined for everyday use, were the important components of the urban life Jansen had envisioned. Yet places like Hacettepe and the Güven Park-Tandoğan Green Strip, which both had the character of everyday green space, were extensively modified and diminished, as summarized above. It was not realized by the development authorities that these green spaces also had the potential to have a representational character, as they could serve as a platform for everyone to practice the youth and health cult that symbolised the break from the old regime.

Development Laws, Regulations, and Land Speculation

The development laws and regulations controlling the urban development were outmoded for a modern urban development plan such as Jansen's. Even though a new development law was passed in 1933, it was prepared under the influence of the one it replaced. The new law was not detailed enough and did not meet all the requirements to implement Jansen's plan. The development administration was trying to find solutions to these problems emanating from the law. A problem of this sort has surfaced during the expropriation of the market places and sports fields nearby the schools. A Development Executive Committee decision in May 1933 clearly expresses that marketplaces marked in the development plan were considered as amenities in favour of public interest according to the Development Law and their parcels would be expropriated, but as the law lacked any details of this kind regarding the sports fields, the decision was to make a request to the gymnastic clubs in Ankara concerning the appropriation of these fields. From questions asked to Jansen the next year, we understand that the problem had not been solved. When Jansen (1934b) was in Ankara in April 1934, he was asked about under whose ownership the sports fields beside the schools would be, and how and under whose supervision the allotment gardens would be rented.

Coupled with this problem was the increasing impact of the bureaucrats and officers of the Republic on the course of urban development. Even while the Hippodrome, 19 Mayıs Stadium, and Güven Park were being built, illegal constructions on sites that were designated as green areas on the development plan were condoned, and measures that did not conform to the plan were implemented (Tankut, 2000: 213). Those who could, got involved in land speculation and used their influence on decision makers for favours. In some instances, using the high expropriation costs as an excuse, plan modifications were made to decrease the amount of green spaces and to keep the plots of influential people out of green spaces (Tankut, 1993: 213). These modifications were made directly on the green spaces that were proposed for daily use of the urbanite, such as the green strips (Development Executive Committee, 1934; 1938) or the urban forest to the south of the National Assembly (Development Executive Committee 1937). Jansen (1936) had proposed this urban forest as a buffer to stop the urban development from coalescing into each other. In 1937, the decision taken by the Development Executive Committee (1937) decreased the width of the urban forest in order to remove the parcels of two deputies out of the no development zone.

The aim of the Republic, to develop Ankara into a modern capital city, was hampered by the insufficiencies of the development laws and regulations, and the land speculation and patronage relations in the course of urban development. The green space structure proposed by Jansen for Ankara has been extensively modified and realised partially in the form of parks, on lands leftover from the modifications. These separate parks are far from constituting the structure of the modern life Jansen had envisaged for the urban population of Ankara and the members of the modern republic. Car ownership increasing after 1950s and the new plans increasing the density of the city, which are not discussed here, have been the other important factors that led

to the modification of the green strips, turning them into streets and car parks. Today, the produced components of the green space structure are still under threat and the modification process of the green space structure proposed by Jansen is far from over.

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Morphological process as an instrument for knowing chronological character: a case study in Tainan

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Abstract. *The evolution of the historical process produced the morphological character of the place, which can be revealed in previous European studies. However, in Asian cities, urban morphology is rapidly altered by industrialisation and the evolution of social environment, such as population explosion in merely half century, lease the morphological structure not really apparently. Therefore, can the “morphological process” (Conzen, 1988) still be a perceive approach to illustrate the city form in East Asia in this era? So, we need to figure out what is the character of Asia morphological process? For the purpose of realising the evolution particularity, we need to find out the fringe-belt (Whitehand, 1987) and built-up area (Ünlü, 2012) as the morphological region which could may reflect the sequence of urban forms. However, in East Asia cities, the boundary was usually blurred by filling buildings with because of the increase population growth. Morphological process can be seen regarded as another evidence of morphogenesis, and therefore be used as an instrument to measure the sequence of urban formation process. With a view to knowing the chronological character of Asian cities, Tainan, an old port city which is located on the East Asia marine trade routes, had experienced the Age of Exploration, industrialisation and the post-war population explosion. The differences of fringe belt formation process and four types of morphological region which correspond to each period specificity will be revealed in this study.*

Key Words: *Fringe belt, built-up area, Morphological process, Morphological region, Tainan.*

Introduction

During the past half century, Asian urban area had experienced rapid industrialisation and post-war population explosion. In the next few decades, the urban areas are expanded and followed by the remodelling of existing settlements, which can also be regarded as the “*urban deformation*”. Generally, urban form can be viewed as the result of the competition and compromise between social and economic forces of every morphological period (Conzen, 1977; Harvey, 1989), especially in European urban studies. Nonetheless, in an even rapid process of urban growth in East Asian context, could features of each era still be recorded or presented by the urban form?

The related study of the evolution of urban form or so called “*morphological process*” can be summarized in three stages: “*Accumulation*”, “*Adaptation*”, and “*Replacement*” (Conzen, 1985), while every urban regions has their unique morphological process to adapt the physical as well as the social environment, and these processes may be recorded on space pattern. However, the chronology of urban development in East Asia is distinct form the situation in European city. Therefore, the methodology, by which space character can be defined through a certain morphological period, may be reviewed by its morphological process once again.

In the past, the history of a city can only be understood through scrutiny of the traditional reference and ancient map. Acquiring the precise location and boundary of an urban area is impossible because of the technical limitation of measurement. Therefore, for the purpose of interrelating the social environment, human activity, and physical environment, urban form, the study of the morphological process of an area may be crucial, because the morphological process is one of the practical ways to present urban development in different periods. Furthermore, the identification of the area, presenting a series of morphological region, can help

to clarify the process of urban evolution. Based on these related studies, each accretion of built-up area and the limit of urban extension, so called “*urban fringe belt*”, can be associated with the location and the form complex character by the sequence of urban development. However, to recognise the boundary of these two kinds of region is extremely difficult. Thus, we have an urge to find another instrument to measure the morphogenesis course. With a view to tackling the problems above, in this study, the morphological process of some representative regions will be identified, and the specificity of the character in different period will be analysed.

Tainan, the oldest port city in Taiwan, is located on the East Asia marine trade routes. Since 17th century, the city has been experienced three major events which caused significant urban growth, including the Age of Exploration, industrialisation, and post-war population explosion. Accordingly, these experiences of expansion make Tainan a pertinent case to illustrate the morphological process. Based on the survey of this research, there are three types of built-up area and two kinds of ‘*fringe-belts*’ in Tainan, and each prototype reflects Tainan development history, including the growth of population and human activity, in certain period. This research endeavours to propose an instrument to understand the process of every morphological region, especially in larger scale. Furthermore, this achievement can help to shape the context to design the urban form in the future.

The related research of morphological process and urban form

The related urban morphology theory, mentioned the spatial continuity of the city (Rossi, 1966), represents the evolution of space. Furthermore, chronological character can be left and carved on the urban texture (Conzen, 1985). Because of the continuous process of evolution, the contemporary structure of urban form must contain the condition of the last era (Erith, 2000). According to the implication above, we can infer that the development course of the past shape today's urban form. The following paragraph will reveal the related study of morphological region which is simultaneously made by the evolution of urban and the factors of deformation, or called morphological process.

The evolution of morphological region

The spaces with geographical similarities will become a spatial grouping of form ensembles, which has “*Ganzheit*” character, such as urban core, period accretion, fringe belts, and the redevelopment of commercial centre, within the process of urban development (Conzen, 1977).

From the macroscopic point of view, these morphological regions have their own specific development orders and locations in a city. On the one hand, the built-up area will become broader and denser from the city centre as the number of the population soars (Whitehand, 2001). On the other hand, fringe belt will be generated as the growth of the population slows down. So the long term period of the fringe belt will be begun with low density and unrepresentative building types (Whitehand, 1994). Hence, distinguishing the built-up area and fringe belt by the urban develop density can help us to define the urban core area and the urban edge (Whitehand, 1994).

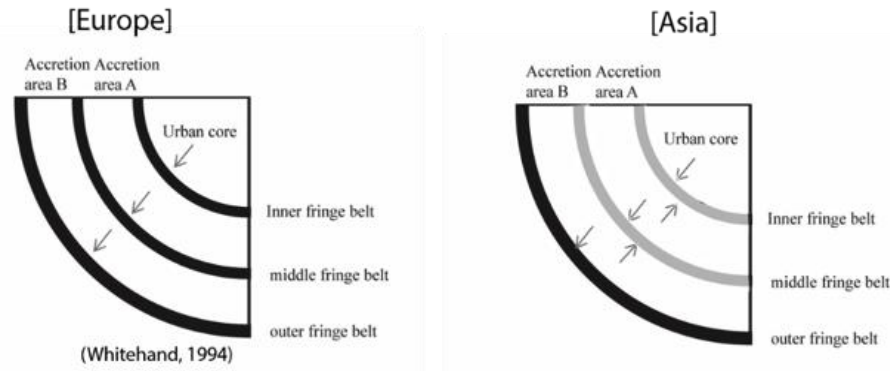


Figure 1. The comparison between Europe and Asia fringe belt model.

Based on the definition of morphological region in great detail, built-up areas hold the most activities in the urban areas and have building coverage in high density. A city as a container which accommodates the characteristics of the contemporary era and the results of all life (Mumford, 1961). Therefore, the built-up areas, which are established in the early times, are supposed to experience many events, causing deformation process and accumulation. Because of the urban form character of fringe belts, such as rectangular shape, larger average plot size, series of the norm for plots in a housing area, less hard surface and fewer road crossing ... etc. (Whitehand and Morton, 2003), the built-up area and fringe belt can be defined by distinguishing the building coverage rate and street density. Furthermore, identification of the built-up area and the location of the fringe belt can help to us to know the chronological character of morphological region.

Generally, the traces of circled proliferation which were made during the process of development can be easily found in many European cases. However, the rapid development of Asia city results in different trajectories in shaping a city. The character of a space keeps changing. To illustrate this, numerous fringe belt areas are turned into built-up areas because of new development. Therefore, the boundaries of the built-up area and the fringe belt can barely be recognised. Accordingly, current urban form in Asia can hardly represent the boundaries and morphological region of a city in different periods. For the purpose of observing the evolution of Asia cities, we need another approach to substitute for morphological region.

Morphological process

Morphological process, representing the causal sequence of urban deformation, can be used as a tool to measure the sequence of urban development. The morphological process in different periods will be recorded on today's urban texture. Thus, this evidence of deformation can help to reveal the temporal and spatial position of every morphological region. Admittedly, the fringe belt and the built-up area of a city can barely be observe in Asia cities. It is possible to figure out the morphological process by identifying the key factors of morphological process in every region's form complex.

According to the previous European morphology studies, the formative process of the townscape includes three stages: accumulation, adaptation and replacement of forms (Conzen, 1985). In fact the formative process of each area will vary from case to case because of the unique characteristic of every place, and furthermore every area is deformed in different way.

The following paragraphs are the definition of each morphological process in related research:

Accumulation

In general, primary and secondary accumulation in the intensive and extensive morphological process of a city will be happened in the case of evolution of society and culture. Thus, the proliferation of a city can be illustrated by observing the shape and the density of built-up areas.

Adaptation of form

The adaptation of form particularly occurs in existing built-up area. During this process, the built-up area in a city may be reshaped to adapt the functional transformation of a city because of the change of social environment. Therefore, outbuildings, the additional constructions, can be regarded as the indication of the adaptation of form.

Redevelopment of form

The existing urban form is usually divided by the route network, adaptive redevelopment and the extension of the road system. Therefore, parts of the existing built-up area may be removed, reconstructed and reformed.

Based on the related research, every area has distinct the morphological process due to the contextual differences in different regions and different periods (Conzen, 1977). Moreover, the rearrangement of land and building can be revealed in the land investigation. According to this context, the morphological process can be understood as following. Firstly, the accumulation process can be recognised by identifying the additional constructions in a city, because of the difference between building density of primary accumulation and that of secondary accumulation. Secondly, the adaptation process can be observed in the area, which experiences transformation of land-use or building construction. Lastly, the plot integration, the building reconstruction and the change of street system can be regarded as signs of the replacement process. Figure 2 reveals the system of the correlation between the form complex and morphological process. The “step” of every process can be seen in the single or multiple combination of form complex.

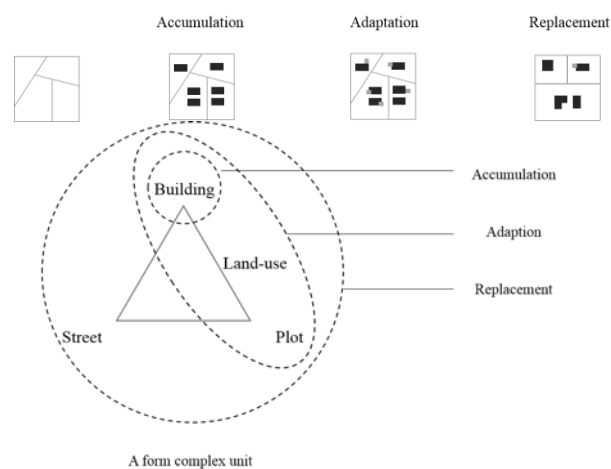


Figure 2. The correspondence between morphological process and form complex

Model

After reviewing the theories of morphological processes, we can apply them to the explanation of deformation sequence of urban form. Morphological regions may have diverse sequence of morphological process because of their different form complex and length of time during development. In most cases, there are three kinds of scenario, which are showed below:

Scenario A: initial accretion

Scenario B: repeating all kinds of process

Scenario C: jumping transformation

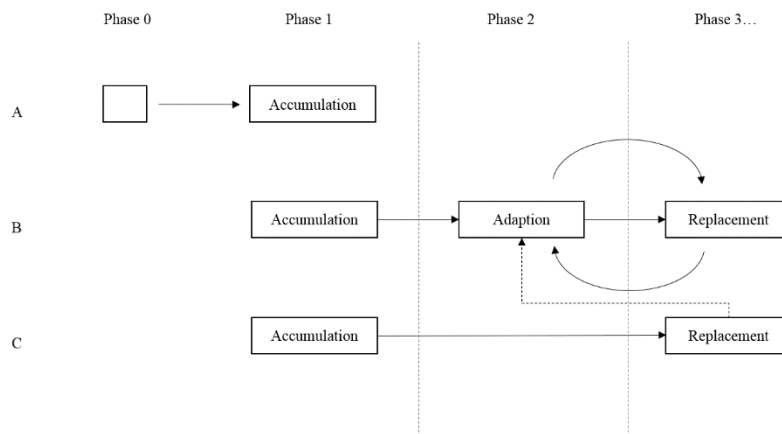


Figure 3. The model of morphological process.

As shown in figure 3, Scenario A is the initial morphogenesis stage which, under the demand from social environment, urges to establish the settlement. This situation can usually be observed in new development area. Scenario B is the most common scenario. After the primary accumulation, the morphological region will start to evolve to adapt new social environment. And after that, due to obvious external factors urging the previous space to change, the space may start its redevelopment process. In this scenario, the adaptation and replacement are in an iterative process. On the other hand, Scenario C is less common and only in case of the rapid growth of population. This situation can be observed through the immediate collage of the urban texture for the living demand. Mostly, in this scenario, the construction works, which are usually large scale or huge amount of residential houses, are determined by the authority. Furthermore, because land ownership generally does not belong to the occupier, there is no right for them to merge the plot or rearrange the land for the buildings which meet the demands in the future. However, the area would change or re-growing when facing the massive demolition, which, therefore, skips the adaptation phase.

However, the scenario can only describes the built-up area in the urban area. For the cases which remain undeveloped status or, in other words, are “fringe belt” (Cozen, 1960) in original stage such as the development of new town may have different morphological process. Although a fringe belt has lower building coverage and social network density, it still maintains the relationship with the urban area and remains the existence urban texture. In order to become a built-up area, fringe belt should go through a significant transformation in order to coordinate the urban area. Therefore, this type of space usually skips accumulation phase, and directly starts from replacement stage.

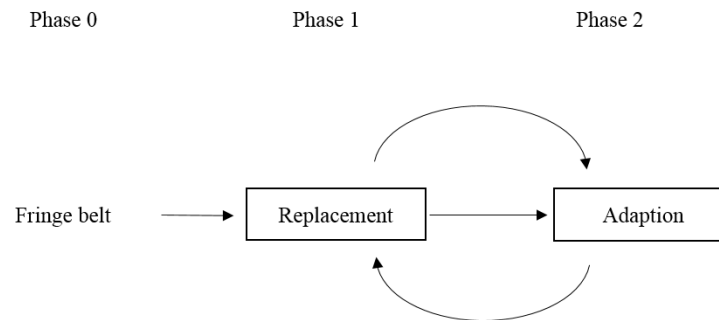


Figure 4. the Fringe belt morphological process.

Fringe belts have different ways of transformation according to their location and size. For instance, inner-fringe belt or middle-fringe belt which locates between the built-up areas is less likely to have large-scale redevelopment. On the other hand, the outer-fringe belt is usually more flexible to carry on large-scale redevelopment. Therefore, by recognising the existing built-up area which is in accordance to the extent and changing of form complex. Then, by compare to the location, it is able to identify the past fringe belt where might be located. According to the spatial characteristics of the morphological region and the sequence of morphological process, this study will present actual operating procedures and analytical methods to analyse complex urban texture in Asia in the next chapter.

Methodology

Based on the above model, we can understand that we should examine the evolution of the process by identifying features of the built-up area, fringe belt, and the morphological process, which contained in every morphological region. Next, those features can be correlated with the sequence according to the location and specificity period (Conzen, 1988). The following parts are the instructions of the instrument for the measurement of the evolution of the process:

The instructions of the instrument

Because the evolution of the city as a whole should be regarded as a single unit. In order to identify "Ganzheit" character or geographical similarities of morphological region, this study proposes a method from macro perspective to categorise space and explain the regional differences. The method of operation shows as follows:

Step 1: Standardizing the measurement unit

Because area is usually too large to be measured as a single unit and observed in complete 'surface', the method suggests to separate the continuous space by using fishnet system which can help to standardize the observation unit. The area of the smallest unit varies with the size of targeted city. The purpose of separation is to standardize each spatial unit in homogeneous perspective and to reduce the potential errors which may occur in the next stage if there are different sizes of the units.

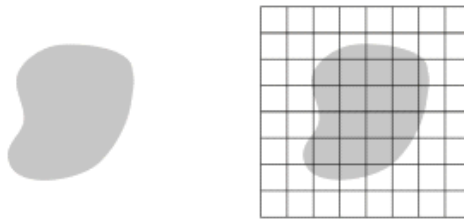


Figure 5. the illustration of cutting fishnet.

Step 2: Analysing the percentage of street and building coverage per grid

Calculating the building and street coverage area of each unit, which may be the most representative are of the property, can help to find out the built-up areas, fringe belts and rural areas in the city. The building coverage can represent the intensity and density of development; the road coverage area can be regarded as the response of the difference of planning texture and the street level. Revealing both the classification and the overlay is a practical approach to distinguish the different density and development intensity of each areas.

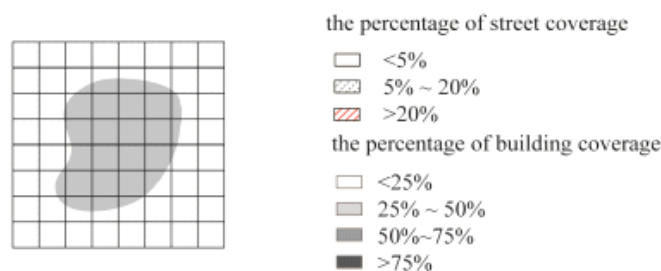


Figure 6. The percentage of the street and building coverage.

Step 3: Defining built-up areas and fringe belts

The following diagram shows the four levels of building coverage and three levels of street coverage. Twelve different combinations can be arranged out by overlaying these characters. In these twelve combinations, both the coverage of built-up area, the ratio of which is lower than fifty percent, and road coverage, the ratio of which lower than twenty percent, are regarded as fringe belt, while the rest combinations have relative high density of built-up area. At this stage, we can identify the boundaries of urban growth and built-up areas in a city.

Step 4: Classifying the morphological region

In this stage, we need to find out the morphological region form these twelve categories, because the space can only be classified by building and street coverage as a criteria to judge heterogeneity in the previous stage, and furthermore that can merely determine the spatial distribution of similar spatial quality, which is not accurate descriptions of each morphological region's "genius loci". Therefore, we have an urge to introduce another approach to identify the prototype of morphological region. As a result, with a view to identifying the morphological process in the next stage, we need to describe the characteristic of each form complex in detail.

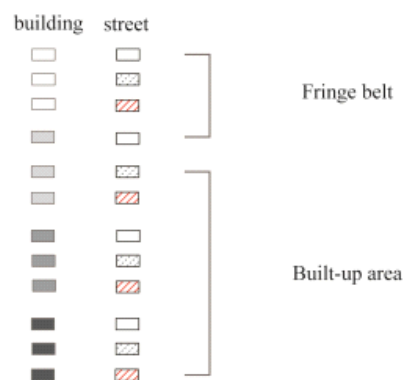


Figure 7. the type of the arrangement.

Step 5: Corresponding to the morphological process

The morphological process, such as accumulation, adaption and redevelopment, in each form complex will be found in this stage. Then, the sequence model of morphological process can be correlated to the phase which each morphological region had experience.

Step 6: Finding out the evolution of urban forms

The morphological evolution sequence of the urban form can be recognised by matching every morphological region and the location of inner, middle and outer fringe belt. In this stage, we can also identify the past fringe belt which becomes to built-up area now. The steps above can help us to find out the sequence of development.

In order to reveal to the characteristics of the periods, we need to seek to another verification to confirm that whether the sequence of development is correct.

Verification

The steps above can help to measure various morphological regions of a city and reveal the processes of urban evolution. In fact the morphogenetic changes of a place can be associated with the character of socio-environment in a certain period of time. To illustrate this, the morphological process of an area usually reflects some significant events, which may be caused by planning programme or political power, such as population growth. For example, the fluctuations in population growth can roughly present the urban transformation of an era; the turning point of the rate of population growth can help to relate the morphological process of an area to the significant event in a period of time. In addition, every related event and planning programme has the announcement date which can be obvious evidence of city deformation. The steps, identified in this research, can help us to find out the evolution of urban form through the morphological region and the morphological process. This result can be applied as a planning method to reshape urban context in the future and rethink planning laws of each region.

Case study

Tainan, the first city in Taiwan, was a part of the East Asia trade route and an important port city in world trade system before 18th century. Over the years, Tainan has experienced many

times of morphological transformation such as the period of modernism construction planning, World War II, post-war population explosion, industrialization and etc. Under this context, the city developed its own way to adapt the environmental change and therefore, created many kinds of morphological region. In the period of post-war population explosion, the population in Tainan had grown from 200000 to approximately 800000. Numerous developments in certain regions sprawl and some inner-fringe belts have been changed into built-up area. Thus, the boundaries of the morphological regions have therefore become indistinct and this situation increased the difficulty to identify the sequence of urban morphological change. To understand the evolution of Tainan urban morphology, this study will try to use the method of morphological process to explore the traces of spatial transformation. The following paragraphs are the results.

Result

We identified the boundary and area of built-up area, fringe belt, and the sequence of morphological region growth by the morphological process measurement. The followings are the results:

The built-up area and fringe belt in Tainan





To find out the current major development area and marginal zone in Tainan, we adapt fishnet system to calculate the building and street coverage for each grid. The area of Tainan metropolitan area is approximately 215 square kilometres. Due to the city's huge scale, this study separates the city into 1800 units and each unit is 500 meters in length and width. Through the calculation we can acquire the percentage of the building and street coverage in each grid. After that, we combine the data with the digital map of Tainan and analyse the distribution of different coverage level. Since there are two variables (street and building coverage) with three and four different levels respectively, there will be twelve categories showed in the map.

In this research, if the unit's building coverage is less than fifty percent and street coverage is less than twenty percent, this unit will be defined as fringe-belt. Hence, there are six categories of fringe-belt and six types of built-up area. However, after identifying the built-up areas and fringe belts in Tainan, we found that the morphological region of Tainan does not comply with the principle, concentric circle model. Therefore, we need another process to identify the space transformation of Tainan.

The morphological region in Tainan

Based on the results of last phase, investigation of the location, building arrangement and land-use type can be accorded with twelve categories. After this process, the morphological region in Tainan can be recognised. As the table 1 shows, four kinds of region have their own spatial particularity. And through the analysis of different spatial characteristics or, in other words, the traces left by the urban transformation, we can identify the possible morphological process of the targeted area. After this stage, we may identify every morphological region and correspond them with the sequence of urban evolution. In addition, we need to correlate the relation location with different morphological regions and therefore the description of the character in each region can be precise.

Table 1. The analysis of morphological region.

type	region	location	Form	Arrangement	Land-use	Process
Type 1 City centre		Urban core	patch	1. organic arrangement 2. fill up the plot	R, R/C	Accumulation, Adaption, Replacement
Type 2 Accretion area_1		1.The extension of core 2.Edge of core	1.patch 2.point	1.Standardized arrangement 2. fill up the plot	R R/C/F	Accumulation, Adaption
Type 3 Accretion area_2		Edge of core	Patch or point	Standardized arrangement	R	Accumulation
Type 4 factory		Urban edge	Patch or point	Big volume tightly arrangement	I, I/R	Accumulation, Adaption

(Land-use code: R- residential, C- commercial, I- industry)

The sequence of morphological region accretion

In order to confirm the chronology of morphological process, this research will compare the current relative location of built-up area and fringe belts. As figure 10 shows, the fringe belts of Tainan are mainly located in outer area.

The inner-fringe belt which as used to be the city walls is not easy to be observed. The middle fringe belts have higher building coverage, but they lose their urban pattern as well as the linkage between patches. The outer fringe belts have lower building density, while remain the linkages between the patches which surround the existing urban area.

The following step is the comparison of location and distribution between fringe belt and built-up area. Figure 10 shows that the accretion spaces are mainly located between the urban core and middle fringe belt, and some of them are merged into the fringe belt. By inference, this could be the evidence of the transformation from fringe belt to built-up area. This kind of space usually contains the traces of large scale redevelopment which aims to the contemporary demands.

The comparison between Asia and Europe urban form

Based on the results above, this sector endeavours to compare the cases in Tainan and United Kingdom. The formation processes of built-up area between these two cases are relative similar. However, the fringe belt of cities in Tainan and United Kingdom is quite different from European's patterns. Although there were numerous city walls in Tainan in the past, most city are torn down now because of the soaring number of population. As a result, the boundaries in the past has been cleared and filled up by the new buildings. The exact place of inner fringe belt can barely be identified; thus the pattern in Taiwan is quite different form the British case which has the inner fringe belt, a closing type.

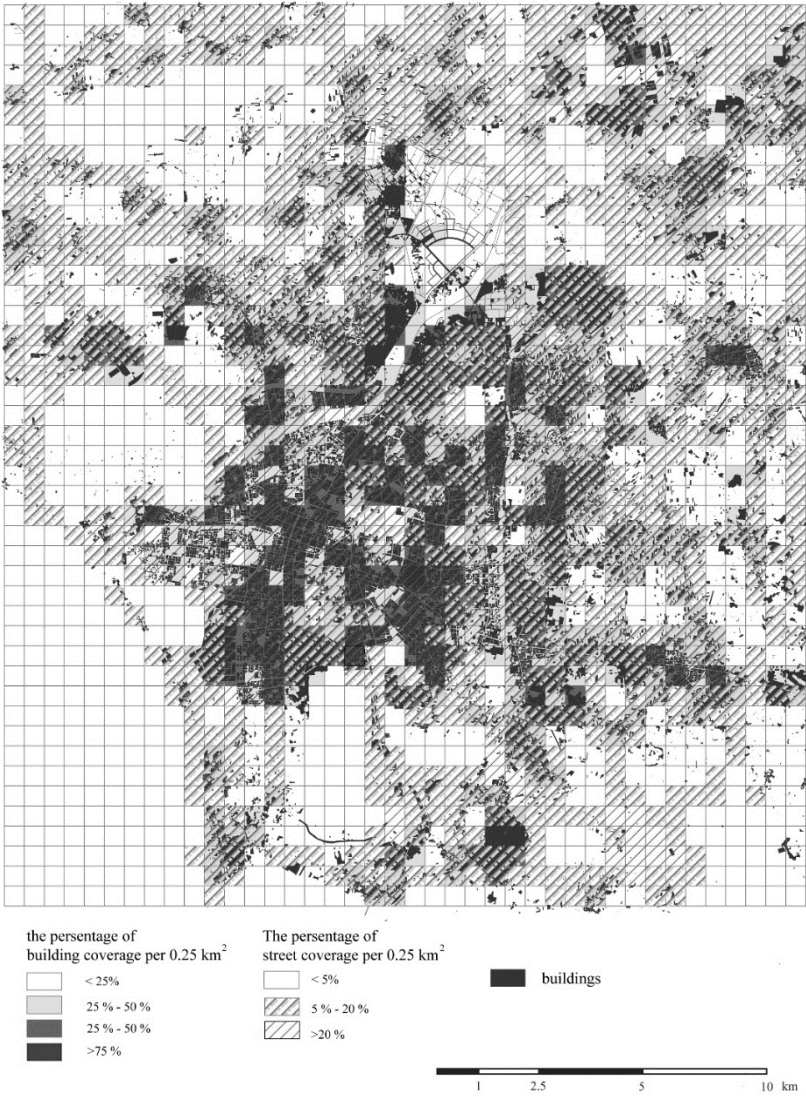


Figure 9. The analysis of building and street coverage.

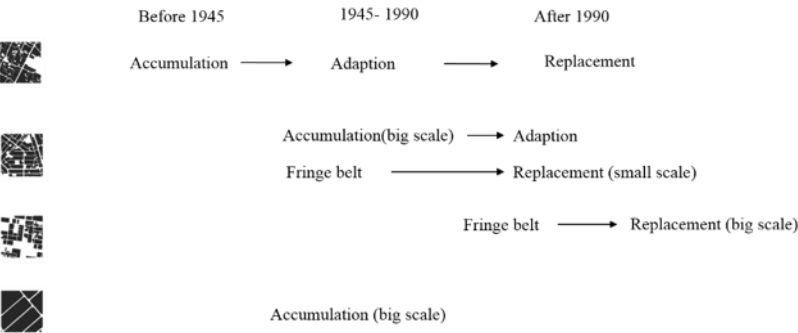


Figure 10. Morphological region and morphological process.

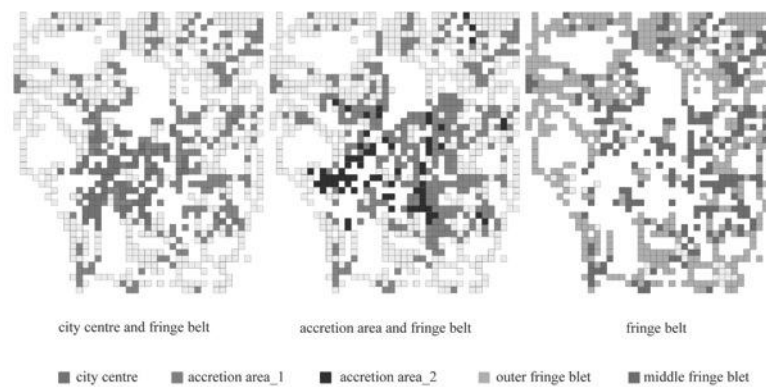


Figure 11. The distribution of fringe belt and built-up area.

In addition, the middle fringe belts of these two cases are also quite different. In Tainan, most of the middle fringe belts may be converted into built-up area in the period of rapid population expansion. Now we can only observe the segments left over from the built-up area. The outer fringe belts in Taiwan are likely surrounded by the city development area, while European cities usually have opened outer fringe belts.

The differences above elaborate the particularity of Asia and Europe, and these discrepancies between cases result in the different morphological region and pattern. However, the trace of development can still be observed in nowadays urban form by the indication of the instrument of morphological process.

Table 2. Comparison of fringe belt between British and Taiwan.

Type of fringe belt	British	Taiwan
Inner fringe belt	Close fringe belt Surrounding the kernel of a town asymmetrically Antecedent fixation line	Only for the city with walls. After removal of the wall, through the conversion process, may not become a closed ring shape.
Middle fringe belt	Open fringe belt Residential integuments	Open fringe belt residential-based, mix with commercial use
Outer fringe belt	Open fringe belt Current periphery of a town	Open fringe belt Current periphery of a town
Factory fringe belt	--	Open fringe belt Surrounding the factory district mix with residential and farm land

Conclusion

In this study, for the purpose of analysing the complex shape, which is curved in particular chronology in East Asia, a new method has been proposed. The past studies have shown that a group of built-up area, sharing similar character, may be constructed in a certain era and the fringe belts of that expand outward in a concentric-circles way. In the rapid expansion of housing and the great demand of economic development, the fringe belt in the inner location is often transformed into built-up area by filling up the buildings or a large-scale replacement. These developments erase the trace of the edge of urban growth. Because the formation trace is

always recorded on every form complex, the morphological process, representing the cause and event in the formation, can be the instrument to measure the significances of urban formation.

The methodology for analysing the formation of urban form is established by this study. The following steps can roughly present the whole process of this method, including standardising the observation unit, determining the edge and built-up area, and finally identifying the morphological process to correspond to the morphological region and develop sequence. While, this method can also be adjusted by the different scale of observation area. The oldest city in Taiwan, Tainan is the operation case in this study. The result shows the applicability of this method in detecting the past formation traces in a relative complex urban form. In addition, this method also can be used in observing the relation between the morphological region and the chorology character.

The method, proposed by this research, can be adopted as an instrument to reveal the chronology character of every city, and further shape the context of the urban form in the future. However, this approach measures every city from the macroscopic scale of view, and therefore is not able to detect the subtle change of urban transformation. In addition, the pattern of land-use and the value of categories vary from city to city. Therefore, the method for analysing urban morphological transformation should be emphasized more on the experience of East Asia city development in different scales and the land-use pattern in the future.

The evolution of urban form since post-war period in Taiwan – a case study of Yonghe city

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Abstract. *To reorganize the living environment ruined by WWII, post-war modernism arose with emphasis on quantity and function of residential buildings, which became the mainstream of urban reconstruction. Moreover, the concept “Automobile dependency” (Reichow, 1959) was comprehensively applied in 1950s. Both essential causes led to specificity of urban forms: an observable morphological period (Conzen, 1960, 1985). In contrast to Europe, two different factors, namely industrialization and promptly increased immigration happened in East Asian metropolises, which resulted in the short supply for residential demand. For the causes above, the process of morphological change transformed rapidly that the form changing can be observed evidently. A city is composed of the complexity of “fatti urbani” (Rossi, 1966) and plots (Tarbatt, 2012). These visible and invisible parts are basic units of urban development (Alexander, 1979). By comparing the correlation between streets, buildings and plots, the result of the evolution of urban form since post-war period can be found in Yonghe, locating in the surrounding area of Taipei, the capital of Taiwan.*

Key Words: *morphological period, post-war modernism, urban form evolution, morphological process, specificity of urban form in Taiwan*

Introduction

In recent decades, urban form study has been extensively used for understanding the context of cities in several countries. Among them, the study of urban form for descriptive and explanatory purposes, with the aim of exploring the evolution of urban form (Moudon, 1997) is one of the most essential part.

However, the total value of an urban form evolution could only grasped in its historical dimension. (Muratori, 1959) In addition, any period creates distinctive forms would suit the particular historical dimension. Therefore, the evolution of urban form, which has its causal sequence, can be easily observed through different periods.

In the period after WWII, post-war modernism arose with emphasis on quantity and function of residential buildings, which became the mainstream of urban reconstruction and affect the evolution of urban form in the following decades. Much research has been discussed through this period in western countries while rarely in eastern countries.

Due to the factors above, this present paper tries to explore the evolution of urban form since post-war period in Taiwan in order to find out the specific morphological process (Conzen, 1977) which leads to different evolution of urban form from western countries.

Evolution of urban form since the post-war period

Every city has its own morphological process (Conzen, 1977), and any period which creates particular forms has its morphological period (Conzen, 1960). However, it is the different context makes the evolution of urban form so distinctive in every single country.

Statement of evolution of urban form

Morphological process

Morphological process is any causal sequence that leads to the definition or alteration of any townscape features and their mutual composition (Conzen, 1977). Understanding the morphological process of the cities is the essential keys to know the cities. There are visible and invisible context which influence the evolution of city. However, urban form, which is easily observable, can be understood historically since the elements which it is comprised undergo continuous transformation and replacement (Moudon, 1997).

Morphological period: specificity of urban form

In morphological process, there are series of periods in an area which creates distinctive material forms in the cultural landscape to suit the particular socio-economic needs of its society (Conzen, 1960). When under the different period of historical or cultural context, the invisible facts such as urban planning, policy or major construction project, would reflect on the specificity of urban form. Therefore, by knowing the relation between periods and forms can we know the morphological period in certain area.

The spiral: evolution of urban form

When the forces caused by the historical and cultural context at play, they would have the capacity to change the previous forms into other forms in the circulation of growth and decline. Hence, each circulation represents one specific form based on one specific period. In the trend of urban development, the circulations of specificity of urban form based on morphological period are connected one after another and eventually become a spiral. Morphological process is the continuously rotating spiral, with growths and declines in each circulation. By knowing each circulation and the force influencing the circulation from growth to decline, the casual sequence of the evolution of urban form could be clearly recognized.

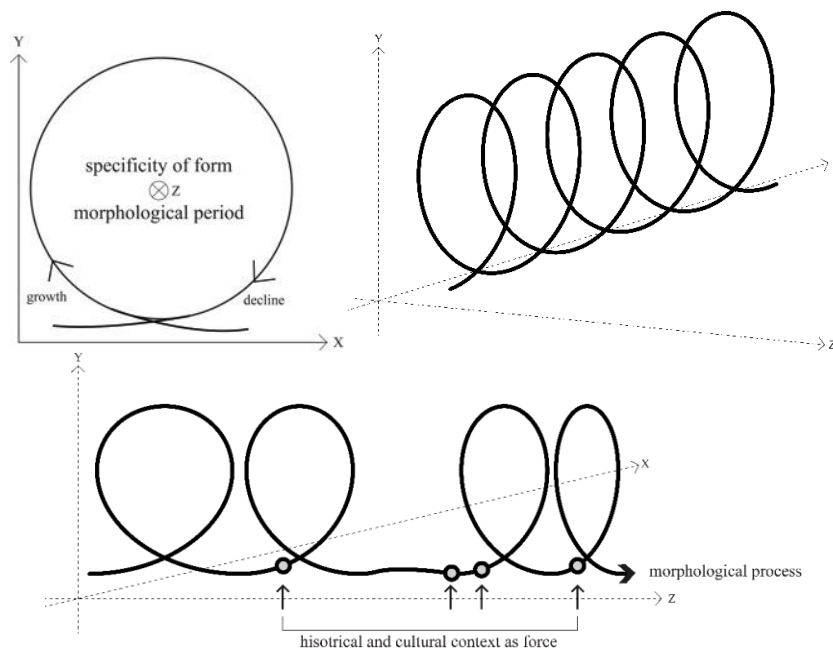


Figure 1. The spiral: evolution of urban form.

Post-war period: “Renaissance of modernism”

In 1950s, post-war modernism arose with Athens Charter to be the mainstream of urban renewal, and therefore influence the urban development throughout the world (Chen & Lai, 2010). In eastern countries, most of the cities weren't seriously destroyed by wars. However, as the colonies of the western countries, the trend of urban planning in western countries greatly influenced the urban form of eastern countries.

In addition, the main idea of post-war modernism still has great impact on the urban landscape nowadays or even in the future (Edward, 1998). Therefore, it is essential to explore the urban development through this specific period, post-war period.

Post-war modernism

The United States played an important role in the modernism movement concerning new advanced building and construction technologies. However, Frank Lloyd Wright was a cornerstone of modernism (Cleary, Levine, Marefat, Pfeiffer & Siry, 2009). His main idea of the architecture, organic architecture with low density of development, was of significance to the following urban planning in America, and so did the urban planning in Taiwan during post-war period.

Zoning: Automobile dependence urban planning

Since the concept “Automobile design urban planning” is comprehensively applied (Reichow, 1959), the idea of zoning came out which led to the different urban landscape from the past. The organic urban fabric is cut by roads and traffic forcibly, which caused not only shattered buildings and plots, but created better location for mix-used or commercial uses beside the street.

Approach to post-war period in Taiwan

In 1949, Nationalist government fled from Mainland China to Taiwan. As the ally of the United States during the Cold War, ROC officials received U.S. Aid, such as military, financial and humanitarian assistance from the United States to their island bastion during 1951 to 1965 (Pellegrin, 2005). And also because of the U.S aid, came out the first government official of urban planning which learned the specialty of urban planning from America (Liao, 2013). In addition, with the extensively used automobile design urban planning, the development of urban planning in post-war period in Taiwan was greatly influenced by western countries.

Methodology

Urban planning is the crucial fact of influencing the urban form, because it has legal effect upon land use, city plans roads, building coverage ratio, etc. Among them, the city plans roads divide cities into blocks and focus on making the regulation of the content in blocks, such as plots and buildings. These visible and invisible parts are the basic unit of the urban form. The paper would focus mainly on the two and also the correlation in between.

Urban planning

Based on the urban planning law in Taiwan, an urban plan shall refer to a planned development for significant facilities concerning urban living, hence it has big influence on the development

of urban forms. And in urban planning, city plans roads are the most directly observable results of the urban planning and they divided cities into blocks.

Not matter the content of blocks, such as plots and buildings, can vary considerably in shape and size, it should develop according to the configuration of streets. And rules in urban planning normally use blocks as the unit to control the development of urban area. Therefore, this paper would use block, which is divided by city plans roads, as the study unit.

Plots & time

In spite of the fact that plot is the invisible element of urban form, it's the basic unit as the urban development (Tarbatt, 2012). And because of the macro-processes have driven changes in urban morphology, the integrity of traditional urban forms would impact on the plot (Tarbatt, 2012). Therefore, by observing the plots, the evolution of cities can be easily seen.

Density is also a crucial part for understanding the series of plots. Normally in historical tendency, larger parcels are subdivided into smaller ones for generating a fascinating or character-full patchwork of form in old cities (Kostof, S., 1991). As the time goes by, street buildings are lost and plots turn larger by combining them together. This phenomenon cause the following landscape: monoculture of land use, monolithic building forms and segregated communities (Tarbatt, 2012), which happened evidently in post-war.

However, the time of urban planning does not correspond to the time of the division of plots in the same place. Moreover, they are under two separate management institution. These lead to the difference between lines of blocks and the lines of plots beside the city plans roads, which causes fragmented area when these two plans overlay with each other. And this paper would exclude those area to reduce the study error.

Buildings & time

A city is composed of the complexity of "fatti urbani" (Rossi, 1966). The city was seen as a material artefact, a man-made object built over time and retaining the traces of time, even if in a discontinuous way (Rossi, 1966). Building is the visible part in urban form and is the main element for directly observing the landscape at present time. In addition, it can also be regard as the proof for the historical events.

Density is also an important part for understanding the development of buildings. Normally, because of the good location of the city centre, it has great potential of development which causes high density of the buildings; while the landscape of suburb area may be low density of buildings.

However, the city has always been characterized largely by the individual dwelling (Rossi, 1966). Because the buildings of residential district change with time and it can be clearly observed, the form of changing can be easily tell. Therefore, this paper would take residential district as the first priority to find out the evolution of urban form.

Correlation between plots and buildings

The plot is an increment of landholding, set out for the express purpose of building, which means the invisible plots would directly influence the visible buildings (Tarbatt, 2012).

Density of plots means the quantity of plots in per unit, which can deduce the ratio of the size in the plot. If the density of the plots are high, there are many plots in per unit and the average of the size in the plot is small; if the density of the plots are low, there are not much of plots in per unit and the average of the size in the plot is much bigger.

Buildings are also same as the inference above. If the density of the buildings is high, there are many buildings in per unit and the average of the size in the building is small; if the density of the buildings is low, there are not much of buildings in per unit and the average of the size in the building is much bigger.

However, in reality, buildings does not correspond to the plots, mostly because of the difficulties of combing the plots to create the new buildings. Hence, normally, we can still see the remaining traces toward plots. In conclusion, the comparison between the density of plots and the density of buildings is worth discussing.

Model of the correlation between plots and buildings

Based on the tendency of the history, the correlation between plots and buildings can reflect the period of time. In the beginning of the development, there are only farms and some built-up area. At that time, farm is people's property and can also be regard as the big plots. Therefore, the density of buildings (BD) is higher than the density of plots (PD), as area A in Figure 2.

As the times go by, there is a tendency for larger plots to be subdivided into smaller ones as the supply of land decreases and demand for it increases (Kostof, S., 1991). The process will go from $PD=BD$ (area B in Figure 2) to $PD>BD$ (area C in Figure 2). In the process B, the plots are mostly equal to the buildings, because the development is based on the urban planning. Later on in process C, the reconstruction of buildings and the construction of widening city plans roads begins in the area which has high potential to develop. And because of the difficulties of combing the plots for new uses, the phenomenon results in many shattered plots, which is the reason why it has higher density of plots than buildings in such area. On the other hand, still some places combine the plots before starting the development. And this will be likely to appear in area A, B or C.

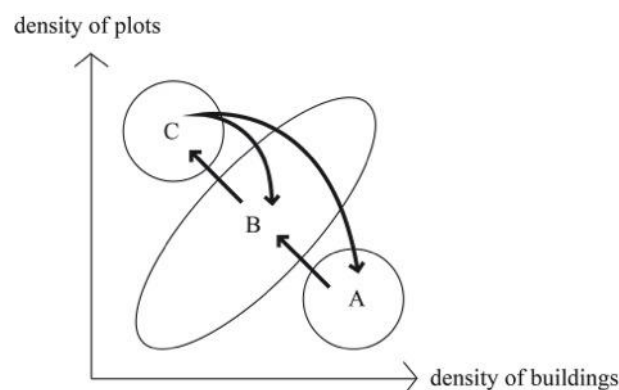


Figure 2. The correlation between plots and buildings.

The correlation between plots and buildings in urban area can be concluded as follows (Figure 2):

A. $PD < BD$

The density of the buildings is high while the density of the plots is low, which means plots and buildings have low correlation. In conclusion, there are larger plots but smaller size of building, which shows that one single plot may have many buildings on it. This categories can be concluded as two: (1) The beginning of the built-up area: Normally, all cities will start at this phase and there are only farms with some farmhouses, or the small area of built up area; (2) Low density of both plots and buildings: At the time goes by, small plots are combined to establish new development and this may also lead to larger density of buildings than plots.

B. $PD = BD$

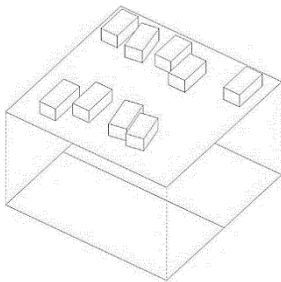
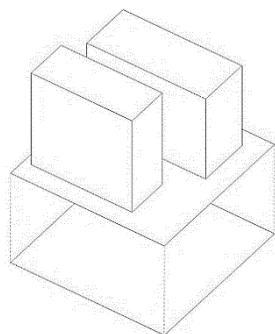
There are mostly same amount of quantity between plots and buildings, which means plots and buildings have high correlation. This categories can be conclude as two: (1) High density of both plots and buildings: The area develops mostly based on the urban planning. There are

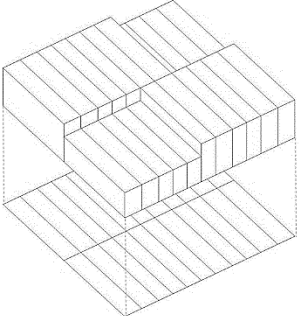
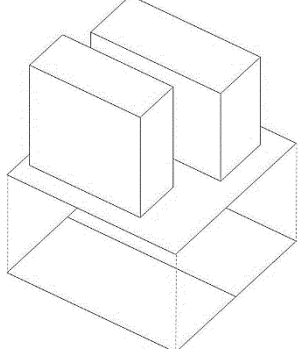
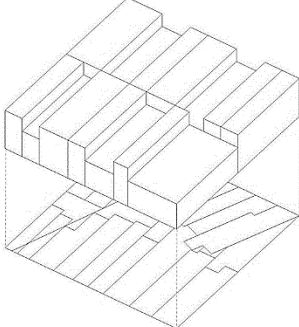
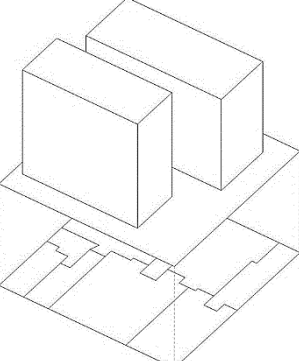
smaller plots and smaller size of buildings, which largely occurred in older period of time; (2) Low density of both plots and buildings: The area develops after the combination of the plots. There are bigger plots and bigger size of buildings, which largely occurred in much closer period of time.

C. PD>BD

The density of the buildings is low while the density of the plots is high, which means plots and buildings have low correlation. In conclusion, there are smaller plots but larger size of building, which shows that there are many plots but just less of buildings on them. This categories can be conclude as two: (1) High density of both plots and buildings: Most are located near the transportation system or the main street. Because of its good location, the area keeps reconstructing but without arranging the plots, which causes the high density of plots; (2) Low density of both plots and buildings: Normally, the area develops on big blocks which is far from the main street and the city centre. Small plots are combined to establish new development and this may also lead to larger density of plots than buildings.

Table 1. The prototype: the correlation between plots and buildings.

A. PD<BD		
Prototype A1		<ul style="list-style-type: none">• Beginning of the built-up area• Big plots and small buildings• Farms with farmhouses• Small area of built up area
Prototype A2		<ul style="list-style-type: none">• Closer period of time• Bigger plots and bigger size of buildings• Small plots are combined to establish new development• Residential or mixed used uses
B. PD=BD		

Prototype B1		<ul style="list-style-type: none"> • Older period of time • Smaller plots and smaller size of buildings • Develops mostly based on the urban planning • Mostly are residential uses
Prototype B2		<ul style="list-style-type: none"> • Closer period of time • Bigger plots and bigger size of buildings • Small plots are combined to establish new development • Residential or mixed used uses
C. PD>BD		
Prototype C1		<ul style="list-style-type: none"> • Older period of time • Highest density of plots of all • Smaller plots and smaller size of buildings • Most located near the transportation system or the main street • Residential or mixed used uses
Prototype C2		<ul style="list-style-type: none"> • Closer period of time • Bigger plots and bigger size of buildings • Residential or mixed used uses

A case study of Yonghe city

Location

Yonghe District is an inner city district in the southern part of New Taipei, Taiwan. It is the smallest district in New Taipei City but the density of the population is the highest in Taiwan.



Figure 3. Location of Yonghe city.

History

The process of urbanization is often accompanied by migration. Nationalist government moved to Taipei in 1949, which led to the migrated population and military dependents' village in Taiwan.

Moreover, because the policy of being air-raid place in 1954 and the first urban planning of Yonghe in 1955, Yonghe city suddenly burst into large amount of people.

In 1951~1965, U. S. Aid happened in Taiwan, which affected the construction of cities, economics or even military event. In addition, scholars brought back the urban planning theories from America, which led to similar ideals of urban planning between Taiwan and America at that time. And the first urban planning in 1957 is based on the ideal of organic and low density of development from America.

Later on after the year of 1970, the population of Yonghe city kept growing because of the migration of town and country. Yonghe was deemed the new residential area for overflowed population from Taipei, and the transition between city and rural area until now.

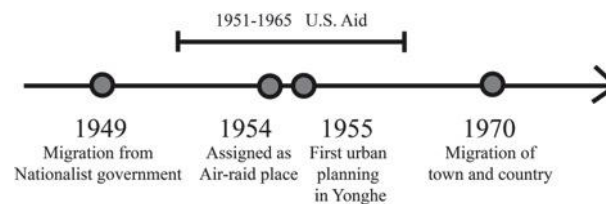


Figure 4. History of Yonghe city.

Model of the correlation between plots and buildings in Yonghe city

Based on the urban planning of Yonghe city, we find out our study area by using the blocks and land use of residential. And by dividing the density of plots and the density of buildings, the correlations between plots and buildings can be concluded as $PD < BD$ (grey area in Figure 5), $PD = BD$ (deep grey area in Figure 5) and $PD > BD$ (black area in Figure 5):

A. $PD < BD$

1. Because of the population grew rapidly in Yonghe, the density of the development was high in all area. Therefore there weren't place like I1 in nowadays.

1-1 It can be regard as the transitional belt, containing both new and old buildings which remains from military dependents' village.

2. New development with big plots with far location from the centre of the Yonghe city. And the land use is mix-used.

B. $PD=BD$

1. The area develops based on the urban planning. There are smaller plots and smaller size of building with accomplished roads in it. And all area is residential uses.

2. There isn't any area like II2 in Yonghe, which reveals the arrangement of the plots is hard to fully correspond to the new development of the buildings.

C. $PD>BD$

1. The area is located beside the main street and the MRT station, which is the highly profitable area with residential uses and a variety of commercial uses in the first floor in Yonghe. And this phenomenon leads to frequent reconstruction which causes more complicated plots.

2. New development with big plots with distance from the centre of the Yonghe city. And the land use is mix-used.

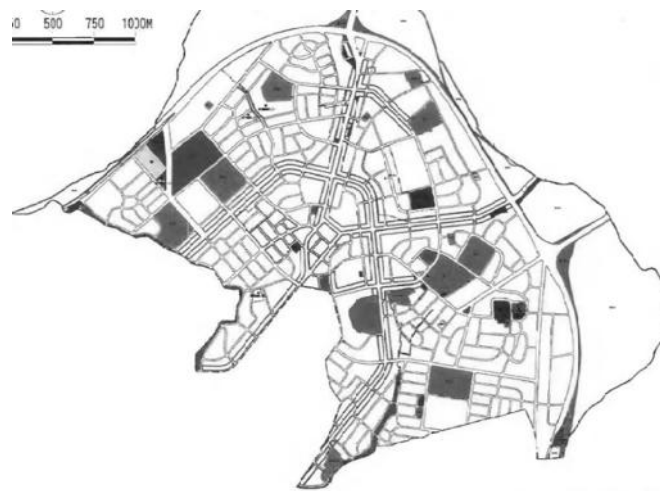



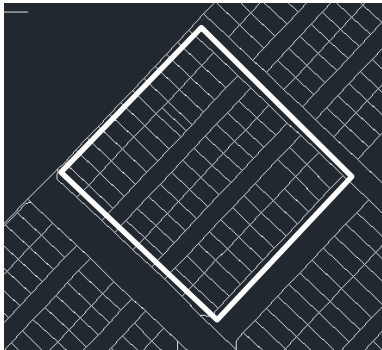

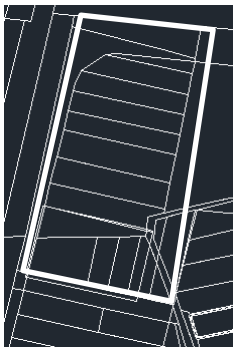
Figure 5. The urban planning of Yonghe city.


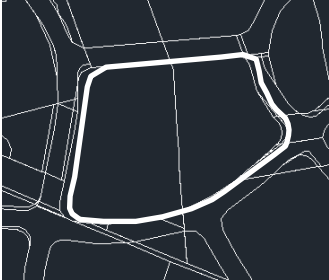


Figure 6. Results of the correlation between plots and buildings.

Table 2. The case study: the correlation between plots and buildings in Yonghe.

A. PD<BD		
Case for A1	none	none
Case for A1-1	Buildings	<ul style="list-style-type: none">• Transition of new and old building• Big plots and small buildings• Remains old buildings from military dependents' village
	Plots	
Case for A2	Buildings	<ul style="list-style-type: none">• After 1970s• Bigger plots and bigger size of buildings• High rise apartment with commercial uses
	Plots	

B. PD=BD		
Case for B1	Buildings	
	Plots	
Case for B2	none	none
C. PD>BD		
Case for C1	Buildings	
	Plots	

<p>Buildings</p> 	<ul style="list-style-type: none"> • After 1970s • Bigger plots and bigger size of buildings • High rise apartment with commercial uses • Far from the city centre
<p>Plots</p> <p>Case for C2</p> 	

Evolution of urban form in Yonghe city

As a conclusion based on the history of Yonghe, morphological period is caused by the historical and cultural context as force. In Yonghe city, there were four main force: migration from Nationalist government in 1949, being assigned as air-raid place in 1954, the first urban planning in 1955 and the migration of town and country. And as the result of correlation between plots and buildings, the specificity of urban form can be classified as: type A1, A1-1, B1, C1 and C2.

By corresponding the morphological period to the specificity of urban form, comes out the spiral of evolution of urban form in Yonghe city. Before the post-war period, Yonghe only has some built-up area and farms on big plots which belongs to type A. Later on, migration from nationalist government occurred and military dependents' village appears. And because the land belongs to government, it still a big plots, hence type also belongs to A. However, this type no longer exists nowadays.

Before coming to the next morphological period, there is a transition of new and old, type A1-1, which under different time of reconstruction in one certain block. Next, because of being assigned as air-raid place in 1954 and the first urban planning in 1955, Yonghe city suddenly burst into people, and led to reconstruction of buildings, which is type B1 and type C1. In spite the fact that they belongs to same period, the type is so different due to the location and the automobile design urban planning. As the result, the arrangement of plots and buildings is complicated if located in the centre of Yonghe city, while it's in order if it's far from the centre. At last, in 1970s, the migration of town and country happened, and the high rise buildings appear, which may belong to type A2 and C2.

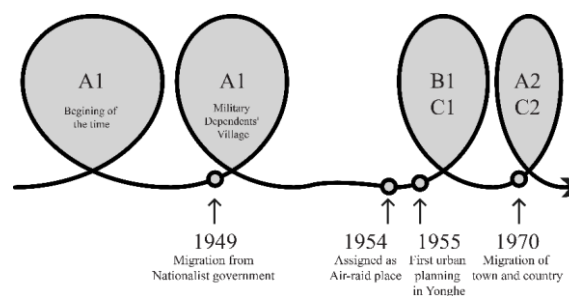


Figure 7. The spiral: evolution of urban form in Yonghe city.

Conclusion

Model

Every city has its own morphological process, and any period which creates particular forms has its morphological period. However, because of the different context, the specificity of urban form makes the evolution of urban form so distinctive in every single country.

From this paper, we can know the specificity of urban form from the correlation of the density of plots and the density of buildings. In conclusion, the process of the specificity of urban form begins from area A, which is greatly affected by the idea of modernism in America. However, because of the large amount of people cases by nationalist government and country to city, it goes on to B and C, and then may go back to type A at last, which is totally different from the idea of the low development of the first urban planning in 1957.

Based on the historical and cultural context as force, the specificity of urban form can correspond to the morphological period. And as the time goes by, the circulation of specificity of urban form and morphological period is like a spiral, which can represent the evolution of urban form.

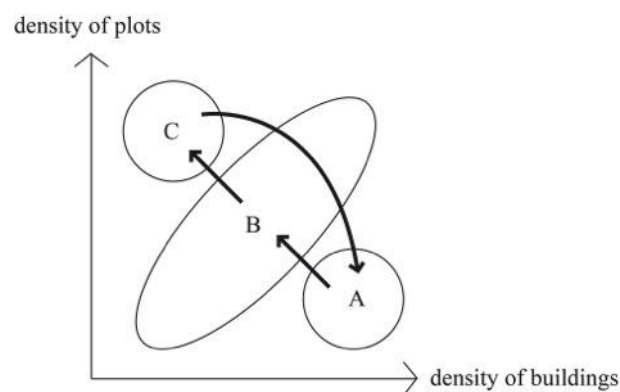


Figure 8. The correlation between plots and buildings in Yonghe City.

Recommendation for future work

However, there are some issues coming out when doing the research. Following are the issues which can be considered in the future:

- 1) There may be heterogeneity in one certain block in Yonghe City:

By using the density of plots and buildings, the content of the inside block will be regarded as homogeneity. However, the different arrangement may be the factor of influencing the evolution of urban form.

- 2) Types may be disappeared through time:

As the type A, it once appeared in the past, but because of the fast regeneration of urban space, it turned into other type. Therefore, it may be possible that some other types are not be discussed.

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Analysis of the correlated relations between ancient Chinese urban morphology and social culture

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Abstract. *Cities gestate culture. Different cultural backgrounds and ideological concept promote diverse city planning thoughts, as well as various forms of cities. Nowadays, the development status of Chinese city, such as the high speed of construction along with the resulting "one side thousand cities" pattern, urges the designers to turn over to think the guiding ideology and practice way of future city construction. However, when looking back upon ancient Chinese urban morphology, its distinct features of the age and spatial attributes are worthy of deep consideration. Based on spatial distribution of ancient cities, this paper takes ancient Chinese culture as an entry point from three cultural levels including the system, material and spirit. Furthermore, the effect and influence of culture on constructing urban form are explored and analysed, and then cultural connotation of ancient Chinese urban morphology is summarized aimed at leading the future urban to be constructed with distinctive character and sense of belonging.*

Key Words: Ancient Chinese, urban morphology, system, Ancient Culture

Introduction

A well-known western scholar Lewis Mumford has a famous metaphor, city is a magnet and a container, which respectively represents city's spiritual essence and physical form and he claimed 'the magnet comes before the container'. He also thought 'If the great capitals, like Babylon, Rome, Athens, Baghdad, Peking, Paris, and London, have dominated the history of their respective countries, it is because they were capable of representing and passing on a larger portion of their total culture.' It can be found that culture has significant influence on urban planning. As a 'magnet', different cultures make cities different in manners and customs, and linguistic performances as well as architectural style and urban morphology.

During the form and evolution of ancient cities in China, cultural conception has great formative effects and it's also an important and unique property of a city. Cultures that greatly influences ancient city planning in China can be classed into three fields: firstly forming and culture of the well-field system, secondly the architectural culture of wooden frame and city layout of ethical topic, and thirdly Chinese traditional theory that man is an integral part of nature, Zhouyi and geomancy, which respectively correspond to system cultural, material cultural, spiritual cultural 3 layers in Leslie A White's theory about structure of urban culture. All the above three fields together constitute an intact theory system that influences ancient city planning in China.

System culture level—the well-field system

As the mediating structure of urban culture, system culture is its normalization and institutionalization. The transition of urban culture will be reflected by vicissitudes of various systems. Urban system culture is based on material culture and mainly aimed at meeting more essential needs of urban inhabitants. And the need produced when citizens try to deal with relationships between individuals or between individual and group because of their

communication needs. Among system culture, family system, economic system and political system are the most predominant. Economic system has the greatest influence on urban morphology while it determines the political system.

China is a large agricultural nation and agriculture is the most important material production department in feudal society, which is also main source of taxes and land rent. The tendency of stressing agriculture and restraining commerce was established in Zhou dynasty and developed through the whole feudal society. To some extent, the early urban morphology in China had been affected by the farming system represented by the well-field system. And the well-field system is a Chinese land distribution method, which means the “nine squares” system(of land ownership in China's slave society) with one large square divided into 9 small ones, the 8 outer ones being allocated to serfs who had to cultivate the central one for the serf owner. This system promoted the feature of square grid of Chinese ancient cities. A book named research on Kao Gong Ji's record on pre-Qin Period city planning system has described that city can be viewed as a large shaft area, whose crisscross footpaths between fields consist road network of cities, and some identically-sized square field are utilized as urban construction lands according to the well-field system. Therefore, the overall spatial layout of square grid of Chinese ancient cities was established. A famous Chinese ancient book "Kao Gong Ji artisan" has detailedly described the basic city planning based on the idea of the well-field system. And the Imperial City has the following characteristics:

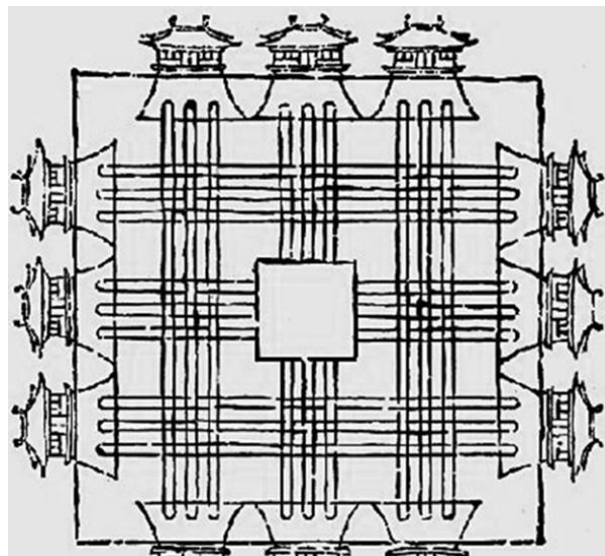


Figure 1. Imperial City described in Kao Gong Ji artisan.

1) The ancestral temple of a ruling house is located on the left and Altar of Land and Grain on the right of the Royal Palace while imperial courts are on the front and markets behind it.—It is a key feature of the planning and structure of the Royal Palace. This feature not only determines the location of central district given priority to body with palaces but also lays the foundations of the overall building planning, which fully embodies the main idea of royal dignity. Palaces are required to be built in the center position of whole city and around it the ancestral temple of a ruling house, Altar of Land and Grain, imperial court, and markets are located of bilateral symmetry. The central axis in North-south direction of palaces is chosen as the principal axis of urban planning, along which three imperial courts symbolizing the state power are built successively to strengthen leading role. So, controlled by the central axis, the ancestral temple of a ruling house and Altar of Land and Grain representing the social rites are unified to form the central district with the Royal Palace as its center. This is palace area and it's the main part of planning and structure of the whole city. And other urban parts are arranged to be located

around it in accordance with their respective functions and layout requirements to together constitute an organic integrity.

2) The regional division is clear and the land layout is rigorous for the Imperial City in respect to each individual component function of the whole planning and structure. The palace area is located along the central axis of whole city planning while other parts around it and of small-scale, which sufficiently demonstrates that the palace area is the emperor's political castle. Industrialists and businessmen live near the market and princes and aristocrats near the palace. However, the common people have to live in the four corners of the city. This structure is formed completely based on the feudal etiquette and it also shows an attribute of the Imperial City.

3) A system of roads consisting of many horizontal roads and axial routes is founded, where there are three main roads, some secondary main roads parallel to the east-west direction or the north-south direction, and also circumferential roads around the city. The road network is symmetrical distributed around the center district while the two middlemost main roads are respectively symmetry axes vertically and horizontally and their crossing point is the palace area. Meanwhile, the main roads extend directly to the city gate so that they are able to connect to roads outside the city. In this way, the system of roads not only helps every parts inside the Imperial City connect to the outside worlds, but also strengthens the reign of the emperor.

Therefore, following the ritual concept, the construction system established in Zhou dynasty utilized the seniors and juniors idea represented by different orientations to locate different functional architectures. A kind of logic about urban planning was gradually formed and it was a ritual planning rule. And the layout centered on the palace district. Firstly, this layout showed slaveholders' sovereign power and dignity and at the same time it's convenient to meet their needs to rule. Secondly, Zhou dynasty adopted the architectural style of square grids in the well-field system and made vertical and horizontal roads compose a strong network. Overall, this architectural conception played a significant role in forming of the size, layout, roads and structure of a city. Especially the urban land-use planning system built based on the well-field system produced far-reaching effect to improvement of ancient city planning in China. And it was inherited by later generations and also developed into a traditional city planning method in China.

Material culture level

Material culture in cities consists of a variety of perceptible and physical infrastructures. The reason why these physical things are incorporated into the scope of urban culture is that not only they embodies the humanized nature feature but also they are the most direct-viewing and most vivid representation of urban culture. It is in the sense of, Kevin Lynch points out, city culture material, is a communication medium, and shows a clear and ambiguous symbol. As one of the most direct expressions of urban culture, architectures directly influence the forming of urban morphology.

Architectural culture about timber construction

The influences traditional architectural culture had on ancient urban planning was firstly reflected in that every layout planning, fortification material and construction technique greatly affects square city walls and square grid of roads. Because of the particular climate, architectures were generally built facing the south and with the north at their back, and on the sun-facing side and the lee side. It gradually led to the north-south square grid of roads network (figure 2). Secondly, nearly every building, such as houses, gardens, palace and even entire city, in ancient cities is surrounded by walls. This courtyard wall culture naturally formed a square and closed architectural feature and the square and linear city construction style therefore became more convenient. Thirdly, the group buildings layout method mainly consisting of

timber construction had a more profound effect on urban morphology. Timber constructions were chosen by everyone from the emperor to common people since that on one hand it was flexible for timber buildings to stretch on planes and multiple buildings could be arranged of axial symmetry in space on the other hand.

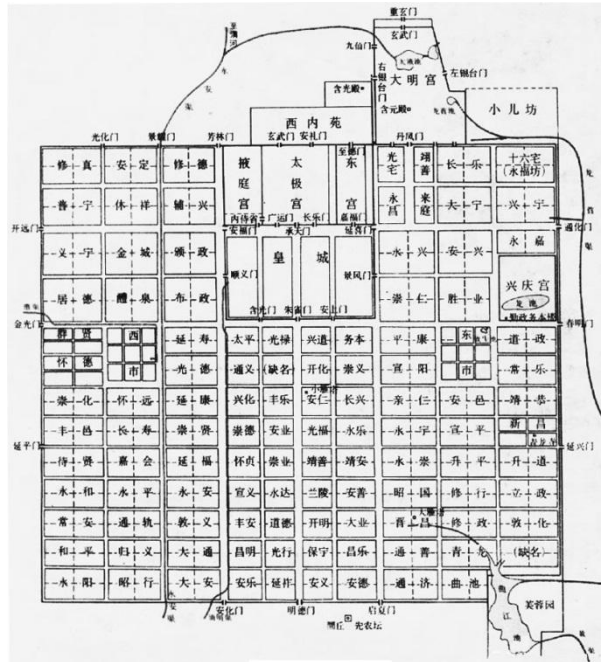


Figure 2. Layout of Chang' an City of the Sui-Tang Times.

City layout with a pecking order and a theme on politics and ethics

Spatial layout of ancient cities in China corresponded to hierarchical feudal ethics culture, which showed supreme power of the feudal society closely monitored the social space. In ancient urban planning and design in China, square form and central position are welcome and favored, and urban space arranged according to quadrangles and alleys had distinct levels and close-knit construction. Chinese famous scholar Xiaoxie Zheng thinks that there was always a kind of square basis largely identical but with minor differences running through spatial distribution and organization of ancient cities in China. Buildings of different functions were often arranged according to obvious central axis so that cities and groups of buildings were constructed on the basis of certain rules and systems. Paratactic banks of quadrangle dwellings composed streets and alleys, which, well-regulated assembled, further composed quadrate or anomalous cities surrounded by defensive walls. From an urban perspective, you can pace up and down from streets hutongs and lanes gradually to courtyards and houses while, as a resident, you could walk out of the room and go to courtyards, lanes and streets and even the outer world. Entire city showed a perfect rationality and a methodical order. Traditional Chinese cities with the artistic methods of organizing urban system and arranging urban layout synthetically reflected political institutions and ethical cultural features in a feudal centralized country.

Ancient Beijing (Peking) couldn't be a better example. The Forbidden City had been always located in the center of Peking until Qing Dynasty was overthrown and it coincided with the north-south central axis of Peking. As a representative of social rites leading urban construction, architectural construction and distribution in Peking were symmetrical and tight. Hall of Supreme Harmony was located on the center of central axis and Temple of Heaven and Earth respectively on its south and north as well as Altar of the Sun and the Moon on east and west

(figure 3). Qing Dynasty had stringent regulations on construction of cities of different classes and scales, materials and colors of dwelling houses of different official titles. For example, the number of housings for officials was given a clear definition based on level of their positions. Also, the seniors and juniors idea was reflected in design and construction of traditional quadrangle dwellings in China, which were thought as city cells. For quadrangle dwellings, the head of a family lived in principal room facing south, the eldest son in west-wing room and the servants in outer court following the pecking order.

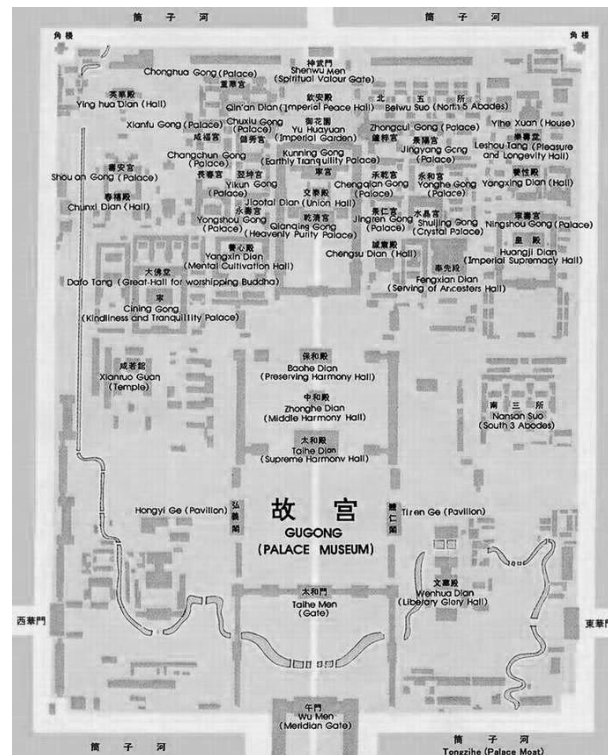


Figure 3. Layout of Forbidden City in the Qing Times.

Spiritual culture level

Confucianism-- theory that man is an integral part of nature

Cities are built on the basis of natural environment, so layout structure and overall appearance of every city will be influenced and restricted by geographical environment and natural conditions. In addition, all buildings in a city are also a kind of environment, where people engage in a variety of activities and which therefore is known as space art.

When ancient Chinese designed and constructed urban architectures, they paid much attention to harmony between buildings and surrounding environments. By means of unifying urban planning and design and combining with the nature closely, they tried to create a pleasant urban ecological environment, which is closely related to Chinese traditional ideology and culture. In dealing with relationship between human and nature, Confucianism advocated the idea that man is an integral part of nature, 'The wise man delights in water and the good man delights in mountains', insisting the organic integration of man and nature. Taoism emphasized 'calm and content himself of nature', 'Man law the law of the heavens, France Road, Imitation of Nature'. Additionally, geomantic omen that highlighted yin-yang and five elements was also supplied to ancient architectures in China. Although it contained a little of superstition, its

purpose was to find a fittest living place for human beings based on mountains, rivers and other natural conditions. It was also supposed to realize harmony between people and nature and in this meaning it was interlinked with the idea of Confucianism and Taoism. This view that we should learn from law of nature was given creative range in site selection and planning of Chinese city, structure and modelling of architectures and especially construction of landscape garden.

In site selection of a city, ancient Chinese laid stress on harmony among the heaven, earth and man to find a suitable living environment. During the overall arrangement period, Chinese cities were mostly constructed suiting local conditions and coordinated with nature. And cities with distinctive style were developed relying on surrounding environment. For instance, Suzhou is a beautiful city where artificial and natural rivers and other resources are adequately utilized to found a waterborne and land transport network (fig 4). Although, for about two thousand years, Suzhou was destroyed and rebuilt many times, its construction still comes down in one continuous line and changes little.

In planning for groups of buildings, Chinese traditional city builders were good at utilizing mountains and rivers to create a good environment architectures and nature integrated. Taking Slender West Lake as an example, many gardens are built along the lake, realizing that artificial and natural environment are combined, and delectable scenic beauty is presented. For thousand years or more, following nature and utilizing mountains and rivers, Chinese have built countless cities that are coordinated with nature. It is a kind of cultural creation as well and one of the basic contents of Chinese culture about traditional cities.

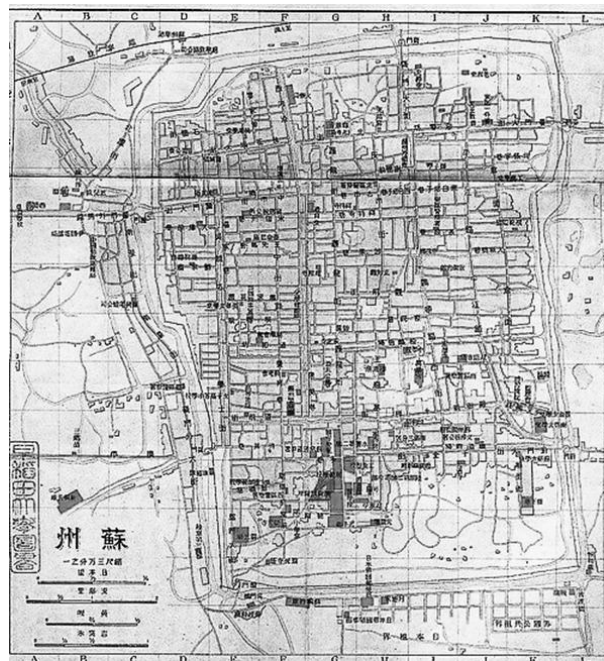


Figure 4. Layout of the ancient Suzhou city.

Taoism--yin-yang and five elements and Zhou Yi

Gemmu of Chinese culture—Zhou Yi is thought as a holy scripture of yin-yang theory and all Chinese culture is rooted in Zhou Yi. Its core idea comes from the common law between nature and human. Essential attributes of Zhou Yi is that things moves in circles, never ends and are boundless and the driving force of this law is yin-yang while its essence is interaction between yin and yang. The five elements, yin-yang and Zhou Yi are basic framework of Chinese classic philosophy and cultural speculations. The five elements are basic knowledge about materials

composing everything and law of their development. Yin-yang reveals two contradictory aspects of a thing in its continuous movement. Based on The five elements and yin-yang, Zhou Yi develops from divination into a theory that systematically interprets and generalizes the world view.

The influence Taoism had on ancient urban planning in China mainly reflected in following aspects: Firstly, ideas of images abstracting from viewing promote formation of the idea about reconciliation with heaven and earth in urban spatial layout in ancient China and it always exists in ancient urban planning. Secondly, armomancy and other analogous ideas that Zhou Yi contains were applied to city planning and the basic feature that number is important for ancient urban layout was formed. Six and nine are often adopted in determining the number of many physical objects in architecture since they represent grandness, maturation, copiousness and consummation in the image-number system.

Fengshui

Urban morphology is a living environment system that contains deep cultural significance instead of a simple geometric patchwork. It is known that every nation is the creator of their living environment. Although the environment is related to external conditions, the more important is expression of their inner consciousness under corresponding cultural concept. As one of the three birthplaces of city, China has had well-developed urban civilization and culture from everlasting When analyzed from the perspective of historical development. And its most distinctive part is profound urban design and site selection of a city according to fengshui.

In construction of ancient cities in China, some artificial measures also were taken to cover the shortage of environment that is ominous according to fengshui. For instance, in planning and construction of Chang'an city in Tang Dynasty, the southeast terrain is higher than southwest terrain, which is thought detrimental in fengshui. Therefore, a pool was dug in southeast direction to lower the terrain, which became a pleasant scenic spot. Then a temple and two high wood towers were built to make the southwest terrain rise. In addition Guangzhou city in Ming Dynasty was also an example.

Conclusion

Material culture of a city is just like its skin, whose development cannot be separated from material culture elements, such as houses, streets, traffic and public buildings. System culture is like skeleton of a city and it provides the guaranty for urban material and spiritual culture. Meanwhile spiritual culture is soul of a city. These three types of culture have influenced and shaped urban morphology together. Most of ancient urban morphology in China was quadrate and axial symmetry was applied to the urban layout while its plane profile and structure appear as regular and square. This urban morphology represents an idea of crown and social rites. Under the requirement of pecking order and regalism, imperial palace is located in the center of a city in ancient China and covers a very large acreage. As for design of a city, ancient Chinese city also has a main feature: urban morphology, urban design, architectural design and garden design are highly combined together.

In conclusion, ancient Chinese city was made different for a long history and cultural characteristics it contains. Produced under a macro social background, it fully reveals the essence of traditional Chinese social life and the guiding ideology for urban construction contains quintessence of traditional Chinese culture.

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Morphological evolution of urban form components in the Historical Peninsula of Istanbul

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Abstract. *Communities transform urban spaces according to their socio-cultural structures, needs, principles and policies. This process occurs either as entirely rebuilding of the space, or as constructing the remaining with the trails left by previous societies. Thus, several cultures generate a physical and social mosaic within the same urban space over time. Certainly, the most apparent reflection of this mosaic can be observed on the morphological structure of the space. City blocks, transportation networks, open spaces, landmarks, monumental buildings and urban facilities come forward as the most prominent components through the transformation process of urban morphology. From this perspective, the Historical Peninsula of Istanbul can be defined as a unique mosaic: The reflection of the cultural features on the urban space can be seen by the variation of urban form components from Pre-Historic period to the present. The aim of this study is to evaluate how different cultures have transformed the morphology of the Historical Peninsula of Istanbul through history. Morphological structures and urban form components were analyzed through old maps in four periods: Greek, Roman, Ottoman and Republican. With the determinations obtained by mapping techniques, the transformation ratio in morphological structure has been examined comparatively via urban form components. In this context, the impact of cultures on urban morphology has also been discussed. According to the findings of the study, 16% of the components has been existed throughout all periods, 68% destroyed in the process, and the rest survived by being transformed or appeared in a certain period.*

Key Words: *Istanbul, historical peninsula, urban history, urban morphology, urban form components*

A brief history of Istanbul

Istanbul is one of the most dominant cities of the world throughout the history. Strategically situated at the edge of a volatile region of the world, and straddling the eastern and western cultures with a long, rich history. It became capital city for two dominant empires and it can be considered as the stage of those cultures that constructed it.

Istanbul is the only city in the world that sits astride two continents Europe and Asia and it was the capital of three great Empires throughout its history: Roman, Byzantine and Ottoman Empires. For 27 consecutive centuries, 3 civilizations; Greeks, The Romans and The Turks built many structures like palaces, stadiums, bathhouses, roads, etc. In each period, the city was destroyed, next generation simply rebuilt on the top of the ruins of the past, adding their own layer. So the city became an unique mosaic with the surviving remains of different periods and cultures.

The first traces of human habitation date back more than 300,000 years in the Yarımburgaz caverns. Between 685-680 BC, The Megarions, inhabitants of the city of Megara (Greece) found the city of Chalcedon, which is located around Kadıköy of today's Istanbul. The transformation process of Marmara Region's morphology extends back to 18 thousand years ago. Current form of the region was shaped 3000 years before present.

In this study, schematizations and geographical information systems are used for historical analysis. Old engravings and maps of historical peninsula are scanned and documented digitally. Then, layers of different eras are georeferenced and digitized for comparing the morphological

situation of different times. In the schematization process, Historical GIS is used to display, store, analyze and compare data and track changes of Historical Peninsula in time.

Greek Period (Byzantion)

In 7th century BC, a man named “Byzas” who was a member of a Dorian Greek sailor group from Aegean Sea constructed a Greek fisher village called “Byzantion”. According to the records, the origin of the village is based on 667 BC, so it can be supposed as a significant reflection of Greek Colonization Movement (750-550 BC). Byzantion was a typical colonial trade city “polis”, which refers to a classical construction of a city and centres on ideas of self-governance, autonomy and independence, with a significant focus on the public realm. The acropolis [place for worship] and the agora [marketplace] were the two major anchors and public spaces linked by wide paved streets in a highly ordered manner. Along with those two main parts of the city, Byzantion had many several urban form components which were devastated by following communities: (I) The nucleus of the city (The first of the seven hills, which Topkapı Palace and Hagia Sophia are located today, surrounded with city walls), (II) The Acropolis (Location of Topkapı Palace), (III) Agora (A grand bazaar), (IV) Amphitheatre, (V) Temples, (VI) Stadion (stadium / sport activities), (VII) Tetrastoon (theatre baths), (VIII) Baths and (IX) Residential Areas (Grid pattern) (Figure 1).

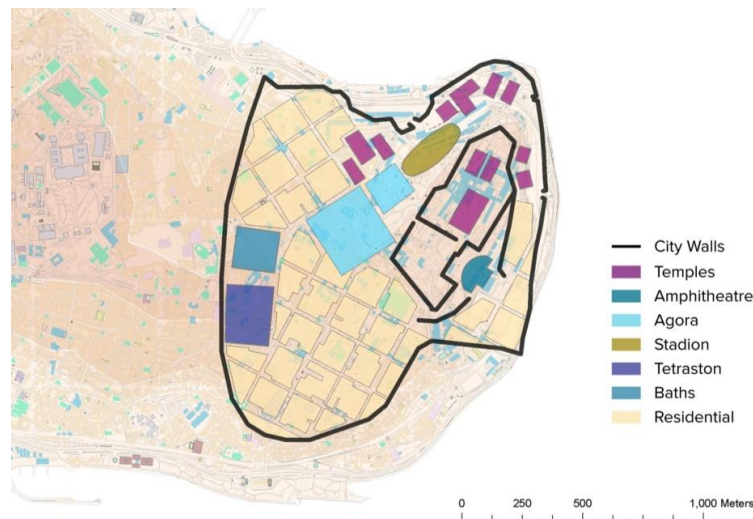


Figure 1. The City of Byzantion (667 BC – 196 AD) and urban form components.

Byzantion was the first nucleus of Istanbul, after this period, the city was developed along the western direction of Historical Peninsula. This continuity was mainly based on the topography of the site, followed by a development throughout the seven hills. The first hill which Byzantion was located is the most important region of Historical Peninsula, in terms of strategic location. It is the main intersection point of Marmara Sea, Bosphorus and Golden Horn. The hilltop was extremely convenient for Acropolis and appropriate to maintain control. However, the information for Greek colonial city Byzantion is very little, because only procedural diagrammatic maps and literature descriptions are available. Since any of the buildings could not reach today. The location of the city walls may be found in several maps.

Roman Period (Byzantium to Constantinople)

In 196 AD, Byzantium was incorporated in the Roman Empire by the Roman Emperor Septimius Severus and converted to Latin as “Byzantium” at 1st century. Byzantium had first been reconstructed in the time of Septimius Severus not just as a Roman city, but modeled on Rome itself, on and around seven hills. Later Constantine the Great chose it as his new capital (330 AD), renaming it “Nea Rome”, and it remained the capital of the eastern part of the Roman Empire. After the separation of Roman Empire into east and west sections, Eastern Rome declared the Nea Rome as a capitol city with a new name “Constantinople” in 395 AD.

In addition to Byzantium’s geographical and strategic location, forests and agricultural lands were the other effective reasons for becoming the new capital city of Roman Empire. Also, the existing city walls were providing security. After the Roman conquest in 330 AD, traditional city planning strategy employed by the Romans on any of their colonies, the Roman Castrum is determined both by the cardinal directions and the protective perimeter afforded by a wall. Public space was at the intersection of the two major roads through the town. Adapted to a hilly terrain and to existing building, this model can be applied to the growth and development of Istanbul during the classical period. The deliberate hierarchy of spaces and the protective quality are present on the larger scale. The old temples and structures were not ruined down, but the whole city was reconstructed by Constantinus I. Also he applied the planning idea of zoning with the inclusion of 14 separate administrative zones similar to Rome. However the road system was totally different; instead of the grid pattern of Rome, Constantinople’s pattern was quite organic. “Mese Street”, which starts in front of the Golden Gate through the historic core of the city, was the main ceremonial artery of the whole structure (Figure – 3).

In this period, urban form components can be listed as follows: (I) Acropolis (from Greek period), (II) City Walls (renewed), (III) Necropolis, (IV) Mese Street (the main artery), (V) Golden Gate (for ceremonies), (VI) Constantinus Forum, (VII) The Great Palace, (VIII) Hippodrome and Obelisks, (IX) Baths, (X) Aqueducts, (XI) Churches (Figure 2).

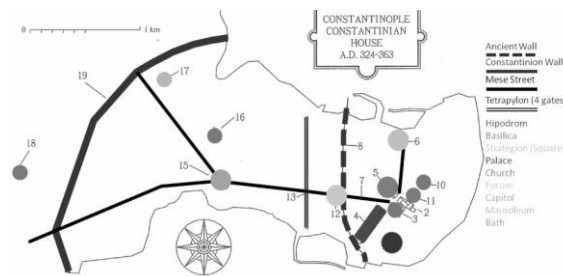


Figure 2. Constantinople (324-363 AD) main urban form components.

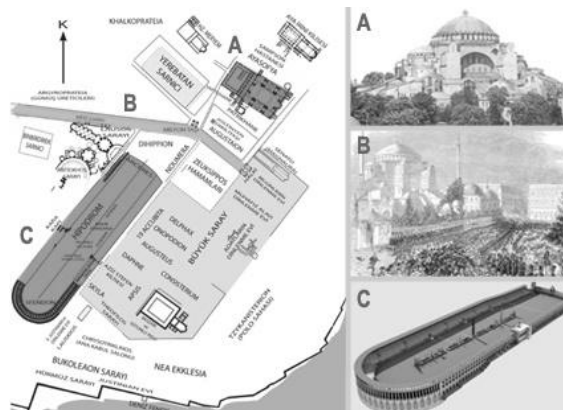


Figure 3. Hagias Sophia Church, Mese Street and Hippodrome.

Between 4th and 5th centuries, the Emperors gave importance to the city centres that reflects to Constantinople with constructing new forums. Forum Bovis and Forum Arcadii, which were the two important focal points of the forum chain, constructed along the main axis on Mese Street. In the 5th century, the city walls were renewed by Theodosius II. The city was enlarged with the construction of the new defensive wall nearly a mile and a half to the west of the Constantinian circuit. By those improvements and the growth of population; the land was extended from 6 km² to 14 km².

In this powerful period of Constantinople, new harbours and warehouses were constructed, public spaces within the old Severan walls were restored and renewed. Architecture and statuary have gained more importance in Roman period; in addition to the newly constructed buildings, streets, piazzas and forums were enriched with obelisks and monuments. Also, administrative and religious buildings were all decorated with ornaments and mosaics. This power and glory began to collapse along with the 7th century in consequence of plague, wars and upheavals, disasters (earthquakes and fires) and economic constraints.

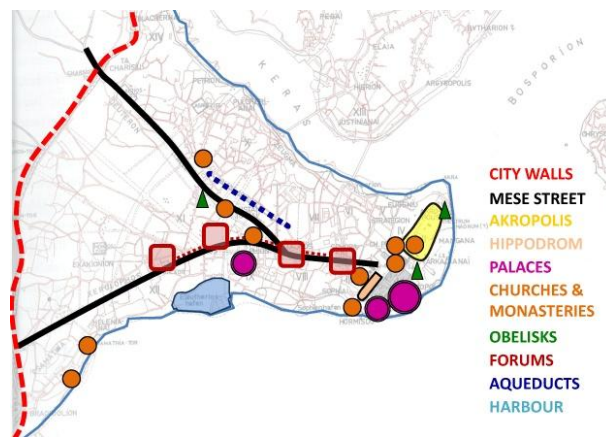


Figure 4. Constantinople (4th – 7th Centuries) main urban form components.

The collapse of the city started with the Arabian and Bulgarian attacks at the beginning of 7th century. A large part of the city was demolished and the identities of the monasteries, churches and public piazzas have changed. This devastation and transformation continued until the 10th century, on the other hand, the city became a religious centre. 25 churches were restored and 8 new churches were constructed. Before the 9th century, the harbour on the southern part of the city was ruined and economical activities were transferred to Mese Street and Haliç. At the beginning of the 12th century, Galata and Haliç districts were besieged and the Great Palace and Mese Street were destroyed.

Between 12th and 15th centuries, city walls, palaces and monasteries were reconstructed. It was clear that the city no longer had the power and glory of the previous centuries. The old city including Hagias Sophia Church, Hippodrome and the Great Palace was not majestic and strong anymore. Around the 14th century, Constantinople was no longer an empire, there were only small villages surrounded by city walls. Due to this decadence, the city was conquered by the Ottoman Empire in 1453. After the conquest, the first act was transforming the Hagias Sophia Church to a mosque, which shows the impact of culture and values to the city. This was also a symbol of a great transition between two major periods.

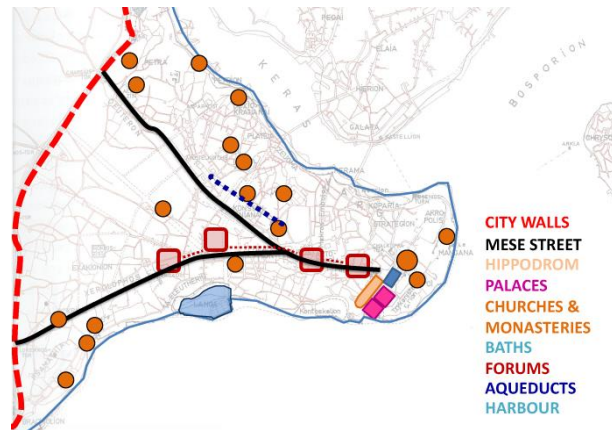


Figure 5. Constantinople (8th – 15th Centuries) main urban form components.

In order to summarize the Roman Period of Istanbul (Constantinople), the rise and fall of the emperors had shaped the structure and morphology of the city. At the end of Roman period, the city has grown to approximately 5 times of the Greek colonial centre and the growth control was achieved by the city walls in different time periods. Mese Street and the forum chain, which connects the historical core to the outer parts, were the most dominant urban form elements of this period. Churches were also significant elements to the fact that the importance of religion. Some components of the previous community have remained in this period; however the identity of many has changed. The topography of the site was the decisive factor for the development of the city. The hills were the main focus for urban form components, especially for constructing the symbolic buildings. In this way, the silhouette of the city has become more powerful and splendid.

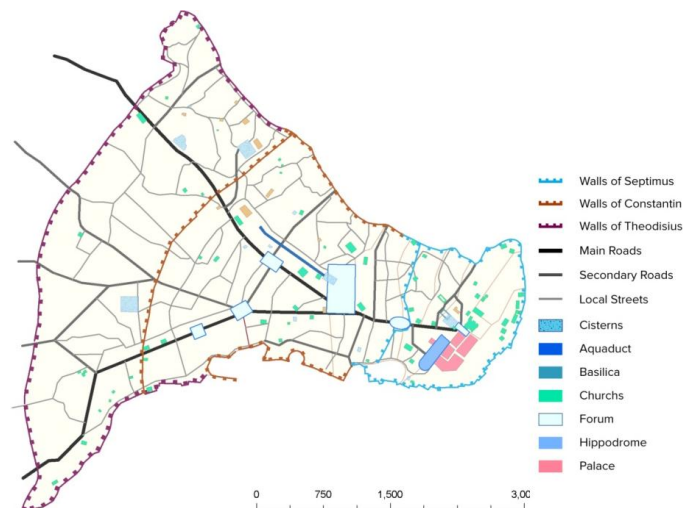


Figure 6. Constantinople, general morphological structure and urban form components of the Roman Era.

Ottoman Period (Konstantiniyye)

Following the conquest of Constantinople, Fatih Sultan Mehmed (Mehmed II) immediately set out to revitalize the city. He urged the return of those who had fled the city during the siege, and resettled Muslims, Jews, and Christians from other parts of Anatolia. The sultan invited people

from all over Europe to his capital, creating a cosmopolitan society that persisted through much of the Ottoman period. Fatih Sultan Mehmed was aimed to reconstruct the city, revive the economy and lay the foundations of a populous and powerful empire; so he repaired the city's damaged infrastructure, began to build the Grand Bazaar, and constructed Topkapı Palace (to the location of the Acropolis), the sultan's official residence. He was dedicated to the idea of renewing a devastated city as a capital of the world with a new structure.

Along with the revitalizing process, many constructions and reconstructions were performed such as renovation of city walls, construction of Yedikule Fortress, conversion of churches into mosques, generation of new gardens, formation of the nucleus of Grand Bazaar, decentralization of old harbours and warehouses to Golden Horn, reconstruction of markets and shops and construction of new market areas in new forms as “han” (inn / caravanserai) and “bedesten” (covered market place).

The Ottomans quickly transformed the city from a bastion of Christianity to a symbol of Islamic culture. Religious foundations were established to fund the construction of imperial mosques, often adjoined by schools, hospitals, and public baths. Also, other urban form components started to be formed by the effect of Islamic Culture. A new settlement unit “mahalla”, which developed around a small local centre including its own mosque, han, market area and bath, began to emerge all across the city⁵⁴. Furthermore, a new formation of the Islamic Culture “Complex (Külliye)” which contains a mosque, an institution, a madrasah (religious school), a library, a clinic (darüşşifa), kitchens, a bathhouse (hammam) and a fountain, was a permanent and unique component of this period (Figure 8). In addition, many churches from the previous period were converted into mosques. Mese Street was henceforth called as “Divan Yolu” and Hippodrome was converted into a piazza and renamed as “At Meydanı”. In summary, main prominent urban form components of Ottoman period can be listed as follows: (I) Mahallas, (II) Mosques, (III) Complexes (Külliye), (IV) Madrasah, (V) Palace (Sultan's residence), (VI) Han / Bedesten, (VII) Baths, (VIII) Market places, (IX) Harbours and Warehouses, (X) Aqueducts, (XI) Trade Centres and (XII) City Walls (Figure 7).

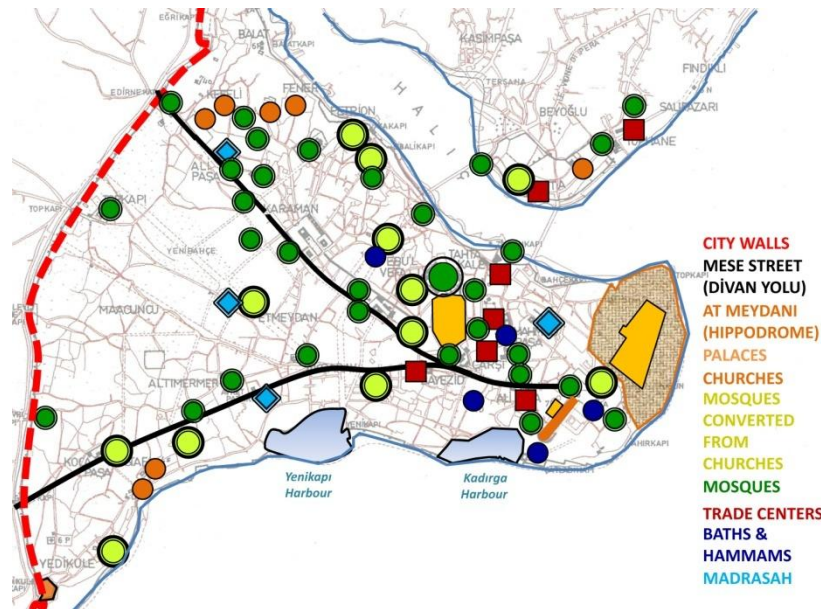


Figure 7. Konstantiniyye (15th – 16th Centuries) main urban form components.

⁵⁴ According to the records of the Ottoman period, there were 180 neighborhood units with the main characteristics of a “Mahalla”.

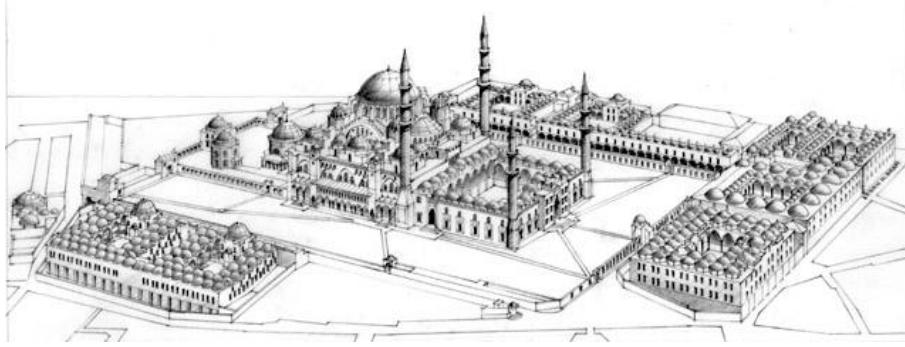


Figure 8. Süleymaniye Mosque and its complex (külliye).

Through the 16th century, commercial centres were at the same places as in the Byzantium Period. The most outstanding commercial areas were between Divan Yolu and southern shores of Golden Horn and Galata. As well as the eastern shore of Bosphorus began to develop in commercial activities, especially Üsküdar, the opposite side of Historical Peninsula. Also the residential areas were significantly developed; settlement extended from Ayasofya (Hagias Sophia) to Beyazıt, Şehzadebaşı and Fatih districts. Moreover, new settlements started to emerge on the shores of Tophane and Fatih, new villages erected in Ortaköy, Arnavutköy, Bebek and İstinye with a predominant Greek population. As in the previous periods, topography had an important role for development. The silhouette of the city was prominent for demonstrating the power and prestige. Therefore, the mosques were constructed on the peaks of the hills to be seen and perceived from various places. As a result; Bayezid Complex, Şehzade Complex and Süleymaniye Complex formed the unique silhouette of the Ottoman Empire.

In this century, Galata District (northern opposite shore of Historical Peninsula) had continued to progress; it was defined as “Pera” or “Istanbul Opposite” and contained three large districts: (I) Muslim district (around the Arap Mosque), (II) The district of the oldest inhabitants around the harbour and (III) Ortahisar Mahalla of the non-Muslim groups (on the slope). Different ethnic groups were lived in their own particular districts not only in Galata, but also all across the city with their own religious rituals and customs.

After this major structure of Ottoman Empire, the city had experienced various failures and changes between 17th and 19th centuries. The awakening of Western Countries in technology, science and economy had a negative effect on the Ottoman Empire, the population continued to increase. In the Tulip Period (in 18th century), the ruling class, court members and senior state bureaucrats started to leave the old quarters by the impact of French Palace and Landscape Design Movement. New palaces, villas, pavilions and mansions were built along the shores of Bosphorus and on the northern side of Golden Horn (Sadabad district). Those new buildings were constructed by the wealth of high bureaucracy and they were hidden from common people. So, the contrast and distinction between the “elites” and local people started to be more explicit. Also in the city centre, Western architectural and artistic styles (Baroque and Rococo) were dominant with the reflection of a new style in Nuruosmaniye Complex. Besides, new military and administrative buildings were constructed outside of the city borders as a nucleus of new districts; such as Selimiye Barracks in Üsküdar, Humbarahane Barracks in Halıcıoğlu, Arsenal Barracks in Tophane and Artillery Barracks in Taksim. The number of “han”s (the symbol of commercial activities) had nearly tripled at the end of 18th century. Lastly, 90 great fires devastated various parts of the city and almost all of the wooden houses were destroyed throughout the 18th century.

In the 19th century, Galata was the commercial centre of Istanbul which includes business centres, banks, shopping arcades and luxury shops. Meanwhile, Karaköy which situated on the shore just below Galata, had became a dynamic commercial centre. The old traditional shops and markets were still concentrated on the Istanbul side.

Until the middle of the 19th century, the image of Istanbul had been characterized with its mosques, tall minarets and their domes with a harmony. In this century, barracks, government buildings, banks and shopping arcades were more predominant on the overall city structure. Also, there were many new developments in transportation; as well as the construction of new roads, ferry boat voyages were increased and a new railroad system was constructed.

Republican Period (Istanbul – Modern Age)

The modern age of Istanbul had started with an administrative reform followed by the idea of making Istanbul as a “symbol of civilization” in 1839. During the truce period before 1923, there were two different pattern typologies in the opposite shores of the Golden Horn; flats and trade units in Galata-Pera district and crowded housing units, mosques and complexes in the Historical Peninsula. In the very first years of Republic, the administrative units moved to Ankara after becoming the capital city. The most important urban renewal project was applied in Beyazıt Square and also other applications were intended to create small green areas, recovering the streets and extending the tram line. Another important project was the Taksim Square Plan, which made by the Italian sculptor Canonica.

In the first half of 1930's; three urban planners A. Agache, H. Lambert and H. Elgoetz proposed many projects for the city's future. The most important proposals were the 2nd degree streets around the landmarks, industrial sites out of the city centre, enrichment of the existing railway system, green and shaded streets and increment of sea voyages instead of constructing a bridge on Bosphorus. Most of them were minor proposals to increase the quality of the urban structure; however the major changes affecting the morphology of the city first came with the Prost Plan in 1937.

Henri Prost aimed many objectives to find the solutions for the problems of the existing city structure: (I) Creating modern infrastructure and flexibilization of transportation system, (II) Conservation of the topography, urban pattern and architectural landmarks, (III) Restriction of the building heights, (IV) Improving the recreational needs, (V) Making the historical and cultural buildings prominent. In line with these objectives, new piazzas, boulevards, streets, stadiums, exhibition areas, opera houses and monuments were constructed (Figure – 9). The plan was revised after 1950 and some of his suggestions were implemented, while some of them were suspended.

There were some negative results of the plan: (I) Prost wanted to protect the historical pattern but the old neighbourhoods were not conserved, (II) During the construction of new roads, some important historical buildings were demolished, (III) With his suggestion of the industrial area in Haliç, the water was polluted and old settlements through the coastline were ruined, (IV) There plans of Üsküdar, Kadıköy, Galata and Beyoğlu were not integrated.

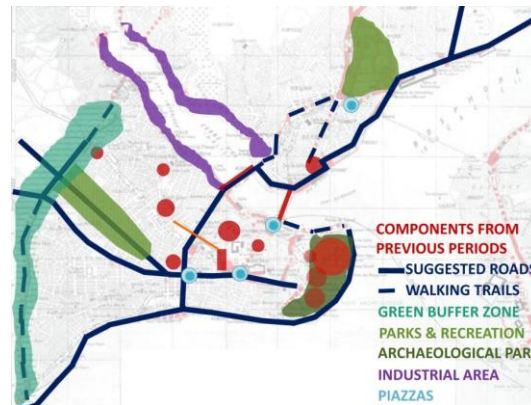


Figure 9. Henry Prost Plan (1937), proposals and new urban form components.

In Menderes Period (1950 – 1960), new major and primary roads were constructed in Historical Peninsula with the revision of Prost Plan: Vatan and Millet Streets, Ordu Street, Sirkeci - Florya Boulevard and Şehzadebaşı – Edirnekapı Roads. The north-south belt Atatürk Boulevard was extended, Barbaros Boulevard was constructed towards the northern direction of Beşiktaş. The hills over Haliç were transformed into squatter areas with the influence of the industry. New piazzas such as Aksaray Square, Eyüp Square and Eminönü Square were generated. During all these applications; lots of historical landmarks were destroyed or moved to other places, approximately 7000 structures were demolished or assigned to government, hotel buildings were constructed into the green zone near Taksim and a huge population migrated from Anatolia to Istanbul in this period. Informal constructions started to dominate and threaten the structure of the city and the boundaries were exceeded, in the meantime, the morphology of Historical Peninsula has been damaged and changed.

After 1970's, construction practices has increased. Two bridges (1973: Bosporus and 1988: Fatih Bridge) gave new directions to the development of the city. In the last 30-year period, Istanbul has become a megalopolis. Contemporary Istanbul is not just one of these historical phases, but a mix of them. The modern project of a new history-less Istanbul is being reevaluated as the city becomes increasingly diverse. The new city has a vibrancy resulting from a recent explosion in population growth and is searching for a new identity. While it does draw on a magnificent legacy from its past, it also faces new challenges as population and economic pressures force the city to adapt, evaluate itself and change.

Intertemporal transitions: from Byzantion to Istanbul

Byzantium to Istanbul (2700 years): Byzantium had very little covering area when compared to today's İstanbul. Only some of the walls and statues are remaining today in Topkapı Palace. The list of the temples and other civic buildings are described in literature, but nearly no maps or engravings can be found describing the city form.

Constantinople to Istanbul (1700 years): Constantinople had a main axis known as Mese Street. In fact, the word “Mese” means middle road, indicating centrality of this street. Mese was the center of economic and social activity, surrounded by colonnaded shopping centres.

Konstantiniyye to Istanbul (560 years): Like Constantine, Mehmet the Conqueror embarked on a building program when he appropriated Istanbul in 1453. As an example of religious tolerance, he retained Hagias Sophia and turned it into a Mosque. Mosques take over the civic services of the city, and the rest of the city fabric re-centres around these spaces and divides into a series of cellular neighbourhoods. The streets congest as the city encrusts itself. In the late Ottoman period, outside pressures lead the emperors to reconsider the role of the city as a model for development of the nation and empire. Looking back to the West for inspiration, late Ottoman emperors began to employ French city planners to re-envision Istanbul in Western image, re-inscribing thoroughfares and public spaces that had disappeared during much of the Ottoman rule. Taking the strategic advantage of fires, various neighbourhoods were redrawn with orthogonal lines, new public spaces were built and roads developed to deal with an increase in population and new transportation technologies.

The Historical Core: From the first settlement to contemporary Istanbul, the Seraglio (Sarayıburnu) was always a sacred place. In Greek and Byzantine periods, the hill in the northern part of the core was Acropolis. In southern side, just outside of the inner city walls, tremendous church of Hagias Sophia has been built. In same area, the Great Palace and Hippodrome has been built, where Blue Mosque and Sultanahmet Square stand today. After the Ottoman conquest, Acropolis was replaced by Topkapı Palace which is the main palace of all emperors. The hippodrome and Great Palace was mostly destroyed in early Ottoman period, thus Blue Mosque has built in the place of Great Palace. The ruins of hippodrome were conserved and became a square.

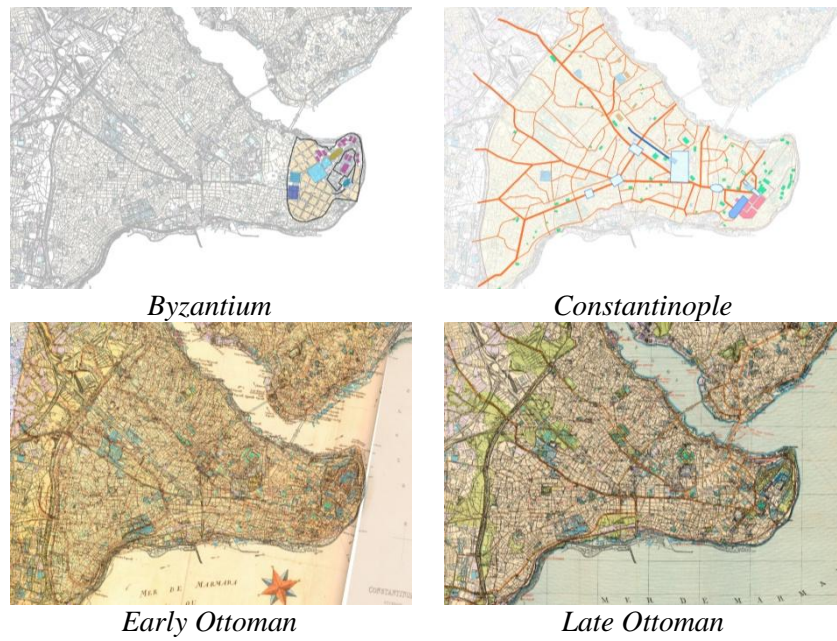


Figure 10. Istanbul, morphological transitions between historical periods.

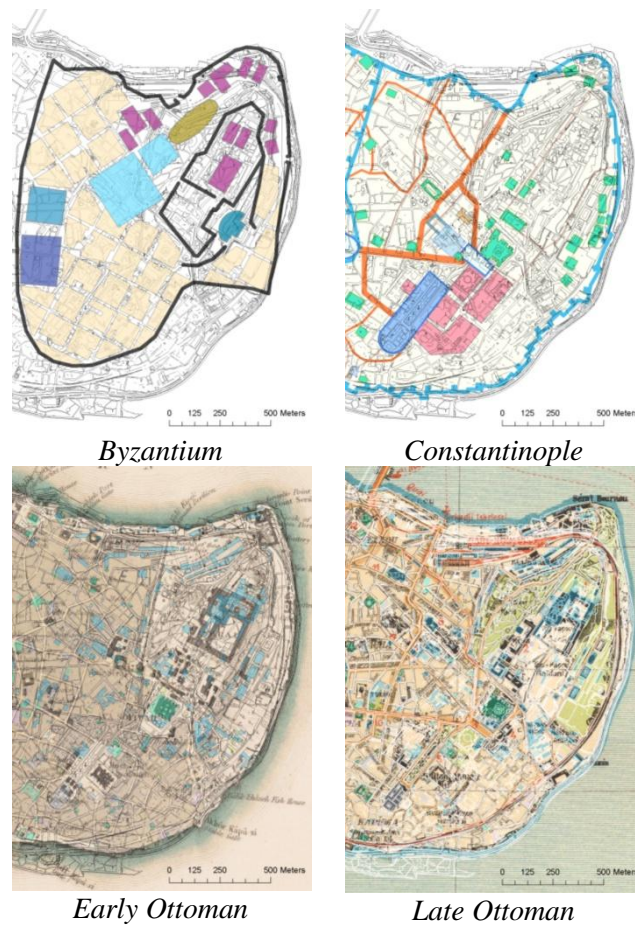


Figure 11. Morphological transformation of the Historical Core of the Peninsula.

Forum Constantin: The Forum of Constantine was built outside of the old walls. It was circular in shape and had two monumental gates to the east and west. The column of Constantine which still stands upright and is known as Çemberlitaş was erected in the centre of the square.

Saraçhane (Aqueducts): Aqueduct of Valens is planned and begun already in the time of Constantine the Great (died 337). It ended in a great reservoir in the vicinity of the Forum of Theodosius. Today, the area is in the quarter of Fatih, and spans the valley between the hills occupied today by the Istanbul University and the Fatih Mosque. The surviving section is 921 metres long, about 50 metres less than the original length. The Atatürk Boulevard passes under its arches.

Conclusion

Throughout all periods, the North-eastern point of the Historical Peninsula was always a sacred & special place since the first settlement. The main morphological characters of Roman Empire, main axis (Mese), Hippodrome, main Palace and Churches with more diagonal streets were made. Mese is still the main road approaching to the historical core area as “Divan Yolu” today. In Ottoman Era, there was lack of planned public open spaces. Since, the mosques were the main nodes of public spaces. The diagonal, straight streets and wide open spaces of Roman city were lost and more organic Islamic pattern appeared.

When the urban form components are examined in detail through different periods; it can be observed that the predominant components of each period are different. In Greek Period; the city walls, Acropolis, Agora and the temples were the main components. With the growth of the city and change of culture in Roman Period, the components which became dominant were new city walls, forums, Hippodrome, Mese Street, aqueducts, churches and monasteries. In Ottoman Period, the walls were nearly same but the most predominant elements were the mosques, which are the main urban form components of the Islamic Culture. In addition, public spaces were transformed into trade areas, Hippodrome was transformed into At Meydanı, Mese Street were renamed as Divan Yolu, new palaces, complexes, harbours and mahallas (neighbourhood units) were constructed. In modern period, a part of the prior components were demolished during new planning and application practices. New roads, open spaces, cultural and administrative buildings and defined function areas were constructed.

When comparatively considered, it can be seen that some of the components are common through all periods, which are city walls, palaces or administrative buildings, aqueducts, monuments, piazzas / public spaces, warehouses and religious buildings. (Table – 1) Almost all of them are still surviving today, although each community was settled on the ruins of the old ones. There were radical differences on the general morphology of the city, just like the Islamic structure of the Ottoman Period with its mosques, quiet and secluded lifestyle, narrow streets and cul-de-sacs in contrast with the Roman culture in such ways. However, urban form components are the remaining traces of the past, even if the general morphological structure of a city has transformed. As well as their importance in historical time sequence, these elements can also be informative landmarks for subsequent periods of time. In this context, Istanbul has a unique mosaic in terms of reflecting different periods. As an epilogue, Istanbul is a palimpsest of geographical and topological preconditions overlaid with multiple layers of history and urban culture and as a contemporary metropolis.

Table 1. Comparative evaluation of urban form components of Istanbul throughout different periods of history

	Greek	Roman	Ottoman	Modern
City Walls				
Via Egnatia				
Mese Street				
Divan Yolu				
Acropolis				
Agora				
Hippodrome				
Obelisks				
Palaces				
Churches				
Temples				
Harbours				
Aqueducts				
Baths				
Gymnasium				
Admin.Centre				
Necropolis				
Golden Gate				
Forums				
Monuments				
Public Space				
Warehouses				
Mosques				
Madrasah				
Trade Center				
At Meydanı				

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A code for the Islamic cities of the Gulf

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Abstract. *The paper demonstrates that the urban fabric of the traditional cities of the Islamic countries, beyond an apparently chaotic image, possess a logical structure, that contains all the information needed for the formulation of a contemporary urban planning code.*

Key Words: *History, fast growing Islamic cities, typology, urban fabric.*

Introduction

The subject of this paper is the traditional Islamic city, or, those settlements of the southern world inhabited and politically controlled by peoples of Islamic faith, as they appeared at the height of the colonial movement of the nineteenth century. The fundamental question is whether these prevalently spontaneous urban constructions are the result of anarchic urban planning, or whether they possessed a complex code. I will demonstrate that the traditional cities of Islamic countries, beyond an apparently disordered image, possess a logical structure that contains all the information needed for the formulation of an urban planning code.

Islamic City

The traditional Islamic city is characterized by homogeneous and compact urban fabrics with building that is for the most part mono-typological, often enclosed in the circuit of their own walls. The chaotic appearance of the traces and building fabrics seen through progressive mechanisms of closure toward the outside and the labyrinthine course of the streets have stirred up the perplexity of Western travellers and the first scholars who confronted the cities of the Ottoman Empire and the Maghreb⁵⁵.

Beyond an initial superficial, subjective impression that all traditional Islamic cities have the same form—in reality they share the use and perception to which the foreign visitor is obligated—they differ from one another in the morphological conditions of their territory, in their origins and their cultural affiliations.

Dar al Islam has welcomed many ethnicities and cultures, which before the Hegira had developed over the course of many centuries their own idea of space and a different relationship with the landscape. The Arab world tied to the deserts and the steppes of arid lands like the

⁵⁵ It is worth summarizing the various Orientalist positions on the Islamic city. The merit of extending the discourse from the monuments to the urban fabric goes to the brothers Georges Marçais and William Marçais who emphasized the essentially urban role of religion. See Georges Marçais, "L'urbanisme musulman," in *Melanges d'histoire et d'archéologie de l'occident musulman, 1: Articles et Conférences de Georges Marçais* (Algiers, 1957), pp. 219-231. Also see William Marçais, "L'islamisme et la vie urbaine," in *Comptes rendus de l'Académie des Inscriptions et Belles Lettres*, (1928), pp. 86-100; G. von Grunebaum and R. Brunschvig share Marçais's spatial model as well as a certain resistance to the "irrationality" of the Arab urban fabric. Only after the sixties, with the conference at Oxford, did these Orientalist propositions begin to be challenged. In this conference, Albert Hourani noted the African origin of the Marçais model, and every other participant underlined the impossibility of generalizing from a single model since the Islamic city is a complex phenomenon, extended in both geography and in time (see Albert Hourani and S. M. Stern, eds., *The Islamic City: A Colloquium* (Oxford, 1970).

Arabian peninsula, in the dialectic between nomad and sedentary, barricaded in oases, has developed a conception of double space: a love of closed and delimited space, from the short perspective, and at the same time an idea of a serial and repetitive architecture of simple elements. The Turkish world is formed in the steppes of Central Asia where the main animal of transport is the horse, which can range infinitely like the eye of the rider. Its space is therefore open, intolerant of limits and enclosures. Beginning in the tenth century, this conception will have to compete first with the Persian world and then with the classical world of Byzantium, ending up profoundly influenced by them. Then there is the Berber world, installed in the Atlas Mountains, that has marked, with its small tribal settlements with no hierarchical nodes, many cities of the Maghreb.

The fundamental fact is that the traditional city with the coherent development of its building fabric, a balanced relationship between residential and monumental building, and a cautious and proportioned use of technology is good, while the contemporary city, built by the great-grandchildren, has no character, like the neighbourhoods of Riyadh or, with an excess of character, is always inappropriate, as at Dubai.

Let's disregard Dubai, which, in its shrewd synthesis of real estate investments and astonishing effects (Miami + Las Vegas), presents itself unfortunately as a successful model to the mayors of the Arab world and beyond, and is in any case an exception. Rather, Riyadh in its ordinariness is an emblematic example⁵⁶.

The failure of the imported Western codes

Beginning in the 1950s under the influence of ARAMCO, the Arabian-American Oil Company, the cities of Saudi Arabia developed according to master plans based on a geometric grid of streets and minimum residential lots. In 1953 in the case of the Al Malaz quarter, called New Riyadh, for government employees, the physical pattern follows the grid with the hierarchy of streets, regular rectangular blocks and square residential lots with 400 square metres of surface. With regard to the traditional city, two new concepts are introduced: very low density, about a fifth of that of the old city, and a large area devoted to streets that end up covering half the total.

The introduction of the principle of detached setbacks has almost automatically imposed the building type of the one- or two-storey villa. In 1968 the plan of the capital was entrusted to Doxiadis Associates who, next to the zoning for the new city, confirmed the choice of the geometric grid, proposing a super grid divided into twelve smaller grids measuring 2 X 2 km. The standard lot is 400 square metres, or 20 X 20, but in low-income neighbourhoods the standard is reduced to 150 square metres. In spite of this, the gross density is very low, with sixteen units per hectare, or 87 inhabitants per hectare⁵⁷.

In the city of Riyadh, the minimum lot sizes with different standards for different areas, related to the London Building Act of 1844, have institutionalized social segregation by income, contrary to the custom of the traditional city, in which different social classes lived side by side. The confirmation of the setbacks, which is inspired by the London Building Act of 1894, and the concession to buildings with separations of only two metres of window openings with a view onto the land of one's neighbour, has in fact obscured the concept of privacy. In Riyadh, neighbours are compelled to arm themselves with panels of corrugated plastic, to extend the height of fence walls to cover the view⁵⁸.

⁵⁶ On Dubai see: Deeba Haider. "The Growing Pains of Dubai: a City in Search of its Identity", in *The City in the Muslim World*, edited by S.K. Jayyusi, R. Holod, A. Petruccioli and A. Raymond, vol. 2, pp.1063-1084, Brill, Leiden, 2008.

⁵⁷ Doxiadis, *Riyadh Master Plan*, A-19, 1971, pp.119-121.

⁵⁸ Saleh Al-Hathloul. *The Arab-Muslim City: Tradition, Continuity and Change in the Physical Environment*, Riyadh, Dar Al Sahan, 1996, p. 215.

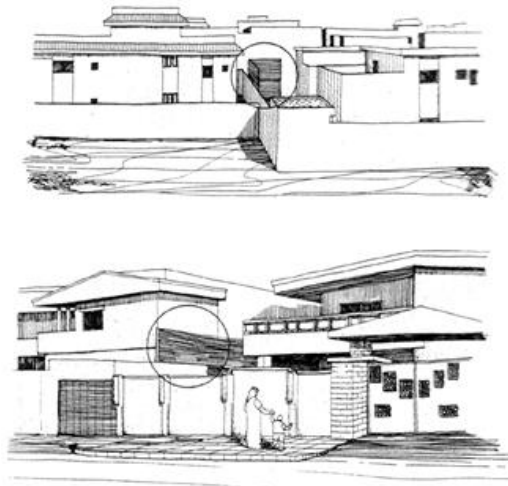


Figure 1. Detached cottages in the city of Riyadh.

A paradoxical situation has been created, a dichotomy between a code of behaviour and long-established customs based on the Koranic Code opposed to the urban planning codes of the municipalities, derived from Western culture.

Riyadh is a city of the modern era, a product of a universal crisis in urban planning of the 20th century that has seen the organic city of the past slowly break up into separate mono-functional parts and architecture become the expression of individual languages, based on self-referential principles. In the 1970s the detachment from history was complete, and rules became increasingly more abstract. Today there is the imperative to re-establish the codes for the contemporary Islamic city, not by means of a universal manual or a pragmatic *laissez-faire*, but rather through the understanding of the processes that in every specific region of the Dar al Islam have given physical form to the necessities of society. This is not a case of codes that are a collection of forms frozen in time like the “Recueil...” of J. N. L. Durand, but rather a patrimony of stratified information jealously guarded by history in the urban fabric of the traditional city.

The Shariah is not an Urban Code

In the context of Islamic legal tradition, this concept of continuity within a tradition that changes is present. The first schools of Kufa and Medina, respectively Hanafi and Maliki in the first century of the Hegira, try to mix the different local traditions with the Koran, to make the ideal doctrine come together in the *sunnah*⁵⁹. With the taking of power by the Abbasid Dynasty, a return to the purity of the law is imposed—so that it might reform the *sunnah* of the Umayyad, giving authority to the most ancient sources—and in the last analysis to the Prophet through the numerous *hadith*⁶⁰. The potential contradiction between *sunnah* and the new *hadith* was rewritten by the Shafia school following the universalist principle, according to which a norm must be recognized not only locally, but by the entire *ummah* of believers. The norms relative to the city contained in the whole of the Koranic Law, basically unchanged after the ninth

⁵⁹ On Islamic law, see: N.J. Coulson. *A History of Islamic Law*, Edinburgh, Edinburgh University Press, 1964; Schacht, J. *An Introduction to Islamic law*, London, Oxford University Press, 1964. The Shafia school recognizes the *sunnah* as the second legal source after the Koran. For Al-Shafi, *sunnah* is the exemplary behaviour of Mohammed inspired by God, while for the early schools it was the local tradition where these were located.

⁶⁰ Besim S. Hakim. “Mediterranean urban and building codes: origins, content, impact and lessons,” in *Urban Design International*, 2008, 13, p. 5.

century, are measures that tend to prevent changes that might disturb the moral integrity of the community or destabilize the peace of the neighbourhood. These are proscriptive meta-principles rather than prescriptive rules⁶¹. They have more of a social value than a physical one; they are rules of conduct rather than urban planning codes.

The Islamic Common Law is not an Urban Code

Among the treatises generated by the Shariah the most ancient are those of Ibn al-Hakam of Cairo (767-829 CE) and Ibn Dinar of Cordoba (827 CE), both lost, but cited by more recent authors. The treatise of Ibn al-Imam of Tutela (940-996 CE) contains numerous legal questions relative to the city and to building with specific cases about Medina, Cairo, Cordoba and Kairawan. After confirming the need for rights of interdependence between citizens and stating that the public can not be damaged by activities that occur in private, Ibn al-Imam discusses problems of the location of mosques and baths and harmful and polluting activities; he gives a rough definition of the hierarchies of the streets; he disciplines the use of the waters; he treats in detail the protection of privacy and the prohibition of outside views. An important role is played in the treatise by the discipline of contact between nearby walls—a principle reinforced by the Prophet in the period of Medina, whose *hadith* states that “a neighbour cannot prohibit another neighbour from inserting a wooden beam in his wall.”⁶². On the private level, the treatise protects the right of use of the property with the possibility of increasing the space up to contact with the adjoining property. It codifies the right to pre-emption of an adjacent property, a principle at the base of the social continuity of the traditional quarters. These are certainly principles that have an undeniable influence on the organization of architecture and urban planning—suffice it to consider that the problem of introspection conditions the opening of doors and windows and the height of buildings—but we are still in any case within the Common Law⁶³.

The concept of *fina*, on the other hand, is original and of great potential, an area of virtual relevance about a metre wide, along the outside wall of the building⁶⁴. It is not an absolute right since its exercise clashes dialectically with the public right, which establishes the control of the streets, the aqueducts, the emptying of the sewers, and garbage collection, ensuring that the public way is kept free and safe. *Fina* is a sophisticated and flexible concept that allows a limited “invasion of the field” without obstruction of the passage, through the use of protections from rain like gargoyles, downspouts, enclosed balconies or *musharabiyyas* or an occupation of the land like temporary merchant stalls outside the stores, seats or steps in front of the door of the house.

The impression one has is that the evolution of the Islamic Mediterranean cities rests on a shrewd interpretation of the *fina*, so that protective roofs can become porticoes and closed, and successively be transformed into an extension of the house, or, the stores can gain surface area

⁶¹ Besim S. Hakim, op.cit., p. 2.

⁶² Saleh Al-Hathloul, op.cit., pp. 97-102.

⁶³ With regard to the house, the treatises of the early centuries have left a series of restrictions that have undoubtedly had an effect on the character of the house: 1. The house cannot have stairs or a *mastaba* on the street, a rule not applied to semi-private streets of the quarter; 2. The doors of houses that face one another should not be placed on the same axis; 3. The lower windows must be located at a height that does not permit views from the outside; 4. The overhangs of the upper floors, whether *mushrabiya* cantilevered spaces must be high enough to allow for the passage of a camel with its load; 5. *Sabat* are not allowed on the public street.

⁶⁴ On the concept and practice of the *fina*, see: Ibn al-Imam, ms. in Algeri Al-Maktabah al-Wataniyah, n.1292, French translation: Barbier “Des droits et obligations entre propriétaires d’heritage voisins,” in *Revue algerienne et tunisienne de legislation et jurisprudence*, part 1, 1900 e part 2, 1901, respectively 1,141 e 143; see also Ibn al-Rami, *Kitab al-I’lan bi-Ahkam al Bunyan*, ms. in Rabat, Dar al-khizanah al-Ammah, n. A8 2834, respectively pp. 43-45.

in a moment of inattention of the *muhtasib*, the official in charge of the control of the bazaar⁶⁵. A particular case of the application of the concept of the *fina* is the *sabat*. This uses the air space of the *fina* on both sides of a street, giving a neighbour the possibility of building a "bridge" over the street, attaching itself to the property of the neighbour across the street. The result goes from a room resting on a row of joists or an arched vault, or held up by two posts on the ground; where the *sabat* is extended in depth there are real tunnels, which are the more propitious the more one moves away from the Mediterranean toward the Sahara Desert. If the *fina* explains in part the generative principles of the Islamic city, especially the building scale, it does not contribute to making the corpus of the Shariah an architectural and planning code. If we accept the idea that the structure of the organism is encoded like a descriptive program, an architectural and planning code of the Islamic city can be reconstructed only *a posteriori* beginning with the legacy of history.

It is an operation of reconstruction that must be carried out backwards, singling out typical behaviours, called reconstruction of the typological process of the house, of the building fabric and urban plan⁶⁶ (12).

Towards the New Urban Code for the Contemporary Islamic City

The construction of a code is therefore a task that can not ignore the local context. Among the many information that the typological process of the cities produces some have universal value like curves around the corners of buildings or the city walls; like the convergence of the paths on the city gates, which give the typical mark of leg chicken: like the layout of building fabrics in relation to the hierarchy of paths. Others will have a purely local character, primarily the choice of residential type so intimately tied to the family social unit, its customs and traditions. The residential type, has been said many times, does not travel, like the dialects it is rooted in the territory, unlike the cultivated language, expression of an elite often multi-religious and multicultural. The construction of a code means pick up the threads of continuity with history with attention to the genius loci, to the deepest traditions of society, which are almost part of its instinct. A basic theme is that of the courtyard house fabric. They are based on an archetypal idea of space: the fence, and widespread in cultures far apart as China, India and the Mediterranean sea. With the passage of time they gave way to extrovert forms of living (not only in Islamic countries, but in all countries at the time under the Roman Empire) based on forms of building types referred to the row-house and then to the apartment-house. In the compact suburbs of Western and Islamic countries the later building type has become the reference type. It should be stressed as row-houses and apartment-houses are not inventions impromptu but the steps of the typological process of the courtyard house, unlike the type of cottage house that reigns in American suburbs, which is a step backward from the "social" and the aggregate capacity of the courtyard house. I demonstrated how easily the adoption of colonial codes has dissected the city of Islamic countries, promoting alien building types and urban fabrics and contrasted with local traditions, social customs and religious rules. The case of Riyadh is the most striking.

⁶⁵ The occupation of public land must have been a usual practice in the traditional Islamic city, if an abundant literature relates the ordinances of the governors to repress it, often unsuccessfully: with regard to Cairo alone, we can cite the *risala* (treatise) of Ibn al-Shihna entitled *Tahsil al-tariq ila tahsil al-tariq*, which boasts of the measures taken by the emir Yashbak min Mahdi in the 15th century to rearrange the streets of Cairo. The *muhtasib* is the traditional inspector of the market. See: R. Levy. "Muhtasib," in *Encyclopaedia of Islam*, 1st ed., vol. 3, pp. 702-703.

⁶⁶ See A. Petruccioli, *After Amnesia*⁶⁶. *Learning from Islamic Mediterranean Urban fabric*, Bari, ICAR, 2007.

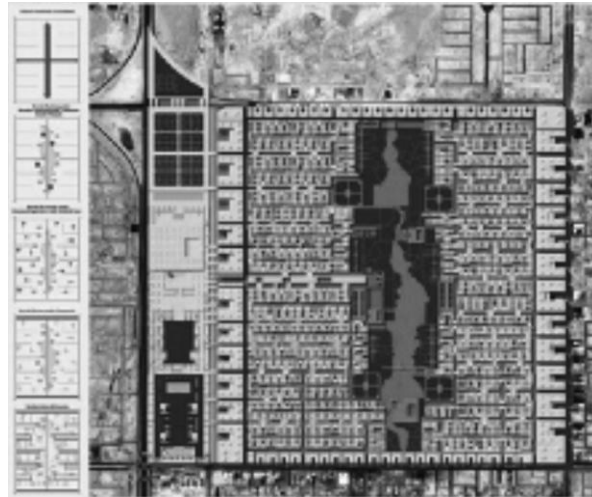


Figure 2. The proposed masterplan of one quadrant in the new expansion of the city of Riyadh.

The central theme of research, I am conducting in the Polytechnic of Bari, is centred on the courtyard house fabric and its application even in the new expansion of the Muslim city, in different climatic and cultural contexts. Taking in consideration all modern problems of traffic, parking and prevalence of the use of private cars, all different schemes have demonstrated their viability in terms of real sustainability, quality of social life offered by public spaces, semi-public and private in terms of performance compared to extreme arid climates. Versus a hypothetical expansion of the city by means of disconnected objects like slabs and towers as in Mostar, Essaouira, Fez and Antakia or by means of repeated endlessly cottage houses as in the suburbs of the Arabian Peninsula we propose to use fabric of courtyard houses. This is a real change of direction at 180 degrees, which opposes the traditional way of composing based on addition to a method based on subtraction: subtraction of paths, creation of voids for the collective life as sahn, courtyards of the mosque or caravanserai, subtraction of Courts for the private life. In the case of Riyadh it has decided to design a new quadrant of the city, an entire compound of 4 square km divided into sub-units of housing 500 x 150 meters, as prepared in the General Master Plan by the municipality.



Figure 3. A proposed neighbourhood in the quadrant.

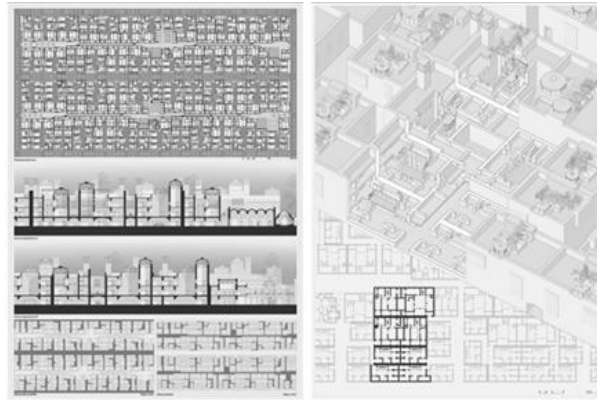


Figure 4. The proposed urban fabric based on innovative design of a traditional layout.

The proposed scheme provides total separation between driveways giving access to each house, walkways, located at an altitude above and adopting a system based on a tissue of courtyard houses. All buildings are largely inspired by traditional types as you can still see in the old city of Al Darriyya. The project results in terms of building performance, high density with 65% of the area covered with three-story buildings and quality of public spaces, despite being a work in progress, shows that path taken is the right one.

Conclusion

In conclusion, the urban codes inspired by the western codes, adopted in modern times by the municipalities of Islamic countries have failed. They have designed expansion quarters very similar to the peripheries of American cities, and they have generated building fabrics and houses that are in clear contrast to the customs, beliefs and sensibilities of Muslims.

At the same time it is important to reaffirm that the moral precepts of the Shariah are not an urban planning code, even if they have indirect influence on building fabrics and types.

A planning code of the traditional Islamic city of the Mediterranean can be inferred only *a posteriori* through a capillary work of interpretation of the typical behaviours of the house, the building fabric and the urban plan of the traditional city. In the first place, it is possible to create a model that draws references from the *khitta* for the urban organism, the centrality and hierarchy of services, and the distribution of the individual quarters and from the typological variants of the behaviour of the urban fabrics an articulation of the fabric and the hierarchy of routes, and the aggregation of building types. It remains understood that planning standards like road sections, detachments, and quantity of services cannot be fixed at a universal level, but only at the local level, since they are the product of climate, materials and local building traditions, that is, diverse architectural cultures that Islam, on the basis of Sura 7 of the Koran, has always respected. I am convinced that the contemporary Islamic city has everything to gain if, instead of articulating in a vacuum architectural objects of abstruse form, separated by left-over spaces without definition, it filled that space with a continuous fabric of introverted architecture like the city of the past. That is, the practice of the Lego toys that work through mechanical addition and juxtaposition, would be substituted by the practice of the organic project of continuous fabrics.

From ‘a miserable town of 150 mud houses’ to ‘the city that never sleeps’: the transformation of Limassol’s urban form over the past 200 years

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Abstract. *This paper describes PhD research, which uses spatial analysis to trace the development of the urban form of Limassol between 1883 and the present day. The research is specifically concerned with the street network and how this relates to different social variables such as ethnicity, educational level, and occupational status. It focuses on how these factors have changed spatially and over time, on analysing such changes diachronically using historical and contemporary maps (from 1883, 1933, 1960, 1987, 2003 and 2011), historical records and census data. This paper presents the findings of the first phase of the research, which analyses the urban morphology using space syntax methodology and block size analysis. Firstly, the space syntax model of the contemporary city is used to construct models of the city in the past based on historical maps, the changes in the accessibility patterns of the city are assessed across time. Secondly, the models are used to construct street block maps and changes in the block size of different areas are evaluated. The analysis shows that as Limassol grew, fringe belts developed around its historical core, partly along radial routes - former rural paths leading to surrounding villages - and then through the development of ring roads. Although the accessibility core of Limassol has shifted over time towards the inner ring road and further out into the contemporary city, the historical core still retains functions and properties typical of its former spatial characteristics. The results suggest that diachronic analysis and combining different approaches provides valuable evidence and facilitates an understanding of the ways in which historical formations of urban configuration influence the present life and form of the city.*

Key Words: *Space syntax, block size, fringe belts, diachronic analysis, Limassol*

Introduction

Diachronic analysis has substantially gained momentum over the past decade thanks to the spread of GIS technologies and software for spatial modelling, which not only allow the geo-referencing and layering of historical information related to the urban form, but also provide greater capabilities to store and analyse larger amounts of data as well as constructing more detailed analyses and accurate results. Interest in the historical processes which see growth and change of the urban environment has also increased as the importance of understanding the process of development in order to gain insight into the contemporary urban form has been recognised – it has even been suggested that the main aim of morphological analysis of the contemporary urban fabric should focus on understanding the transformations that led to the development of features peculiar to the contemporary age (Levy, 1999).

The ability to identify different morphological periods and urban typologies afforded by diachronic analysis provides the tools to develop an interpretive narrative as to what caused changes and to assess how the contemporary urban fabric is a reflection of past and present social, economic and cultural factors. The relationship between socio-economic and cultural conditions and the urban fabric is key to understanding the urban fabric to the extent that it may not be possible to ‘read’ form correctly unless we fully understand the cultural conditions which generated it and which are reflected in the ways additions to the an original historical core are mixed with or distinguished from the older fabric (Kostof, 1999). The issue of how the physical, material form of the city relates to social processes is inextricably linked to the dual nature of

cities as both physical and social entities – as the collection of material elements which make up the city and as a system of human activity and interaction. This is what Hillier and Vaughan (2007) term the physical and the social city, arguing ultimately that the city is one entity as “the physical and social cities act conjointly to produce significant outcomes”.

The relevance of diachronic research is that it does not exclusively aim at achieving an understanding of generative rules of urban development but it also provides methodologies for analysis comprising different analytical tools which can be used individually for assessment of past and contemporary urban forms as well as proposed developments. It thus also aims to inform contemporary design in its attempt to incorporate inherited street patterns and the built heritage within the urban landscape, enhancing its potential to enable a collective experience of urban space, thus fostering a collective identity (McQuillan, 1990).

This paper presents the findings of the first phase of PhD research focusing on how the relationship between physical elements of the city and social factors has changed spatially and over time. The analyses and findings presented here relate exclusively to physical factors - though they are framed within the socio-cultural context – and focus on how the urban form of the city of Limassol, Cyprus, has changed between the end of the 19th century and the present time. Space syntax methodology and block size analysis are used to describe the characteristics of the city at different points in time, assessing its spatial properties and the way its urban form functions. Spatial models of the city are constructed and analysed based on historical maps (from 1883, 1933, 1960, 1987, 2003 and 2011); elements added and changed between two periods are analysed quantitatively and qualitatively, while the formation of suburban areas, fringe belts, the development of a conurbation and changes in the centrality of city are assessed.

Limassol's urban development

Limassol has changed dramatically over the past 200 years; it has developed from being little more than a village described as a “miserable town of 150 mud houses of which 100 are Greek and 50 Turks” (Turner, 1820) to a sizeable city of over 180,000 inhabitants, which has “several reputations, ‘the city that never sleeps’ is one... thanks to the tourist area’s exuberant night life” (Marić, 2009). Limassol occupies the southernmost point of the island and is the largest port in the country, home of the 3rd largest merchant navy in Europe and a highly diverse city - as of 2011 3.6% of Limassol’s population were Romanian; 3.3% British; 3.1% Greek; 2.3% Russian and 2.3% Bulgarian, to name just the top five minorities. The city stretches east-west along the coast and expands to the hills at the foot of the mountain range to its north – although like other Cypriot cities density is low and sprawl is evident, it is somewhat more ‘compact’ than other cities on the island as its development is constrained by U.K. sovereign territory to its west and the mountains to its north. Much of Limassol’s development in recent years has thus occurred on the hills to the north and along the coastline to the east, the latter geared towards to the tourist industry.

The small town described by travellers during the first half of the 19th century was accurately represented in an admiralty chart of 1849, shown in figure 1. Although it is unclear whether the map covers the whole of the built area, specific elements of city, such as the fort, mosques, churches, the jetty and the water tower are marked, while the basic urban form of the historical town centre is recognisable in the area around the fort and the street of Agiou Andreou, parallel to the shoreline and becoming the street of Agkyras from the fort heading out north-west over the river – this was known to be the main commercial street during the Ottoman period (Severis, 2006).

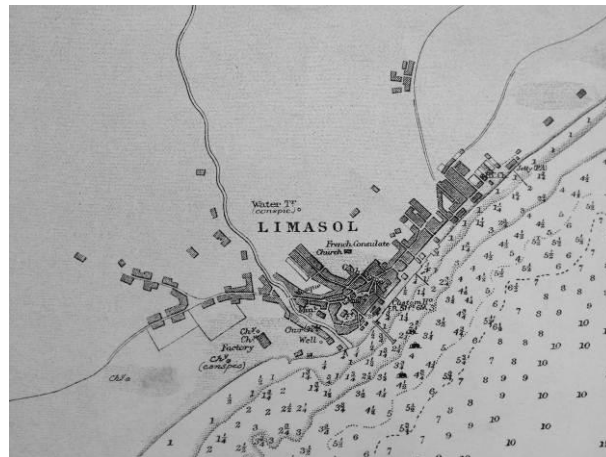


Figure 1. Admiralty chart of Limassol, 1849, drawn by Lieut. Lord John T. Browne (survey by Capt T. Graves. Admiralty Chart 2074. 3.5 sea miles to one inch, London, National Archives).

Towards the end of the Ottoman period, Limassol develops as a city of proto-industrialisation, as the economy benefited from the stationing of British troops in the district, with consequent development of establishments and retail facilities in the town, partly meeting increased and changed demands due to social and historical changes (Katsiaounis, 1996). However, during this time geographical divisions related to ethnicity had become more and more spatially defined along with other social factors, such as social class – the town was divided into a Turkish and a Greek sector (west and east of the river respectively), a poorer area was expanding around the fort and the port, while the wealthier classes had established themselves further north around the church of Katholiki. Figure 2 shows the city in 1883 – it had clearly developed significantly towards the north and the east and it now included the street of Anexartisias, the main contemporary commercial street in the historical centre, while the large block of the Commissioner's deposit to the north is evident (later to become the hospital and police headquarters). The Commissioner's house, currently the home of the historical archives, is now also present in the top right corner of the map - the public gardens were later developed around this.



Figure 2. Map of Limassol, 1883, from Rodney (2001).

Heading into the 20th century ethnic diversity and spatial divisions are evident from travellers' records; by the 1930s Agiou Andreou is identified as the street with the highest

number of shops, with the Turkish bazaar is at its western end (towards Agkyras), meanwhile the British community had settled in the eastern end of the town around the public gardens while the Turkish continued to occupy the area west of the river and the Greeks the central area of the town (Peto, 1927).

The years of British rule see the development of much urban infrastructure along with the paving of former footpaths connecting the city to the surrounding villages and now forming the main radial routes 'sprouting' from the edge of the historical town centre out to the suburbs in various directions. Right after World War II, the first ring road of the city (Makariou) is built, starting just to the north of the Commissioner's house along a former ditch lined with a footpath and continuing further west to surround the whole city – this road is marked 'By-pass' in a tourist map of 1947 (figure 3) and it has now become a popular commercial and service street, while still functioning as a major vehicular route through the modern city centre.

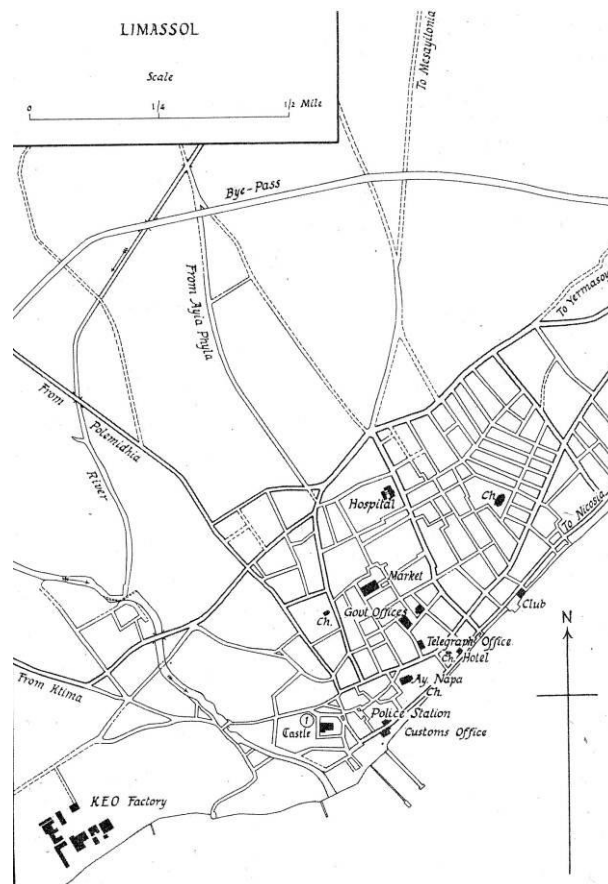


Figure 3. Tourist map of Limassol during the colonial period (Mangoian & Mangoian, 1947).

By 1960 the area between the edge of the historical core and the ring road is the focus of densification, while further development takes place to the north of Makariou; the densification is represented (though not fully) in a tourist map of 1974 (figure 4) where it is also clear that some land uses, such as the hospital, have shifted. The hospital has been moved to the former Commissioner's Depot - no longer in use since Cypriot independence in 1960 - while the building along the street of Anexartisias was reused to become the district office.

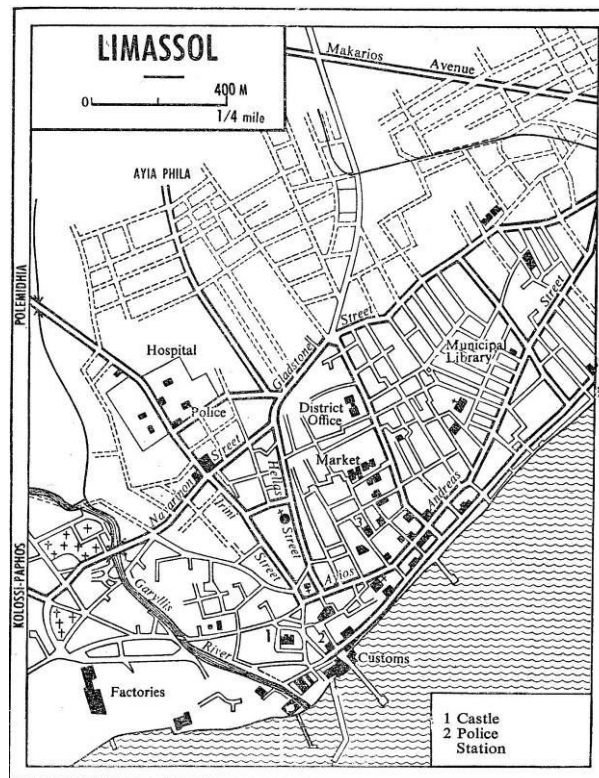


Figure 4. Tourist map of Limassol during the post-colonial period (Milliex, 1974).

Limassol grew after rapidly the 1974 Turkish invasion of Cyprus, when almost half of the island's population became refugees in need of housing. Consequently, a large number of housing estates were built at the edges of cities where land values were relatively low and large development areas available. Due to this and further expansion at a time when planning regulation was almost non-existent led to a rather fragmented urban fabric. Previous analyses of Limassol's growth have pointed out that uncontrolled urban development led to an uneven expansion of the city, creating a fragmented structure and leaving many gaps in the urban fabric (Kritioti, 1988). The motorway surrounding the city was built in the 1980s as far north as it was viable, 'demarcating' the division between the city and the villages to its north. The construction of the motorway also demarcated a large, low density fringe belt between Makariou and the motorway itself, but as the city grew further and densification took place, a second ring road was built in the 1990s connecting existing stretches of road and 'splitting' the fringe belt into two. Limassol is now a significantly large city and the urban area encompasses the former villages to the north of the motorway; despite the densification, large gaps and large blocks remain in the urban fabric, especially within the fringe belts and the distribution of the population between the urban and the metropolitan areas has continued to decrease towards lower densities from 70% of the population based in the urban area in 1982 to only 52% nowadays (Gerasimou and Georgoudis, 2011) due to suburban sprawl and the proliferation of private parking space, while employment, services and commercial activities as well as tourist services concentrate in the historic town centre and the coastal area.

Methodology

Two types of analyses were undertaken to describe and analyse the evolution of the urban form of Limassol: space syntax analysis and block size analysis. Both were applied to all the available historical maps and were selected not only because they provide quantitative results

which in a later phase of research can be statistically related to social data, but also because they are particularly suitable to diachronic analysis and applicable to the city scale with relatively little human and time resources. Space syntax methodology provides an analysis of the city at different scales and has the ability to highlight how the main structure of the city changes over time, while block size analysis is able to capture and describe the process of formation and densification of fringe belts as described by Whitehand (2001) and M. P. Conzen (2009). Both methodologies are highly relevant to the case at hand: space syntax because it allows for comparison of systems of different size and is thus a reliable hard measure for comparing a city diachronically when this has grown significantly, as is the case here; block size analysis provides a 'proxy' - if only very limited - for a Conzenian approach by assessing changes at street block level. In the case of Limassol, where the initial assessment of its form and development clearly shows the existence of an inner, middle and outer fringe belt, it is necessary to engage such a methodology and assess the fringe belts individually along with the spatial analysis.

Six spatial models of Limassol were constructed using space syntax methodology⁶⁷. Space syntax quantitatively describes patterns of spatial layout; once the model is built, it can be analysed to provide various measures reflecting different properties of the urban configuration and of specific elements of the street network, such as a street segment. The most important measures of space syntax are *integration*, representing 'to-movement' or the accessibility of a specific element within the system, and *choice*, representing 'through-movement' or betweenness (the number of times a segment falls on the shortest route between all pairs of segments within a specified radius). Measures can be calculated at the city-wide scale or at any given radius, the city-wide measures taking into account all elements in the system and the 'local' measures taking into account all elements within the given radius. City-wide measures tend to be representative of the whole-city structure and often correlate with vehicular movement; local measures tend to be representative of local neighbourhood structures within a city and often correlate with pedestrian movement.

The specific analysis used in this study is angular segment analysis, which takes into account least angular deviation of each segment from all other segments (hence it takes into account the relative straightness of a route). The measure used is *normalised angular choice* (referred to here as NACH, 'choice' or 'accessibility') which allows for comparison between systems of different size. Furthermore because of the mathematical way the measure of choice is normalised, it takes into account the depth of elements within the system (a proxy for integration) and hence it combines a representation of to- and through-movement (see Hillier et al. 2012).

NACH values range between 0 and 2, where values above 1.3 are considered to be in the top range of accessibility, and values of 1.5 or above being extremely high. All the segments in the system with values of 1.3 or above are considered here to be part of the core structure of the city – the global structure when considering the whole system or the local neighbourhoods' structure when considering a specific local radius. The two cores can be matched to identify the *multi-scale* core of the city – all the segments which have both the highest global and local integration value, constituting the centrality of the city.

The spatial models were drawn manually in MapInfo GIS using historical and contemporary maps as basemaps, which were geo-referenced manually using 10 control points. The contemporary spatial model was constructed first, layered onto the historical maps and elements removed and adjusted to construct the historical models with a methodology similar to that of Pinho and Oliveira (2009). The choice measures were calculated using the DephMap Process tool in the Space Syntax extension for MapInfo developed and licensed by Space Syntax Ltd.

⁶⁷ For further details of space syntax theory and methodology see www.spacesyntax.org along with Hillier and Hanson (1984); Hillier (1996); the appendix in Vaughan and Geddes (2009) for details of space syntax measures, Hillier and Iida (2005) for details of angular analysis, Hillier et al. (2012) for details of the normalised choice measure, and Versluis (2013) for details of multi-scale analysis.

NACH was then calculated automatically in GIS using the formula provided in Hillier et al. (2012).

Block size maps were automatically constructed from the spatial model using the Blocks Size tool in the Space Syntax extension for MapInfo mentioned above. Average block sizes were calculated for the whole city, the historical core and each fringe belt using simple query tools in GIS. It must be stressed that this is only a very limited 'proxy' for the Conzenian approach as the automated way of constructing the blocks, though time efficient, means that these comprise the open areas and not just the built blocks; it also means that blocks at the edges of the model which are not bounded by roads and accessed through a dead end are not represented in these maps. The areas were defined as follows:

Historical core: from the coast line to the route along Navarinou/Gladstonos, comprising the historical Turkish area to the west of the river and the public gardens on the east side of the town centre. This comprises almost all of the built area of 1883;

Inner Fringe Belt (IFB): the area comprised between the route along Navarinou/Gladstonos and the inner ring road (Makariou), including the industrial area to the west up to the new port, for the years 1933, 1960, 1987, 2003 and 2011;

Middle Fringe Belt (MFB): the area comprised between Makariou and the A1 motorway for the years 1960, 1987, 2003 and 2011. This was divided into Middle Fringe Belt A (MFBa), the area comprised between Makariou and the outer ring road built in the 1990s, along the road of Kyprianou comprising the area of Agios Nikolaos to the east and Tsiflikoudia to the West, and Middle Fringe Belt B (MFBb), the area comprised between the edge MFBa and the A1 motorway. MFBa and MFBb were used in the analysis of 2003 and 2011;

Outer Fringe Belt (OFB), the area outside the A1 motorway comprising the old villages surrounding the city and also including the tourist area, the easternmost stretch of city along the coast within the motorway for the years 1987, 2003 and 2011.

Findings

Spatial analysis

The space syntax analysis shows that the greatest change over time occurred in the 'superstructure' of the city, with global accessibility values decreasing steadily through the years for both the city as a whole and the historical town centre. This decrease is slightly more pronounced for the city as a whole – a significant drop occurred between 1883 and 1933, but this is perhaps because the spatial model of 1933 includes the footpaths radiating out to the surrounding villages and at the time few connections between the radial routes were available outside the town centre.

The greatest drop in the global accessibility of the town centre comes between 1960 and 1987, hence following the construction of the motorway.

At the local level, whether this is very local (400m) or a slightly wider radius (1200m), change is not as significant, in particular following 1960s, values of local accessibility for both the historical town centre and the city as a whole seem to stabilise, especially for the wider local accessibility at 800m and 1200m radius. The results of the space syntax analysis are summarised in table 1.

The global structure of the city shifts from the historical centre outwards, initially it comprises all major routes within the centre including the whole of the seafront, the street of Agiou Andreou and the whole of Anexartisias. By 1960 the western side of the seafront has lost its importance at the city-scale and the global structure includes less segments within the historical centre and more to its north, including much of the inner ring road (Makariou). By 2011 only the northern edge of the historical centre is part of the global structure of the city, which has moved further north and east to comprises both ring roads, the motorway and most of

the radial roads, including the stretches going through the old villages and the stretch of the seafront east of the inner ring road, leading to the tourist area along the coast.

Table 1. Mean accessibility values

Year	Town Centre R400	Town Centre R800	Town Centre R1200	Town Centre RN	Whole City R400	Whole City R800	Whole City R1200	Whole City RN
1883	1.10	1.13	1.16	1.26	1.10	1.13	1.14	1.24
1933	1.13	1.15	1.19	1.24	1.15	1.19	1.19	1.15
1960	1.14	1.16	1.19	1.20	1.10	1.12	1.14	1.11
1987	1.14	1.16	1.18	1.11	1.08	1.09	1.10	1.03
2003	1.13	1.16	1.18	1.09	1.08	1.09	1.10	1.03
2011	1.14	1.16	1.18	1.10	1.09	1.09	1.10	1.02

The distribution of local accessibility values at the 1200m radius changes far less over time and although accessibility decreases slightly in the southern area of the city and increases in the area north of the historical centre, the difference is not significant, suggesting that the development of the city to the north and the changes occurred over time have only had a marginal impact on the functioning of the historical town centre at the local level.

The results of the multi-scale analysis, measuring the overlap of street segments with both high global accessibility values and high local accessibility values, clearly shows how the core structure of the city shifts overtime – this is presented in figures 5-10.

The overlap between global and local accessibility is an indicator of the intelligibility of a city. The extent of the overlap was measured as the proportion of segments with both global and local (1200m radius) NACH values of over 1.3 out of the total number of segments. This analysis (presented in table 2) shows that except for 1883 when the city was still fairly small and much of its eastern side made up of open fields and gardens, the overall extent of the multi-scale core decreases significantly over time. It also shows that the core concentrates in the historical town centre. As the core shifted towards newly built areas in the city the difference between the extent of the core within the town centre and within the whole city also decreases significantly as more and more of the core ‘moves’ out of the historical town centre – the exception again is 1883 when almost the whole city was within the boundary of the historical core. It has to be noted however that, despite dramatic growth and change a good proportion of the historical centre is still part of the core, though most of this is its northern edge (figure 10).

Table 2. Extent of multi-scale core

Year	Town Centre	Whole City	Difference
1883	25.2%	22.6%	2.6%
1933	33.6%	18.7%	14.9%
1960	27.3%	14.7%	12.6%
1987	19.2%	6.9%	12.3%
2003	15.0%	6.0%	9%
2011	10.2%	5.0%	5.2%

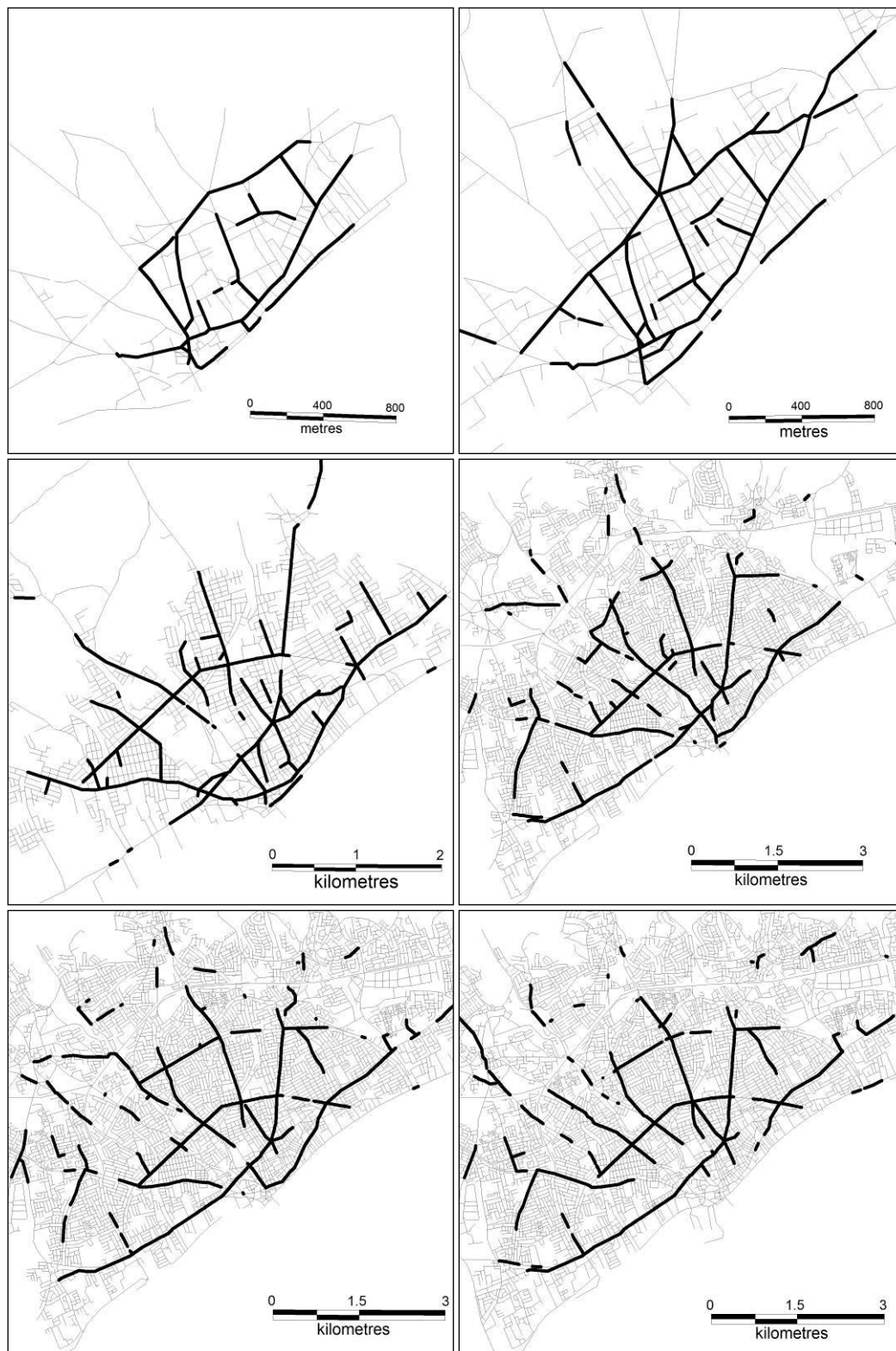


Figure 5. Multi-scale accessibility core of Limassol (left to right and top to bottom: 1883, 1933, 1960, 1987, 2003 and 2011).

Block size analysis

The block size analysis of the contemporary city (figure 6) shows how the historical town centre is almost wholly made up of small blocks with the exclusion of the eastern edge where the athletic centre and public gardens are located, and the western edge where a newly-built marina has created a number of large blocks. Both the IFB and MFBa are also dense with some exceptions, especially at their western end along the coast where much of the industrial uses are still located.

MFBb still comprises a high number of large blocks, especially in the eastern side where a large industrial area is located and residential development is still very low density. In this case the areas dense with very small blocks comprise many of the refugee housing estates built after 1974, which are made up of slab building blocks criss-crossed by a high number of pedestrian footways creating highly permeable environments and very small street blocks. This area also includes the centre of the old village of Mesa Geitonia – the only one to the south of the motorway. The OFB comprises the highest number of very large blocks, including along the coast to the east where the tourist development has seen the construction of large hotels with extensive grounds and parking areas; the dense areas to the north of the motorway are the centre of the old villages surrounding Limassol.

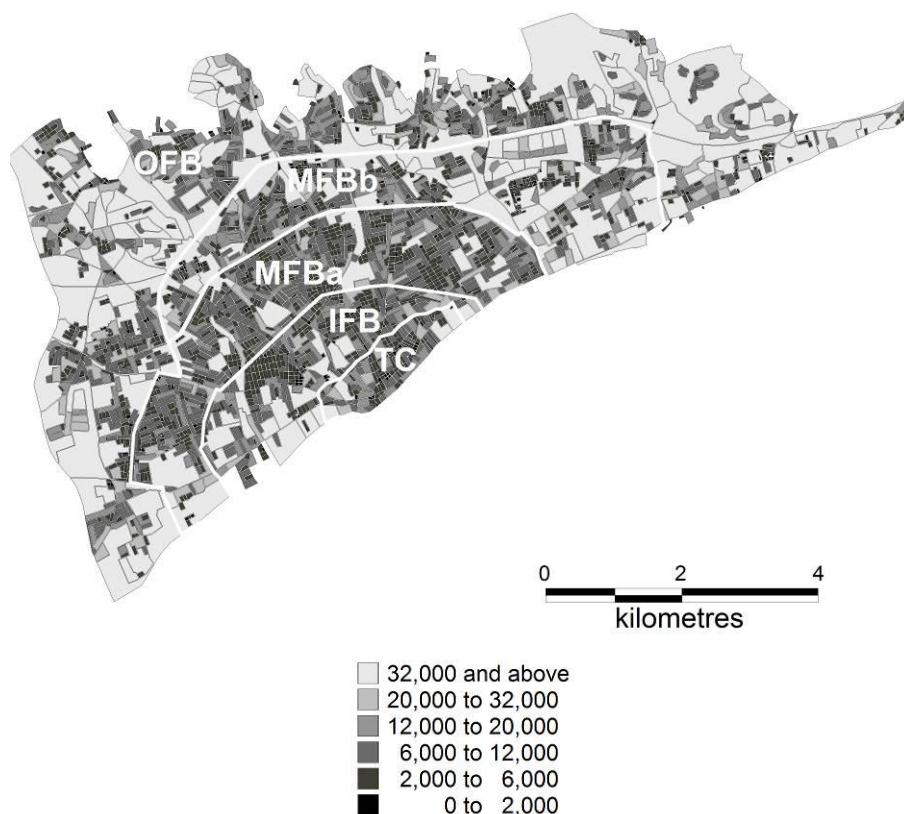


Figure 6. Block size (m²) map of Limassol, 2011.

Looking at the distribution of block sizes over time (table 3), it is interesting to note the fluctuation in the proportion of large block sizes (20Km² – 32Km² and 32Km² and above) which increases as fringe belts are created (IFB created 1883-1960), decreases as they are densified (IFB densified, beginning of MFB 1933-1960), increases again as further fringe belts are

created (MFB established, OFB created 1960-1987), decreases again as the fringe belts are further developed (IFB, MFB – in particular MFBa – and OFB densified 1987-2003) and increases again as the OFB expands farther (2003-2011).

Table 3. Distribution of block sizes over time

Size (Km ²)	1883	1933	1960	1987	2003	2011
32+	7.5%	14.8%	4.1%	5.9%	5.5%	6.7%
20 - 32	5.3%	5.6%	2.4%	3.6%	4.4%	4.7%
12 - 20	10.6%	6.5%	6.8%	8.6%	8.2%	9.6%
6 - 12	17.0%	18.5%	26.3%	30.1%	31.4%	28.5%
2 - 6	34.0%	39.4%	52.7%	43.2%	40.2%	39.7%
0 - 2	25.5%	15.3%	7.7%	8.6%	10.4%	10.8%

The mean block size for each area over time shows the densification process occurring across time in all areas (table 4), this is with the exception of the city as whole which expanded greatly between 1883 and 1960 to develop two fringe belts. The block size for the town centre, the OFB and the city as a whole also increased between 2003 and 2011, in the former case this is due to the marina development at the western edge of the historical town centre which has created large blocks where previously there were none, in the latter two cases this is due to the expansion of the OFB further out into the surrounding areas. It should also be noted that once the MFB gets split into two it is the northern part, further away from the town centre that comprises the large blocks (slightly larger on average than for the whole MFB 15 years previously. Interestingly, the MFBa has smaller blocks than the IFB, this is possibly because the IFB has retained many of its former land uses which require large blocks, while the MFBa has been the focus of much residential development.

Table 4. Mean block size (m²) for each area

Area	1883	1933 ⁶⁸	1960	1987	2003	2011
Town Centre	9,810	9,675	7,211	6,879	6,374	7,104
IFB	29,404	78,051	14,464	10,166	9,625	9,407
MFB			15,039	14,268	11,103	10,697
MFBa					8,788	8,547
MFBb					14,631	13,617
OFB				18,680	15,074	19,963
Whole City	11,269	87,924	15,786	14,134	11,927	13,548

Discussion

Shifting centrality, spatial change and continuity

The fact that global accessibility continues to decrease despite the insertion of ring roads across the city suggests that such roads, thought of as improving longer distance connectivity within

⁶⁸ The value for the IFB and the whole city in 1933 comprise a large area of open fields between the historical town centre and the surrounding villages included in the spatial model and it is thus not comparable to the other values.

the city, either do not meet this purpose or do not do so sufficiently to ‘counteract’ the effect of growth, densification and sprawl on global accessibility.

It is perhaps to be expected that local accessibility values of the historical town centre would change little after a certain time, as development and redevelopment would occur mostly in areas relatively far from it. This is however only partly true as a major development recently occurred within the historical town centre with the construction of the new marina – this has clearly impacted on the mean block size of this area, but does not seem to have had a measurable impact on accessibility, which may also be due to the fact that it is located along an edge of the city (the coastline).

It is certainly more puzzling why at the city wide scale local accessibility values seem to remain quite stable despite a lot of densification and change in permeability as shown by the block size analysis. This might be simply an effect of averaging local values for the whole city, whereas changes might be found within local areas subject to development between two periods, or it may be that somehow the system ‘adjusts’ itself over time to provide a certain level of overall local accessibility across different areas. This issue remains open for further analysis and interpretation.

Centrality has been shown to be a process (Hillier, 1999) and it is certainly not surprising that this has shifted over time to ‘relocate’ to a more geographically central area with characterised by higher accessibility. The decrease in global values and in the extent of the multi-scale core was also to be expected as this is in line with previous research showing that global accessibility and legibility tend to decrease over time as the city-system grows, and that this is the case for many Mediterranean port cities that have grown rapidly in recent years (Shpuza, 2009). The shift in centrality shown by the spatial analysis is corroborated by historical records and contemporary data on land use which identify the main commercial road as moving from Agkyras at the western edge of the town centre to Agiou Andreou further east and then northwards onto Anexartisias and Makariou, the latter three remain popular commercial streets, with Agiou Andreou being more of a tourists’ destination and Anexartisias and Makariou being more of a locals’ destination.

The fact that a good proportion of the town centre is still part of the multi-scale core of the city points to a form of ‘spatial resilience’ of the historical centre in the face of dramatic growth and change.

Fringe belt formation, expansion and densification

The block size analysis shows that fringe belts with different characteristics and varying mean block size do exist. These are created through the establishment of long, fairly continuous ring roads, but are ‘broken up’ into areas by radial routes, many of which correspond to former footpaths leading to surrounding villages. Densification of each area over time is also clear and this has occurred through the creation of shorter streets (often of equal length with many residential areas having grid-like design) as part of developments built within the boundaries of the areas formed by the long radial and concentric routes. The analysis however also shows that densification is not necessarily an infinite and irreversible process as the rate of densification tends to decrease over time and may eventually come to a halt. In the case of OFBs this may, at least temporarily, develop to be less dense through expansion into surrounding areas, while specific cases, such as that of the town centre where the construction of the marina has seen the creation of a land bank along the coast and the formation of large blocks, means that even when block size is traditionally small and persistently so, development interventions may alter the picture of the historical urban form.

Conclusions

This paper has brought together two types of analyses to reveal trends in the evolution of the urban form of Limassol. Additionally to confirming previous research results regarding decreasing global accessibility and intelligibility of cities through growth and development, and the formation and ‘internalisation’ of fringe belts over time, it has highlighted the resilience of the Limassol’s historical town centre as a successful local centre at various local scales. It has also pointed to the interrelationship between the construction of long concentric routes, the formation of fringe belts and accessibility values at the global and local level by revealing that roads planned for improving long-distance connections within a city may not have the impact they were expected to, do not necessarily influence the functioning of local neighbourhoods and might in some cases (such as in the case of the eastern stretch of Makariou) turn into local centres themselves. Without diachronic analysis it would not have been possible to assess how the addition of physical elements to the existing systems had an impact on the way the city functions at present, neither it would have been possible without assessing both the spatial accessibility of the city and the process of densification together.

The combination of space syntax and Conzenian approaches used here contributes to the development of the links between the two and the further understanding of their complementary which has been initiated in recent years (Pinho and Oliveira, 2009; Griffiths et al., 2010). The large time gaps between the maps analysed and the lack of detailed information about the planning, approval and construction of specific physical elements of the city, does not, unfortunately, allow for an accurate analysis of the economic cycles which are a pre-requisite for the emergence of fringe belts along with the existence of an established urban core. Both these elements do certainly exist in the case of Limassol, however the time gap between the periods analysed includes both times of economic slump and growth and they do, in fact, cover both the establishment of long routes and fringe belts as well as the construction of shorter routes, formation of smaller block sizes and densification of fringe belts. Perhaps the most important result of this study is that it opens up possibilities to enhance the understanding of generative rules of development by further researching the relationship between the economic cycles and the times of construction of longer and shorter routes along with the analysis of street blocks, hence shedding light on how the space syntax’ laws of centrality and compactness (Hillier, 2002) relate to fringe belt theory and economic trends.

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Analyzing the effects of hot and arid climate on the form of historic cities of Iran

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Abstract. *A significant portion of the current territory of Iran is situated in hot and arid climate. While the strenuous climatic conditions have made living very trying, the greatest and biggest cities of Iran in the last millennium have emerged in these areas. It seems that one of the reasons contributing to the formation, growth and sustainability of these cities, is the specific methods used in their architecture and urban planning. Since one of the methods has manifested itself in the form of historic cities in hot and arid climate, in this paper urban form is analyzed. The main focus in analysis of urban form is urban structure (shape, figure, direction of passages), neighborhood context (shape, size, direction, sort of buildings and yards) and mass and space patterns. The aim of this paper is to assess the urban form in order to discern the characteristics whose make the harmony between urban settlement and harsh climatic conditions. Results of this survey are shown that special form of historic cities (Qazvin, Qom, Kashan, Nain, Yazd, Kerman, Meybod and Ardakan) was affected by Climate property. Moreover the special climatic characteristics of each of these cities make a difference in their form characteristics to achieve appropriate compatibility with environment.*

Key Words: Form characteristics, hot and arid climate, historic cities of Iran

Introduction

Archeological discoveries have shown a history of 8000 years of urbanization in Iranian plateau. Vast alluvial plains, groundwater resources and having knowledge about agriculture, mathematics and astronomy has helped to foundation and survival of different civilizations in the central Iranian plateau. Today, because of last millenniums climate changes, approximately all parts of Iranian plateau have hot and dry climate which is an unsuitable condition for human living. Iranians have applied different techniques to survive and live in this condition. Application of these techniques can be seen in the urban form of Iranian historical cities. Iranian large cities generally have hot and dry climate and their fabrics are effectively related to their surrounding environment.

Therefore, in this paper the general climatic condition of central Iranian plateau is presented at first and then, those characteristics of urban form that were the result of this climatic condition are listed. Study of urban form in this paper is more based on the work of Conzen. Structure of city (form and orientation of roads) and neighborhood fabric (form, size, orientation and arrangement of buildings and open spaces, built form and open spaces patterns) are considered in the investigation of urban form. The quality of relationship between climate and urban form in Iranian cities will be examined in the next sections.

Iran hot and arid climate

Central, eastern, southeastern and southern regions of Iran have hot and dry climate. Hot and dry climate in central Iranian plateau is dependent on two phenomena. First, the Hedley cell phenomenon (figure 1) and the second, its location on the world's desert belt and also being

surrounded by Alborz, Zagros and Hindukush mountains in north, west and east, which prevent moisture advection over inland parts (figure 2).

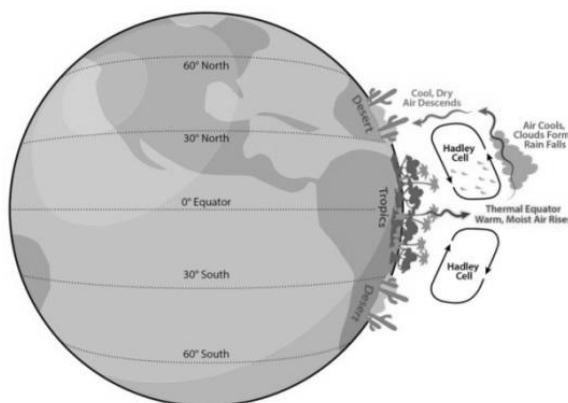


Figure 1. Hedley cell phenomenon⁶⁹.

Dasht-e Kavir and Lut desert are two large and inhabitable deserts in the world that are located in central Iran. Foothills of the Alborz and Zagros mountains are habitable areas of central plateau. From Qazvin in northwest to Sistan in southeast, there is a chain of settlements located in the margins of desert. This chain of settlements consists of different large and small cities and villages. Large cities in the mentioned region, from northwest to southeast, are Qazvin, Tehran, Rey, Qom, Ardestan, Nain, Ardakan, Meybod, Yazd, Bafq, Sirjan, Kerman and BAM. Among them, those cities that have preserved their traditional fabrics are selected and investigated in this paper.



Figure 2. Iran climate zones, cities located in hot dry climate⁷⁰.

The mentioned cities are surrounded by Zagros Mountains in west and vast deserts in east. This geographical condition causes favorable wind from west and unfavorable wind from east.

⁶⁹ <http://fanack.com/en/countries/iran/basic-facts/geography-and-climate/biodiversity>

⁷⁰ <http://askabiologist.asu.edu/explore/desert>

Iranian cities were established in regions with sufficient water resources. There are two kinds of water supply: springs, like Fin spring; and Qanat systems which transfer melt water from mountains to human settlements. Dry weather in these cities causes big temperature differences between day and night, summer and winter. In summers, temperature goes high up to 40°C and in winter, there are several ice days. Temperature difference between day and night, particularly at first days of spring and fall is approximately 20°C.

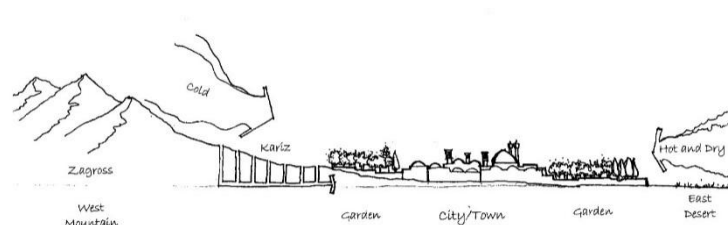


Figure 3. Wind flow in the cities located along desert margins, hot dry wind from east and cold humid mountain wind from west.

This extreme weather condition has always challenged living of people but also has led them to find amazing solutions in competing annoying weather condition. They have learned to exploit this weather condition to create comfortable condition for living. These hard weather conditions are: the scorching heat of the sun; high temperature in day and low temperature at night; diurnal temperature variation particularly in summers; extreme cold weather in winter and extreme hot weather in summer; dry weather as a result of little precipitation and water supply reduction; occurrence of hot storms with dust and sandy tones.

The urban form of desert towns

Structure and fabric of desert towns are investigated in this paper. Structure is about the shape of street network. Shape of street network, hierarchy of roads, length and width of roads and their junctions are studied in the structure section. The study of urban fabric is done in two scales: shape and size of blocks and shape and size of parcels. Parcel Shape, parcel orientation, compactness, arrangement of parcels, proportion of built forms to open spaces, density and orientation of open spaces are studied under the subject of urban fabric.

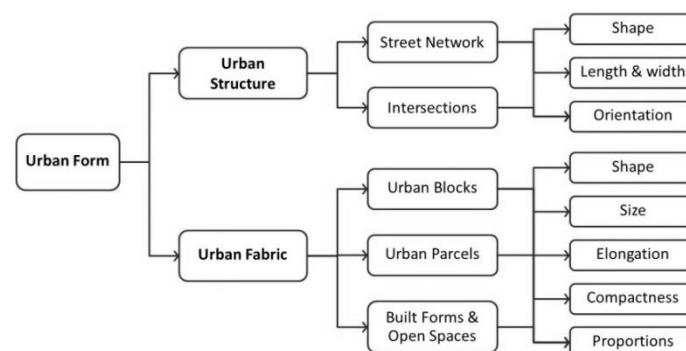


Figure 4. Relationship of urban form characteristics in Iranian historical cities.

Structure

The hierarchal order of street network including Main Roads, alleys lead to neighborhood centers (Gozar), secondary alleys (kocheh), semi private passageways (Darband), is most

important characteristic of urban structure. These Roads are different in length, width, orientation and other qualities. Alleys that lead to neighborhood centers are wider and their orientation is northeast southeast. All these kinds of roads have the same orientation, but there are some exceptions in Kerman and Ardakan. These exceptions will be discussed in the next section. Alleys that lead to neighborhood centers are main roads in formation of the historical urban structure. Secondary alleys are perpendicular to main alleys and connect one main alley to another one. Semi-private passageways are branches of alleys that are meandrous and covered in some parts. (Rezai, 2009)

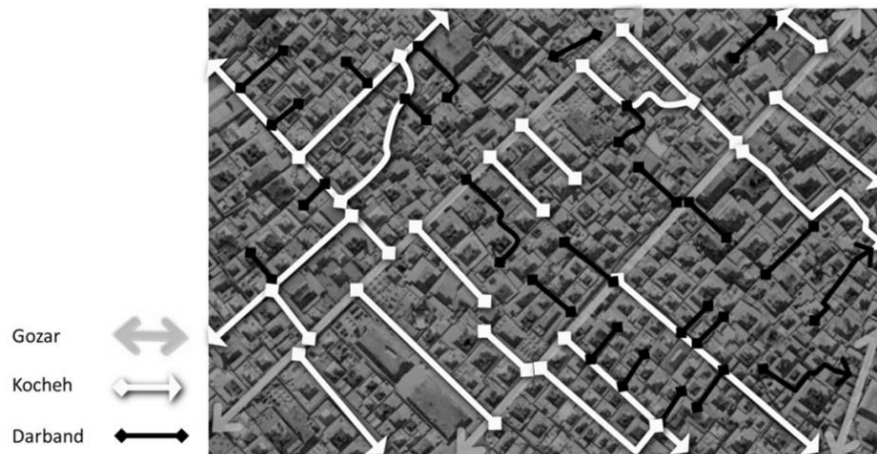


Figure 5. Hierarchical order of roads in Godal mosalla neighborhood of Yazd, orientation of main alleys are similar to the orientation of houses (Rezai 2009).

Street network is generally organic. It means that they don't have ordered geometric shape, but they have structured in a natural order. Shape of roads is based on the land topography. Roads are generally established in place of gullies. None of traditional cities have Euclidean geometry in shape of street network, but they have organic form. They were very narrow in comparison with today's streets. In fact, they were tracks among urban blocks.



Figure 6. Fabrics of Isfahan, Qom and Meybod, urban roads are tracks among dense urban tissues. Wide and straight streets are the result of interventions in last centuries.

Urban fabric

This section investigates size, shape, arrangement of urban blocks and parcels which is based on property boundaries. Shape and patterns of built forms and open spaces are also considered.

Urban blocks

Urban blocks are set of cells separated by roads. They have organic shape like human body's cells. They seem disordered in comparison with modern urban fabrics, but they have organic order. Blocks are not equal in size, but they can be classified in certain ranges. Blocks are arranged in coherent and connected urban fabric. As mentioned above, narrow alleys separate blocks in compact fabric of traditional cities.

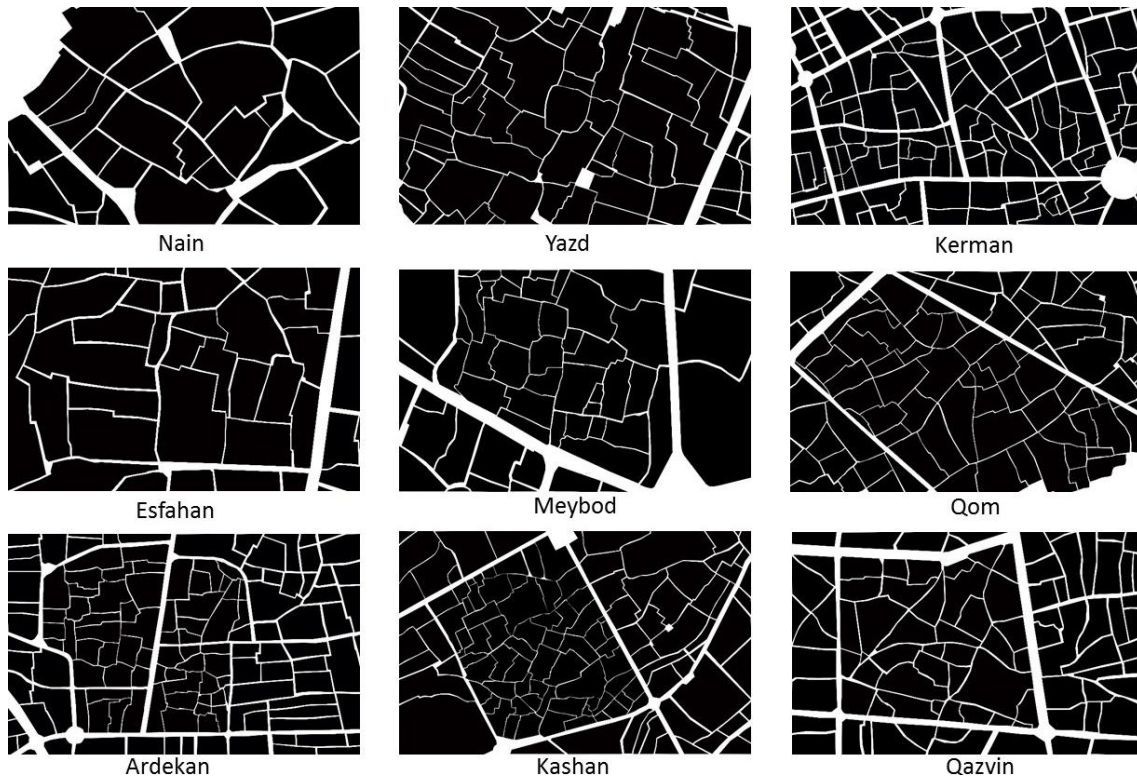


Figure 7. Blocks arrangement in historical cities of Iran.

Shape and size of parcels

Parcels are located in compact fabric and they don't have certain geometric shape. They are in large and small size. Their orientation is coordinated with alleys orientation, that is northeast southwest toward Qibla.



Figure 8. Blocks arrangement in Yazd and Qom.

Built form and open spaces

This section investigates the proportion of built form to open spaces in urban parcels. In historical cities, houses have central courtyard and built forms were arranged around the central courtyard. Therefore, in study of urban form of Iranian historical cities, the built form contains living spaces built around one open space (central courtyard). Unlike the shape of whole parcel, the central courtyards have certain geometric shapes. Orientation of all courtyards in one city follows same pattern.

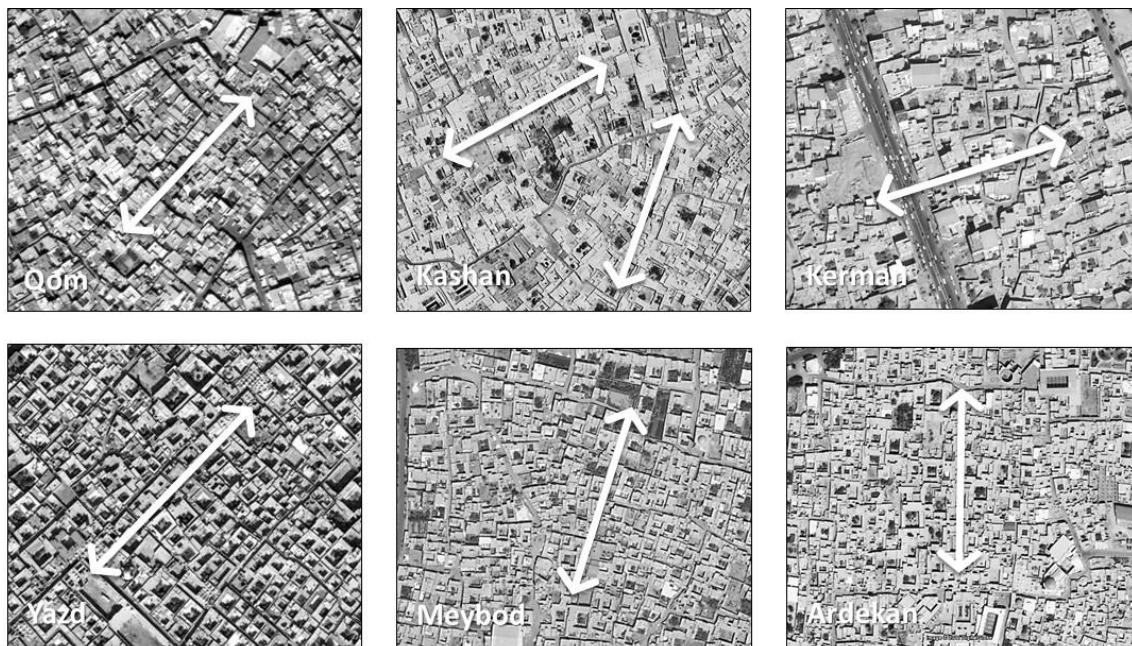


Figure 9. Orientation of courtyards in Iranian historical cities.

Urban form and climate

Urban form of Iranian historical cities were discussed in the previous section. In this section, those characteristics of urban form will be discussed that make historical cities more compatible with the microclimate of their region. These characteristics can be observed in the structure and fabric of historical cities. Those people living in similar climatic condition have similar problems.

Orientation of roads

In almost all Iranian cities, orientation of alleys that lead to neighborhood centers is toward Qibla, northeast-southwest. This orientation is the same as orientation of houses and in accordance with central courtyard which makes traditional houses more energy efficient. This is also the best orientation to get benefits of favorable winds. Ardakan and Kerman are exceptions to this principle. Alleys leading to neighborhood centers are in north-south orientation in Ardakan and in east-west orientation in Kerman. This is because of different direction of favorable winds in these two cities. In Ardakan, mountains are located in south of the city and therefore favorable wind blows from south to urban area. In Kerman, elevated mountains are located in east and wind blows from east to west.



Figure 10. Urban roads in Yazd, Ardakan and Kerman, Alleys leading to neighborhood centers are in north-south orientation in Ardakan and in east-west orientation in Kerman.

Narrow roads are another feature of urban form that help these cities encounter extreme climatic condition. This narrow width increases compactness and help to encounter unfavorable winds. Elevated walls shade narrow road's area and help to protect from direct sunlight heat. Covered spaces of alleys increase shaded area. Being covered and having large height to width ratio make these spaces more comfortable in the presence of hot dry wind of desert regions. One important characteristic of urban form is compactness. Compactness will be discussed in the next section.

Compactness

Compactness help to protect from unfavorable hot dry winds in summer and cold dry winds in winter. Compactness also decreases heat absorption from sunlight. Compactness protects building walls from sunlight in summer and form cold airflow in winter. One of most valuable solutions in response to extreme climatic condition of Iranian historical cities is the reduction of the amount of area exposed to heat by increasing compactness.

Central courtyard

Central courtyard plan of houses is most important characteristic of urban form in all Iranian historical cities. This pattern is a specific feature of historical Iranian urban form. All building parcels have central courtyard and unlike the shape of whole parcel, they have ordered shape and similar orientation. This ordered shape and similar orientation is completely consistent with the climate of their regions.

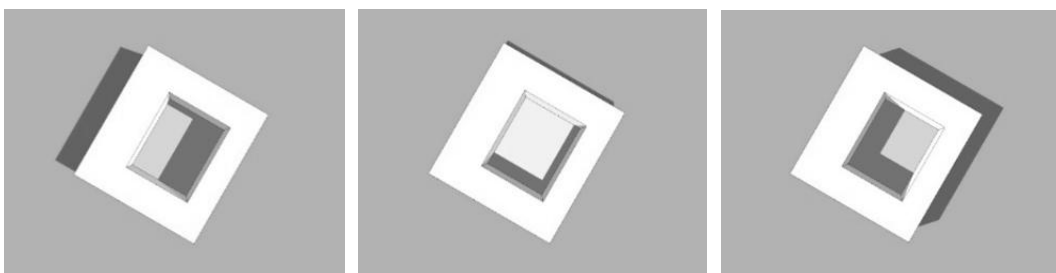


Figure 11. Shade and light patterns in central courtyard houses in morning, noon and evening time.

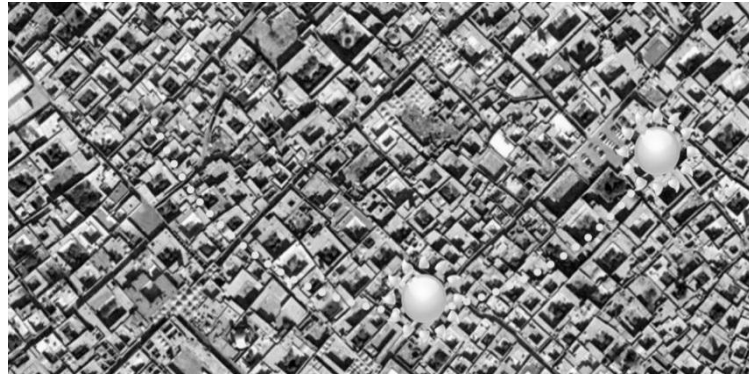


Figure 12. Northeast-southwest orientation of courtyards in Yazd.

Courtyards are generally in rectangular shape. Elongation of courtyards has northeast-southwest orientation. This elongation allows maximum use of sunlight for east and south side of the house. This elongation also allows maximum use of favorable sunlight in morning time. Axis of this elongation is also oriented toward Qibla. As mentioned above, Kerman and Ardakan are the exceptions to this principle.

Built forms including rooms, halls and porches are arranged around central courtyard. This kind of spatial arrangement allows the use of natural light in living rooms. Small size of rooms makes them more energy efficient and cause reduction in energy consumption for cooling and heating.

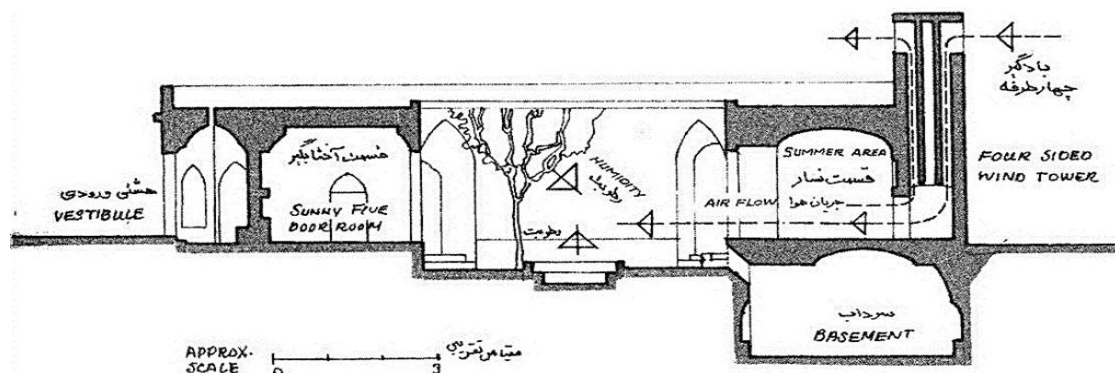


Figure 13. Arabs house in Yazd, Functionality of architectural components and the climate. (Tavassoli 2002).

By being lower than ground level, courtyards are able to preserve cold air mass of early morning hours in the yard and apply it to keep the house spaces cool in next hours. Houses with Godal Baghche, a green space lower than ground level, more effectively do this. Long courtyards have shade in morning and evening due to smaller angle of sun's rays. Airflow over the building parcel does not whirl dust particles that are near the garden surface and therefore dust particles cannot enter the living rooms.



Figure 14. Ordered rectangular shape of central courtyards unlike the organically shape roads in Yazd (Rezai 2009).

Conclusion

Climatic condition has always challenged the living of people in central parts of Iranian plateau. This has led them to find amazing solutions in competing annoying weather condition. They have learned to exploit this weather condition to create comfortable condition for living. These cities with narrow roads, compact fabric, appropriate built form and open space patterns, have created comfortable space for their settlers. This study showed that the orientation of roads, shape and size of blocks and parcels in Iranian historical cities were cleverly designed in relation to the climatic condition of their region. Urban form of Iranian historical city had made the living of its settlers more sustainable and allowed them to efficiently get benefits of natural resources. However, modern urban form of Iranian cities is not like historical urban form and their settlers consume a large amount of resources and energy in their life. It seem that thousands years of experience in shaping urban fabrics is dismissed. Iranian historical cities were in complete harmony with their natural environment like a bird nest or termites construction.

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Island-City / City-Island: Island precincts and evolving urban morphology of Abu Dhabi, UAE

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Abstract. *Islands hold a strong association with concepts of exclusivity and nature, due to their isolated configuration and the strong presence of the Sea, respectively. However, examples abound of cities that have emerged as island cities and as urban archipelagos. Consumerist and tourism-driven economies have helped further appreciate the value of the islands waterfronts and their adaptation as landscapes of leisure and recreation. Advances in technology and availability of capital have allowed articulation of grand visions for islands, both natural and man-made. Hence the development of islands has played a significant role in the emerging urban form of several coastal cities. Cities in the Middle East, in particular, have displayed this pattern in a more pronounced manner and as a recurring theme, evident in projects like The Pearl-Qatar and The Palm Islands (Elsheshtawy, 2010), which have also contributed to the city-image of Doha and Dubai respectively. Abu Dhabi, an island city itself, has joined this trend by recognizing the development potential of its peripheral islands. While historically development was concentrated on the main island, which characterised the city form, it has now extended to the various peripheral islands that are being developed as key projects. This paper studies the emergent morphology of Abu Dhabi, as influenced by the creation, development and redevelopment of its various islands. Common morphological patterns at the scale of the island shall be identified and relations drawn to the overall city morphology. The paper also discusses issues pertaining to the evolving city morphology such as the environment, connectivity, edges, seams and gateways.*

Key Words: *Abu Dhabi, Islands, Morphology, Urban form, Urban design.*

Cities, due to their inherent definition as places of concentration and exchange, have constantly grappled with the pressure to grow and expand which in turn has triggered urban transformations that mark the morphological history of the city. City form has been shaped by the primary layer of the city - its natural geographical and topographical condition - 'the constitution of the elements, land and water, nature, soil and climate' (Le Corbusier, 1957). Coastal cities, urban waterfronts, hillside towns, bayside development are all examples of urban types which reflect this interplay between the natural layer of the city and the development pressures it experiences. This paper explores the emerging urban patterns relating to city form through the development of its peripheral islands by providing an account of the city of Abu Dhabi, the capital of the United Arab Emirates.

The case of Abu Dhabi is particularly interesting, since it is representative of several characteristics observed in many of the Gulf cities – accelerated growth due to discovery of oil, focused efforts at diversifying the economic base, particularly through the tourism sector, intense inter-city competition and assertion as world-cities. In addition to commonalities in climate and culture, the cities also share a common regional geography that includes a barrier island chain along the coast. Water, as a landscape feature, finds a special importance in new developments. Cities like Dubai, Qatar and Bahrain are constructing a new city image through high-profile projects like the Pearl Island reclamation project in Doha and the Palms Islands in Dubai. The region has also received considerable attention with regard to sustainability, primarily because of the rapid economic growth driven by fossil fuels, extreme climatic conditions that necessitate widespread use of air conditioning and the requirement for desalination plants. The Gulf countries wanting to position themselves towards sustainable

growth due to high per capita emissions, have been undertaking several initiatives such as Qatar Sustainability Assessment System (QSAS) in Qatar and Estidama in Abu Dhabi to demonstrate their commitment towards this cause.

In order to create a background for the contemporary urban form, this paper first presents a brief development history of the city. The plan 2030 and current development proposals are then comprehensively described. The paper examines the current and future patterns of development that relate to the decision to develop the peripheral islands. The research methodology includes site visits and an examination of the physical attributes of different areas. Morphological studies are used to discuss these patterns and to investigate the relation of elements, both at the scale of the island as well as the city. Select examples have been discussed as cases that are particularly illustrative of the issue and to substantiate the conclusions that are being drawn. The paper concludes with a consideration of the emerging issues relating to the urban form and summarizes potential future directions.

Helmy (2008) in her doctoral dissertation provides a summary of urban studies in the Gulf and categorizes them as historical urbanization, modern urbanization and oil urbanization. Contemporary research in the post-oil urban fabric has been faced with the challenge of keeping pace with the explosive growth experienced by the Gulf countries. Elsheshtawy (2005, 2010), Moustafa (2005), Eleishe (2006) and Al Naem (2005) have discussed aspects of contemporary urbanism in various Gulf cities. This paper attempts to contribute towards the body of research in the post-oil urban fabric of Abu Dhabi by discussing a contemporary urban pattern that addresses the role of environment in shaping the urban fabric.

Abu Dhabi – A brief history

Abu Dhabi is the capital of the United Arab Emirates, the seat of the federal government and the wealthiest of the Emirates as a result of its abundant oil reserves. It is situated on a T-shaped island which projects into the Arabian Gulf from the central western coast, a part of an archipelago of several islands within the emirate. Other islands, such as Sir Bani Yas and Dalma have played a historical role in the evolution and growth of the southern Arabian Gulf as a trading center. In general, the native people of the Gulf region, called the Bedouins selected areas such as the mountains, oases and the coast while seeking settlements in the harsh desert conditions. The largely nomadic, migratory population shifted from region to region in response to the rhythms of seasons and trade. Buildings and settlements were distributed along a net of social and economic relations that tied the interior of Arabia with the larger commercial network of the region (Hawker, 2008).

Residential clusters date back to 1761, when the principal local tribes of Abu Dhabi, the Bani Yas, who were settled in an inland oasis, moved to the coastline seeking better living conditions. (Elsheshtawy, 2010). Presence of water helped and it grew as a permanent settlement devoted to fishing and pearling. A turning point in the development of Abu Dhabi came about in 1953, when Abu Dhabi Marine Areas Ltd. (ADMA) obtained offshore oil concessions resulting in royalty payments. This triggered the development process, which accelerated when Sheikh Zayed bin Sultan Al Nahyan took over as the ruler in 1966.

The task of making the masterplan of the city was undertaken. In addition to extensive greening, the main concerns of the planners were a responsive Arab Islamic style, identifying areas of development and the problem of settling the native Bedouin who were accustomed to a migratory, nomadic lifestyle (Raban, 1987). The 1960s to 80s saw a surge in construction activity. High densities were attained since land was parcelised into small chunks and allocated to nationals. The possibility of installing infrastructure and the reliance on technology for cooling buildings lifted the limits on urbanizable land and waterfront development and land reclamation gained importance. The urgency for development placed a greater focus on planning and land sub-division.

Vision 2030 and proposals for islands

In comparison with other oil-based economies of the region, Abu Dhabi may be differentiated in the restraint that it has exercised in its growth and development, primarily due to the greater availability of natural resources. This restraint has allowed it a second mover's advantage (Rogers 1983) and a chance to deliberate upon its growth directions by preparing a vision, which includes socio-environmental concerns in addition to market-driven forces. The Plan Abu Dhabi 2030: Urban Structure Framework Plan, prepared by the Urban Planning Council (UPC) in collaboration with the Abu Dhabi Council for Economic Development (ADCED) was released in 2007. The document envisages Abu Dhabi as a 'leading 21st century Arab capital, that is based on a range of factors to ensure sustainable growth and a high quality of living'. (Plan Abu Dhabi 2030). In order to achieve this vision, the planning principles follow the 4 pillars of Estidama (a sustainability program, customized for the Middle East – Environment, Economy, Society and Culture. The Plan Abu Dhabi 2030, documents the initiatives to develop the peripheral islands of Abu Dhabi to ensure they are an important part of the city's identity. It is envisaged that the city be defined as much by the natural islands and dunes surrounding it as the infrastructure, streets and homes to be developed. (Executive Summary, Plan Abu Dhabi 2030). Strong emphasis is being awarded to leisure and tourism and key projects which are earmarked towards this purpose include the Sadiyat Island as the cultural district, Yas Island with a Formula One circuit, the manmade Lulu island, which will potentially hold a major park and the Desert Islands projects. The Environmental Framework Plan proposes a Green Gradient to regulate the development of the islands by assigning a series of inhabitation levels, ranging from 'Park Core Islands' to City Edge Islands' (Plan Abu Dhabi 2030, p 51, 138). The Central Business District (CBD) that is scattered over several diverse islands is consolidated on Al Maryah Island to improve its legibility (Plan Abu Dhabi, p55). Fig1. provides an overview of the key island development project.

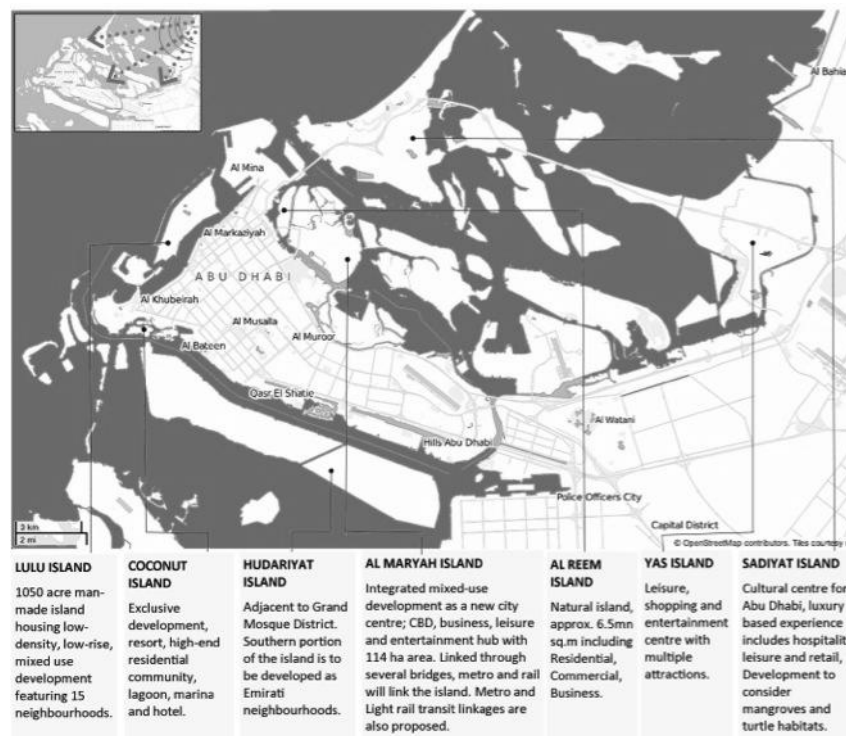


Figure 1. Map of Abu Dhabi – New island proposals and initiatives in Plan Abu Dhabi 2030. Developed on maps courtesy OpenStreetMap.org.

Developing the Islands – Place-Branding

The isolated self-contained, configuration of islands as well as the complete absence of any development presents a ‘blank slate’ to the developer. Though development is guided by an overall vision for the city as a whole, drawing references from the surrounding fabric often becomes difficult and convoluted. Castello (2010) discusses the complementary nature of place-making and place-marketing in the genesis of places and comments on the growing importance of marketing in creating associations with places. Hashim (2012) examines the efforts of the Office of the Brand Abu Dhabi as part of the city’s efforts to place itself as a globally significant city and studies the case of Sadiyat Island. The strong imageability of the water also means that celebrated architectural icons are often commissioned to generate an exciting waterfront experience (Zoe, 2012).

Leisure, recreation and entertainment are dominating functions employed in the mechanism of place-branding of the islands. Hannigan (1998), refers to places intended for leisure and entertainment, permanently offering an attractive mix of festivity and social interaction. Sassen and Roost (1999) discuss the role of entertainment industry in creating urban places dedicated to products and leisure services. Two of the most significant island projects, reflective of these trends in Abu Dhabi are the islands at Yas and Sadiyat which have seen extensive development in erstwhile empty islands. Yas island is intended to be a recreational and entertainment node while Sadiyat will be a cultural district and both developments have been positioned at a global scale.

Sadiyat Island, an island half a kilometer off the coast of Abu Dhabi is being pitched as a venue for staging classical concerts, art exhibits and a major book fair. It comprises of 4 museums, each designed by a celebrity architect and 19 pavilions, varying in size from 2000 to 10000 sq. m. strung along a water canal, which have been conceptualized in order to host an Art Biennale. The Art Biennale will be a regularly recurring art exhibition (every 2 years), which is inspired by the historically acclaimed ‘Venice Biennale’, which was first held in 1895. It is interesting to note that the masterplan while planning for events also acknowledges the fact that the events will be occurring only for a short duration. Hence the pavilions have been designed such that one face of the pavilion fronts the canal and the other face responds towards the commercial development within the island. This creation of a flexible framework appears as an important characteristic when planning for large events since it addresses their temporal nature. Other characteristics of this development trend are the creation of thematic environments and the dominance of projects delivered by star-architects and the pursuit of superlatives (Fig2).



Figure 2. Place-Branding of Sadiyat Island through signature architecture (Source: The Sadiyat Brochure).

The development of islands incurs large costs due to the extensive infrastructure requirements and landworks entailed. Hence there is often a tendency to parcelise the land and divide the island project into sub-projects in order to distribute the risks of investments. This can at times cause the public realm to become fragmented.

Recharging the Void

Initially designed as a compact city, concentrated around the Corniche and the port, the downtown area displays a strong imageability that reduces towards the periphery. Peripheral areas may be characterized by several features such as low density, large sizes of land parcels and reduced imageability and activity. Fabric dating from various development periods often surrounds them. With the development of peripheral islands, these areas figure as voids in the city fabric, since it appears as though the development has leapfrogged over them. In the modified context of the developing peripheral islands, such urban voids are gaining a renewed value due to the significance of their location at the cusp of different fabrics and are likely to undergo dramatic urban transformations in the near future (Fig3).

In the contemporary urban territory, the void or the un-built becomes the structuring elements and thus should be studied as one of the components – as important as the built one. (Cortes, 2006). It would be very useful to develop design guidelines that address the opportunistic value of such sites – the possibility of saving them as open spaces for the city, as spaces from where the fabrics dating from different periods may be observed, as spaces that serve as important connections between different districts and as spaces which allow informal activity and inclusiveness. One such area in Al Zahiya, previously known as the old Tourist Club Club Area was studied and documented by students of an Urban Design Studio at Abu Dhabi University (Fig3).



Figure 3. Above - Satellite image of the old TCA area showing urban fabrics ranging from different development periods (source: Wikimapia. Right – Graphics showing the appearance of voids in the urban fabric as peripheral islands are developed).

Connecting the Islands: Expanding the Periphery

The word ‘island’ itself is used in common language to represent an independent entity that has little or no relation with others. In urban design literature, the term islands and archipelagos have been used to refer to the extent of exclusiveness of developments (Buchanan, 2013). Adham K, (2010), uses the term island both to make references to geographical configuration as well as to allude to new forms of urban archipelagos prevalent in Doha and the region.

Abu Dhabi, an island itself, is located less than 250m from the mainland, separated by a shallow stretch of water, which gave it a strategic advantage but posed an obstruction to trade and transport (Khaleej Times). In the early 1950s, when a proper link to the mainland became essential with the oil discovery, Petroleum Development (later Abu Dhabi Petroleum Company) had a narrow causeway built over this. Under the leadership of Sheikh Zayed, a decision was taken to turn the causeway to a bridge and the Al Maqta bridge was opened in 1968 (Radan, 2014, Khaleej Times). This was followed by the Mussafah bridge and more recently, an iconic connection, the Sheikh Zayed Bridge, designed by Zaha Hadid was opened in 2010 (Construction Week online). The 3 bridges serve as portals to the city. The 3 major arterials extending from these portals were the main routes through which the city was experienced. The strong directionality of these routes, together with the linearity of the landmass, helped establish the city image, reinforcing the perception of moving to and away from the city centre.

The traditional linear / grid configuration of transportation configuration is gradually being replaced by a network configuration (Fig4). The Eastern Ring Road or Salam Street (now renamed Sheikh Zayed bin Sultan Street) was extended to the Corniche end of Abu Dhabi island where it turns to join the other arterials Khaleej al Arabi and Old Airport road). The Sheikh Khalifa Highway, E12, connects the city to the 3 major islands – Sadiyat, Jubail and Yas, re-entering the city close to the airport. Similarly the manmade island, Lulu, which is currently accessed only by ferry, is set to be connected to the mainland at the Marina breakwater and the Port Zayed. The high-speed arterial thus created would circumscribe the older parts of the city, quite like a ring road. The direct connectivity would allow one to travel straight from the airport to the island destinations, bypassing older areas of the city.



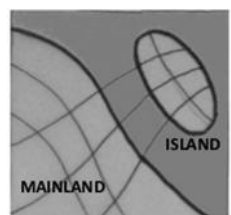

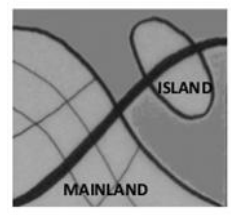
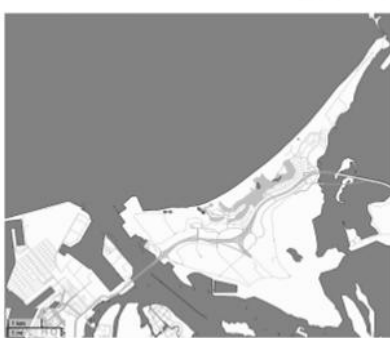
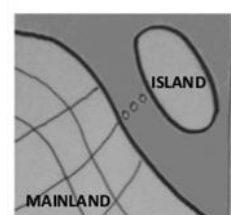

Figure 4. Above – Planned improvements in the Surface Transport MasterPlan for Abu Dhabi (source: STMP, Abu Dhabi. Right - Changes to the Transportation structure of Abu Dhabi from linear / grid type to a network configuration in relation to development of peripheral islands).

These new connections could be understood as creating a ‘string of beads’ configuration of urban centres which are carefully linked to important transport nodes thus facilitating a global connectivity. Since movement routes play an instrumental role in the perception of the city, this modified movement structure will be integral to the development of the new urban morphological form and the traditional perception of the city as a ‘T’- shaped island.

Further, based on the nature of connectivity between the city and the island, there appear to be 3 models of islands: Inclusive, Connected and Exclusive. A comparison of the 3 types has been described in Table 1.

The Al Maryah island, (Fig5) an example of an inclusive island is being proposed as the new Central Business District and will therefore support the highest concentration of office space in Abu Dhabi. Since the CBD shall incorporate adjacent edges of Al Mina, Al Reem and Abu Dhabi islands, it is planned that existing city streets will be extended into the proposed islands, through modestly scaled bridges (Abu Dhabi Surface Transport Masterplan STMP, p51).

Table 1. Types of Islands based on connectivity. Maps of islands sourced from OpenStreetMap.org.

		<p>Location of island very close to city.</p> <p>Attempts to extend city structure and fabric.</p> <p>Greater degree of access and permeability.</p> <p>Integrated development.</p>
		<p>Use of Place-branding to create new development.</p> <p>Projects tend to address a global audience eg.—Leisure destinations, cultural and entertainment attractions etc. High speed global connectivity to allow access.</p> <p>Some areas have environmental emphasis</p>
		<p>Either reserved for a gated community or having a strong environmental emphasis.</p> <p>Access through private roads and / or through ferries.</p> <p>Possibility of considering off-the-grid infrastructure to reduce environmental impacts.</p>

The Connected type of island presents further issues in terms of morphology. Such islands are characterized by a strong urban edge created due to the transport connection that often dissects the island. An example of this may be seen on the Yas Island where the Sheikh Khalifa Highway divides the island into areas, which are also being developed as Yas North and Yas South (Fig6). Though an attempt has been made to propose parks which will serve as seams and link the two sides, they have a limited effectiveness in serving as seams.

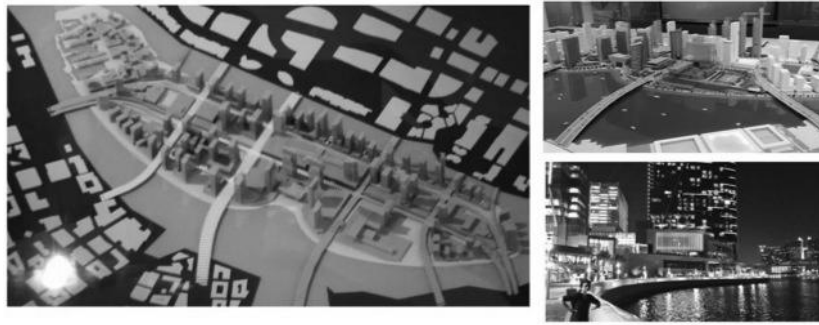


Figure 5. The Al Maryah Island, an example of a development integrated with surrounding fabric. Left and top right - Photos of exhibits in The Galleria Mall, Bottom right – View of waterfront of Al Maryah Island with the main city in the backdrop.



Figure 6. Clockwise from top left: Map of Yas Island showing the E12 highway dissecting the island into Yas north and South – Source: OpenStreetMap; View of the highway creating an urban edge; View of the Gateway Park designed as a seam for Yas North and South.

Connecting the local island-based movement networks to the city arterial also affects the urban form and image of the proposed development. Since this involves geometries and traffic interchanges, which are predominantly concerned with regulating the traffic speeds, they can interfere adversely with intuitive way-finding due to maze of interchanges and ramps and also the presence of buildings on the transport routes. This may be experienced through the example of Manarat al Sadiyat (Fig7), a visitor centre designed to convey the vision for the island to the visitors.



Figure 7. Access to Manarat al Sadiyat, Map courtesy: OpenStreetMap.org

The Abu Dhabi Surface Transport Master Plan (ADSTMP) also proposes that the planned land-based transport network will be supplemented by ferries and water taxis to serve the off-shore island districts in an effort towards creating a multi-modal transport system

Conclusions

As Abu Dhabi pursues its vision for the future, it is quite evidently doing so through massive development projects, proposed on its peripheral islands. The need to balance environmental issues, urban form and city image with the pressures of development and expansion thus comes into the forefront.

The decision to develop large areas over short periods of time on a geographical configuration which is physically isolated has led to the predominant use of place-branding as a favoured means of place-making. Place branding has simultaneously reinforced and leveraged upon the exclusiveness of the island landform. Place branding in Abu Dhabi's islands has focused on hosting mega-events and emphasizing the islands for their natural value. The Green Gradient specified in the Plan Abu Dhabi 2030 is a positive effort that codifies the role of environment in the future development of these islands. Since the hosting of mega-events and creation of architectural icons is a strategy adopted by cities to boost tourism (Richards and Wilson, 2005), it is therefore oriented towards an international audience. Hence direct connectivity through global links such as the high-speed transport arterials and access from the airport gain significance in these projects.

As peripheral islands develop as nodes of activity, a reconfiguration of land values is brought about with erstwhile fringe areas and voids in the urban fabric gaining a renewed importance. The voids hold importance since they can connect and stitch together different fabrics and allow better integration and continuity of the public realm. Development guidelines that recognize this opportunity and addresses this urban type would be useful in ensuring that these issues are appropriately dealt with.

Connections required to make the peripheral islands accessible are transforming the traditional linear / grid form of the city circulation to a network type which connects the dispersed nodes. The morphology of the island itself is influenced by the extent of connectivity with the main city, with some islands retaining their exclusiveness, some linked through arterials and others being integrated with the main city. Both the exclusive and connected models of islands have the merit of limiting the impact of the transport infrastructure on the natural systems and mangroves.

The high costs of development on islands means special attention is required to ensure that short-term economic considerations are balanced with long-term goals of vision, waterfront development and sustainable public realms. Further research and morphological studies that compare the urban form of the different types of islands, potential guidelines for fringe areas and voids and urban infill would be very useful.

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Restelo neighbourhood: a paradigmatic example of urban form overlapping

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Abstract. *This paper reviews the numerous phases of the urban growth planned for the Restelo neighbourhood, located in Lisbon, which is regarded as a paradigmatic example of an amalgam of urban interventions in the same territory. Throughout the twentieth century the growth of the Portuguese capital was directly associated to political decisions made by the Municipality and the Ministry of Public Works. The intention to develop a housing neighbourhood in the south-west limit of the city emerges from a dictatorship minister that saw, in this territory, a perfect scenario for Faria da Costa to put into practice the urban knowledge acquired in Paris. But if Duarte Pacheco had been called an urban planner, the subsequent politicians called in architect teams to redraw what had not been yet built. Multiple forms expressed in this urban agglomeration testify different solutions in urban design. This paper aims to: i) reveal the evolution of the urban form in the Restelo neighbourhood; ii) contribute to the understanding of the urban form development in Portuguese Urban History; iii) provide historical basis for the debate on the respect on previous urban design solutions. Still with land to urbanize, the Restelo is a territory open to future urban proposals.*

Key Words: Restelo-Portugal, urban History, urban form, municipality.

Introduction

This paper intends to present a critical view of the several phases of urban growth performed on the Restelo neighbourhood, from the first proposal “Ajuda Hillside Urban Plan” (“Plano de Urbanização da Encosta da Ajuda”, 1938) developed by the first Portuguese architect graduated in Urbanism, to the public contest of ideas “East Zone Restelo Hillside” (“Zona Nascente da Encosta do Restelo”, 1991). Due to the fact that this information is deposited in sparse archives and is widely unknown to the scientific community, the Portuguese historiography had not yet been totally released. This served, therefore, as motivation for the development of a PhD research (d'Almeida, 2013). We live in a period where the population inhabits territories that are constantly subjected to urban and architectural interventions. Based on the experience of the Restelo neighbourhood, we hope to contribute to the debate on future interventions that will take place on this or other territories. Justified value: 1º) The comprehensive overview of Duarte Pacheco's definition of Lisbon's growth lines; 2º) The visionary attitude of this Minister of Public Works of sending to the Institut d'Urbanisme de Paris one Portuguese architect to study Urban Planning and to bring back to Portugal the knowledge acquired from Henri Prost (1874-1959), Jacques Gréber (1882-1962), Georges Sébille (1879-1962), Donat Alfred Agache (1875-1934) and Etienne De Gröer (1882-1974); 3º) The lack of vision of the politicians that followed Duarte Pacheco and consistently contributed for the changes that occurred at the Restelo neighbourhood, making this a paradigmatic example of overlapping urban form.

This paper is organised in four parts. After this introduction, the second part describes “The heavy task of Duarte Pacheco” part of the assuming the lead of the municipality of Lisbon, accumulating it with the position of Minister of Public Works as he idealizes the Lisbon city's urban growth without Portuguese urban planners. The third part demonstrates the transition “From Ajuda Hillside to Restelo Neighbourhood”, showing the passage of an agricultural field to an urbanized territory, according to the model of Garden City. The final part of this paper

focuses on the evolution “From Neighbourhood to Neighbourhoods”, exposing the overlapping of urban plans and, consequently, urban forms over more than fifty years.

The heavy task of Duarte Pacheco

In 1938, the engineer Duarte Pacheco (1900-1943) (Costa, 2012), Minister of Public Works (1932-1936 and 1938-1943), accumulated political responsibilities when he assumed the post of Mayor of Lisbon (1938-1943) – “I know it's a heavy task that is being required of me and I realize the extent of the sacrifice that the acceptance of this duty represents” (Pacheco, 1944), were the words in his inauguration speech. In the funeral ceremonies held after his death, the deputy president Eduardo Rodrigues de Carvalho recalled a walk he had with the Minister: “from that bright spirit flowed in torrents of thoughts on the Eduardo VII Park, the highway, the aesthetic arrangement of petty buildings that line the Avenue and the Restauradores Square (...) the Rossio arrangement, the downtown traffic, the vision of the tunnels starting from the Restauradores by the Corpo Santo, and from Socorro to St. Domingos, to tackle the problem of Almirante Reis’ connection with Rossio, all treated with great depth” (Carvalho, 1944). Pacheco’s passage in the political life was brief but active, creating conditions to achieve what he envisioned for the city of Lisbon: the “Capital of the Portuguese Empire” (Lobo, 1995). Firstly, to avoid the constant hiring of foreign professionals and due to the lack of Portuguese urban planners (Ferreira, 1987), he opened a contest for a Portuguese architect to specialize in Urbanism in the Institut d’Urbanisme de Paris; secondly, he hired the newly graduated architect in urban planning to integrate the technical team of the Municipality of Lisbon shortly after his return to Portugal; finally, he requested this urban planner to develop much of his idealized urban production for the city of Lisbon. João Guilherme Faria da Costa (1906-1971), the first Portuguese urban planner, in a first stage and among other projects was commissioned to give urban form to Ajuda Hillside (1938), Areeiro (1938), Alvalade (1945-1948) (Costa, 2002) and link 24th July Avenue to Comércio Square (1947).

From Ajuda Hillside to Restelo Neighbourhood

In 1938, the 300 hectares of the “Ajuda Hillside”, located on the western limit of the municipality of Lisbon, were the focus of the first urban interventions part of the “Ajuda Hillside Urban Plan”. With some urgency, this plan aimed to transform a territory occupied by farms and palaces into a large residential neighbourhood, to accommodate 36.000 inhabitants with generous financial resources. Positioned in the back slope of the Jeronimos Monastery it should also served as a scenario for the Portuguese World Exhibition (1940) and as the beginning of the Estoril Coast, which had suffered some changes part of the urban development plan carried out by Alfred Agache in 1933.

With the axis defined by the Belém Tower and the St. Jerónimo Chapel, as Beaux-Arts style, the urban planner Faria da Costa designed the plan with three main motorways lined with vegetation – Dom Vasco da Gama Avenue/Descobertas Avenue, Torre de Belém Avenue and Jerónimos Street/Ilha da Madeira Avenue – taking advantage of the urban scenario and strategically enjoying panoramic views over the Tagus River. A third Avenue, designated Restelo Avenue, follows the contours and guides the urban network with concentric streets that look over the river like an amphitheatre. This Avenue outlined the areas to urbanize in the 1st and 2nd phase of urbanization. As in the new Australian capital (1911) projected by Walter Burley Griffin (1876-1937), for Restelo Faria da Costa thought about a residential neighbourhood to be seen from Belém. The buildings of greater height were placed in the higher elevation of the slope and the single-family homes were placed in isolation in the plot along the “galleries” that make up the “audience”. Looking for a certain classical monumentality as Henri Prost did in Casablanca (1915-1922), a church completed the urban ensemble. Following the

Ebenazar Howard (1850-1928) model of the Garden City (1898), matching the city and the countryside, Faria da Costa wanted to create a self-sufficient neighbourhood whose boundaries were defined by a peripheral green belt – the Monsanto Park – where the discomfort of dwelling in the metropolitan area is diluted with the contemplation of landscaped squares that remind us of Letchworth (1902-1906), designed by Raymond Unwin (1863-1940) and Barry Parker (1867-1947). Applying the zoning principle Faria da Costa created residential areas separated from commercial areas and opened spaces. The contemplation of the commercial centres concentrated near the dwellings creates neighbourhood units that serve the resident population and ensure a certain morphological and social homogeneity.

From Neighbourhood to Neighbourhoods

The Restelo neighbourhood was already under construction when it gave the first major change of the original “Ajuda Hillside Urban Plan”. With Duarte Pacheco’s death (1943) the new Minister of Public Works (1947-1954), José Frederico Ulrich (1905-1982), leads the urbanization works differently, taking Restelo neighbourhood to very different directions comparing to what was conceived by the earlier Statesman. Called again to design at Restelo, Faria da Costa is at that time requested to change the general urban plan with the “Study of Economic Houses of Ajuda Hillside Neighbourhood” (“Estudo do Projeto do Aglomerado de Casas Económicas da Encosta da Ajuda”, 1947-1952), giving rise to the construction of the identified Restelo Economic Neighbourhood. As advocated by the architect Raul Lino (1879-1974) (Pereira 2013) this economic neighbourhood was composed of single-family houses, for state employees, military and their families. Consisting of approximately 460 attached houses, the presented solution is distinguished from the initially private homes because the economic houses were distributed in line, forming autonomous blocks built with each type of house oriented in the same direction, seeking to provide equal living conditions. As a consequence, streets with continuous buildings in block arise, approaching the urban form designed by German Modern architects, namely by Walter Gropius (1883-1969) author of Dammerstock neighbourhood (1928-1929) in Karlsruhe, Germany. Although Portuguese laws considered, at that time, four classes of houses (Class A, B, C or D; Type I, II or III), the Restelo Economic Neighbourhood only contemplated the upper classes C and D, because they had to be integrated with the houses previously built and whose lands had been acquired in public auction by those who offered greater value.

The restructuring of “Ajuda Hillside Urban Plan”, considered of great importance to promote a significant urban and social change, was readily exposed at the exhibition 15 Years of Public Works: 1932-1947 (1948), held at Instituto Superior Técnico (Lisbon Technical University) under the support of the Government in an initiative by José Frederico Ulrich. About one year after the inauguration of this economic neighbourhood, with Álvaro Salvação Barreto (1890-1975) at the presidency of the Lisbon Municipality (1944-1959), Faria da Costa was invited to re-urbanize the land north of Restelo Avenue with the urban plan of the “Residential District of Ajuda Hillside – 2nd part” (“Bairro Residencial da Encosta da Ajuda - 2ª Fase”, 1953). At that moment that urban planner was looking to partially break the central avenue with the creation of a promontory around the St. Jerónimo Chapel. A perpendicular axis to the main avenue defined the northern limit of the intervention with blocks of four floored buildings located perpendicularly to the street axis. This review of the previous general urban plan was never implemented. The planned roads that snaked the steepness of the slope accompanying it with the constant presence of single-family houses, as we shall see, will be partially replaced by renewed urban interventions that gave priority to modern hierarchical streets where multifamily houses prevail.

The creation of the Office of Municipal Urbanization Studies (Gabinete de Estudos de Urbanização, GEU 1954) allocate 100 hectares of land in Restelo for the development of the “Restelo Hillside Urban Plan” (“Plano de Urbanização da Encosta do Restelo”, approximately

1954). The GEU team planned tower buildings and lined buildings to respond to the increasing of the population. Now were the reflections of CIAM congress, namely the Charter of Athens (1933-1941) that fascinated the young architects and urban planners. Concentrating height housing blocks independent from traffic routes, each outlined "housing unit" was relieved with the presence of green spaces, as idealized in the British New Towns planned in Harlow (Frederick Gibberd, 1947) and Roehampton (London County Council, coordinated by John Leslie Martin, 1952-1959). In each cell, the equipment considered essential for the neighbourhood consolidation were: church or cultural centre, commercial centre, schools and administrative institutions. A prioritisation of the traffic routes led to the disappearance of the "traditional street" for main motorways where blocks or buildings were built in line and located obliquely to get better solar exposure. The "Lisbon old blocks" disappear and the "Modern City" appears. However, to respond to the requests for housing cooperatives who wanted to built homes for its members, Pedro Falcão e Cunha (b. 1922) and José Aleixo de França Sommer Ribeiro (1924-2006), architects that worked for the GEU, were instructed to develop the "Readjustment of the 2nd Phase of Restelo Hillside" ("Reajustamento da 2ª Fase da Encosta do Restelo", 1959). This urban plan replaced, once again, two blocks per single-family houses and attached houses, solution predicted in 1953 by Faria da Costa. At this planning stage, three categories of buildings were predicted (Category I, II or III), for three different salaries (200\$00-300\$00, 400\$00-600\$00 or 700\$00-900\$00). Next to Ilha da Madeira Avenue, six tower buildings with an "H" plan and 96 apartments were contemplated (category II), which should make the transition between the cooperative housing and housing for category III. In a sense, this phase of urbanization has been forgotten by the Portuguese historiography, perhaps because it was not entirely built. However, it is important to remember that this plan was developed by the same architects that worked at the urban plan of Olivais Norte (1955-1958), a very similar proposal developed after "Restelo Hillside Urban Plan".

During the 40s of XX century the Ajuda Hillside was faithful to tradition. During the 1950s over 400 projects of scarce equipments and numerous houses were approved for the entire Restelo neighbourhood. Among other Portuguese traditional single-family dwellings or where the history of architecture from the fifteenth and sixteenth centuries were somehow represented (Acciaiuoli, 1991), there were the finest examples of Modern Architecture built in Lisbon. During the twenty years that followed, diplomats, artists and intellectuals hired the most renowned architects to project their private houses, making this place a strategic point to test the modernity. Although the division of the plots do not meet the requirements of the requested programs, this was no impediment for the simultaneous acquisition of two plots. Serving as a project-lab to the youngest class of architects, these projects were exposed at the General Exhibition of Fine Arts (1946-1956), the greatest "publicity event" where several generations of architects and artists exhibit their work, in opposition to the exhibitions organized by the regime.

With França Borges at the presidency of the Lisbon Municipality (1959-1970) other architects employed by the City Hall were called to intervene with partial urban plans replacing the previously prepared by GEU. In 1965, Ruy António da Silveira Borges (1916-1978) was responsible for the "Study of urban arrangement and architectural complex of the land next to the C.G. Street" ("Estudo do conjunto arquitetónico e arranjo urbanístico do pormenor do terreno junto à Rua C.G.", now Ilha da Madeira Avenue) whose five modern housing blocks were built by the same project; a year later Manuel Alves de Sousa (b. 1925) was invited to prepare a detailed plan of a housing development located at the southern edge of Cell C, which matches what was planned. After the building construction of the Ministry for Colonial Affairs (1960-1962), the remaining area was being occupied by buildings on a large number promoted by civil construction companies or groups of people associated to premeditated investment.

The lack of technical expertise at the municipal services leads to other professionals. Between 1964 and 1970 the architect Francisco Zinho Antunes (1921-2002) and the engineer Eurico Ferreira Gonçalves (1916-2005) developed the "Study of Restelo and Caramão da Ajuda Urbanization" ("Estudo de Urbanização do Restelo e Caramão da Ajuda"), commonly known as

"Hight Restelo Plan" ("Plano do Alto do Restelo"). This urban plan had several phases due to the guidelines given by the urban planner George Meyer-Heine (1905-1984) that was responsible for the revision of the Lisbon Master Plan. At this time this urban plan was limited to 30 hectares of surface circumscribed in an adjacent neighbourhood area, bordering the Monsanto Park and the Caramão da Ajuda Economic Neighbourhood, designed by the architect Luís Benavente between 1947 and 1957. This new team planned and constructed tower-buildings from 8 to 12 floors interconnected by buildings from 1 to 3 floors. Following one of the central concerns of the Team X (1953-1984) – constituted by Alison Smithson (1928-1993), Peter Smithson (1923-2003), Jaap Bakema (1914-1981), Georges Candilis (1913-1995), Aldo Van Eyck (1918-1999), Giancarlo di Carlo (1919-2005) and Shadrach Woods (1923-1973) – these galleries placed at different levels intended separate the pedestrians from the vehicles and favour human relationships between the communities that faced the commercial spaces. All these tower-buildings functioned as a barrier, forcing Caramão da Ajuda residents to contour the buildings than to cross through the galleries as previously predicted. There is a certain constraint between the coexistence of different social classes.

The new Chair of the Council led by Santos e Castro (1970-1972) interrupted the operation and suspended the announced 2nd phase of urbanization. This second phase should have continued the construction of the tower-buildings in the south land of Gregório Lopes Street (the cornice line), where a Centrum on a platform was also planned. It was too late to "remedy" the northern slope view of the Jeronimos Monastery but it was necessary to avoid the negative effect of the scale emphasized by the building towers in an elevated area of the city. This construction forever altered the view of Lisbon from the Tagus River. The architects Nuno Teotónio Pereira (b. 1922), Nuno Portas (b. 1934) and João Paciência (b. 1947) and the landscape architect Gonçalo Ribeiro Telles (b. 1922) formed a new team to design the next urban changes at Restelo neighbourhood. These professionals had the obligation to keep the already existing population density but significantly reduce the height of the prospected buildings. Thus, before the recent Lisbon General Urban Plan (1977) defined the guidelines for the "Restelo Zoning Plan" ("Plano de Pormenor do Restelo", 1971), the urban plan is going to turn the tower-buildings horizontal and create low height blocks, recovering the concept of elongated blocks and traditional streets that point to the Tagus River. This plan was looking to dilute the nearest neighbourhood plans partly built; creating a passage between the south housing area (Faria da Costa), to the east block-units (GEU; Silveira Borges; Alves de Sousa) and the north tower-buildings (Zinho Antunes and Ferreira Gonçalves).

Meanwhile, the Public Urbanization Company of Lisbon (Empresa Pública de Urbanização de Lisboa, EPUL) was created (1971-2002), giving them administrative and financial autonomy. This company had a prominent role in the field of urban planning and housing in the city of Lisbon. Some of the municipal planning processes were transferred to this company, including the "Restelo Zoning Plan" whose urban arrangement had been previously approved by the City Council and the housing projects created by the same team of designers, to which joined the architect Pedro Viana Botelho (b. 1948) and the landscape architect Francisco Caldeira Cabral (1908-1992). EPUL continued the process with the opening of a tender for the construction of the "pilot-block", located on the south end of the enterprise, called the "EP Zone" (Zona EP - Estudo Prévio). This district included town houses which aggregated a set of courtyards and terraces and a collective block-unit that took advantage of hits on gallery. With a new Mayor (1972-1974), the Lieutenant Colonel Jorge da Silva Sebastião (b. 1919), EPUL planned a phased construction but did not build the central area that included a civic and cultural centre, a hotel, offices and a church.

The transition from a dictatorship to a democracy had further repercussions on the entire process. Under claim of the EPUL services, this public company decided that the new projects should be developing internally. The building projects located on the western side were given to the architect Vítor Alberto (b. 1938), employee of this public company. At odds with the "Restelo Zoning Plan", this architect increased two floors to the building projects. Curiously, these projects were awarded with an Honourable Mention of the Valmor Prize (1988), the most

important recognition given in Portugal to an architect and his work. Although the new chairman led by Nuno Krus Abecassis (1929-1999) had led all building projects located on the east slope to the authors of the zoning plan, only the called “Pink Block” was built (“Quarteirão Rosa” 1984-1987, honorable mentions of Valmor and Municipal Award in 1987 and 1988) because in 1984 EPUL decided to review the projects and the allotment of five hectares located at the nascent part, which were still available for urbanization. Already under the tutelage of the director Joel Hasse Ferreira (b. 1944), in 1991 EPUL opens a contest of ideas for the “East Zone Restelo Hillside” (“Zona Nascente da Encosta do Restelo”) which qualified the project submitted by the architect Nuno Leónidas (b. 1954) (see figure 1).

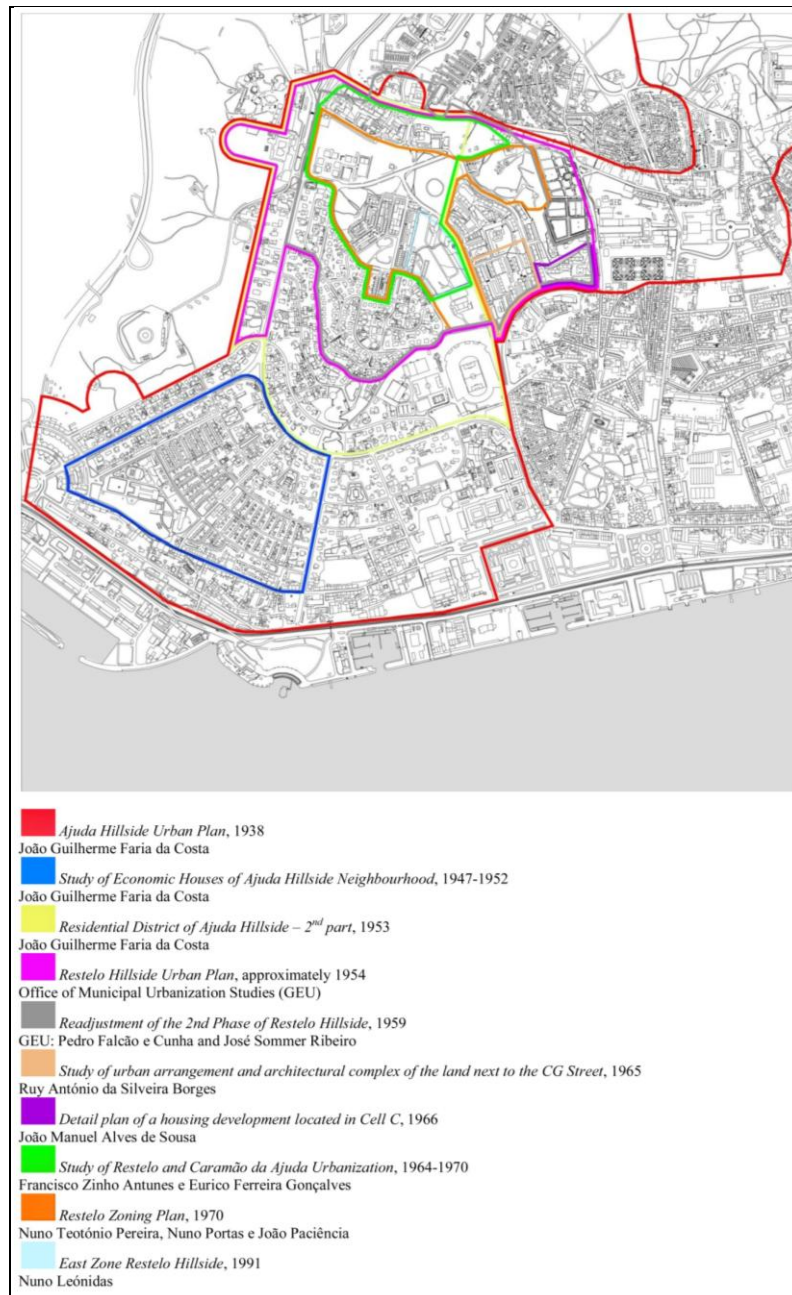





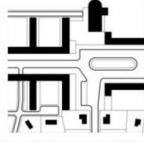

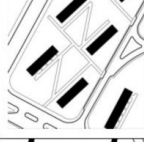
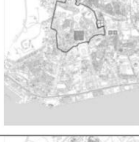


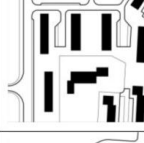



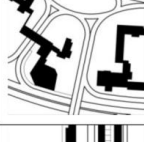

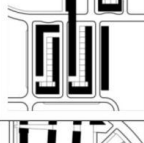

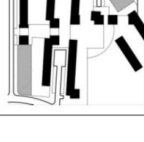


Figure 1. Restelo neighbourhood: overlapping of urban plans. (source: Patrícia Bento d’Almeida).

Table 1. Urban Forms in Ajuda Hillside/Restelo. (source: Patrícia Bento d'Almeida).

MAYOR OF LISBON	MINISTER OF PUBLIC WORKS	URBAN PLANNER	YEAR OF PLAN	URBAN PLAN	FRAMEWORK MAP	DETAIL OF URBAN FORM
D. Pacheco	D. Pacheco	J.G. Faria da Costa	1938	<i>Ajuda Hillside Urban Plan</i>		
A. Salvação Barreto	J.F. Ulrich	J.G. Faria da Costa	1947-1952	<i>Study of Economic Houses of Ajuda Hillside Neighbourhood</i>		
A. Salvação Barreto	J.F. Ulrich	J.G. Faria da Costa	1953	<i>Residential District of Ajuda Hillside – 2nd part</i>		
A. Salvação Barreto	E. Arantes e Oliveira	Office of Municipal Urbanization Studies (GEU)	approximately 1954	<i>Restelo Hillside Urban Plan</i>		
A. França Borges	E. Arantes e Oliveira	GEU: P. Falcão e Cunha and J. Sommer Ribeiro	1959	<i>Readjustment of the 2nd Phase of Restelo Hillside</i>		
A. França Borges	E. Arantes e Oliveira	R.A. Silveira Borges	1965	<i>Study of urban arrangement and architectural complex of the land next to the CG Street</i>		
A. França Borges	E. Arantes e Oliveira	M. Alves de Sousa	1966	Detail plan of a housing development located in Cell C		
A. França Borges	E. Arantes e Oliveira	F. Zinho Antunes and E. Ferreira Gonçalves	1964-1970	<i>Study of Restelo and Caramão da Ajuda Urbanization</i>		
F. Santos e Castro	R. Alves da Silva Sanches	N. Teotónio Pereira, N. Portas, J. Paciência	1970	<i>Restelo Zoning Plan</i>		
J. Sampaio	J. Martins Ferreira do Amaral	N. Leônidas	1991	<i>East Zone Restelo Hillside</i>		

Conclusions

From the selected proposal in contest, the “Slope of the Monastery” (“Encosta do Mosteiro”) was built. Because the basic characteristics of the “Restelo Zoning Plan” were not ensured, the

architect Nuno Teotónio Pereira criticized the urban intervention on an article to be published in the 35th EPUL anniversary (Pereira, 2006). Presently, still to urbanise, are some plots called “High Restelo” (“Alto do Restelo”) and “Embassies Plot” (“Terreno das Embaixadas”). This means that the passage of a dozen presidents by the Municipality of Lisbon was not yet sufficient to terminate the development of this urban agglomeration. It is with difficulty that we recognise this part of the city as a neighbourhood because the equipments that should give to this place some autonomy were not built. We have seen that since the late '30s until now the change of leadership also meant the changing of the "urban-planner" responsible for the Restelo planning. To define areas of the capital expansion the engineer Duarte Pacheco appealed to an urban-planner and a single urban plan was developed to create a distinct elite residential area. The leaders that succeeded in the Municipality and in the Ministry of Public Works requested the collaboration of other professionals to respond to the needs of the moment. Each professional did not take into account the previously developed plans, but saw them as a condition. Each architect will give effect to a particular urban form in his design area. Thus, by way of example in the city of Lisbon, the urban agglomeration of Restelo is the result of an overlap of urban forms (see table 1).

Acknowledgments

The present work benefited from the input of Margarida Acciaiuoli and Michel Toussaint Alves Pereira, who were the supervisors of the PhD thesis research that conducted to this paper (d'Almeida, 2013).

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Utopia and reality: from Etienne de Gröer to the late 20th century. Évora, Portugal

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Abstract. *The origin of Évora dates back a few millennia, and this fact caused successive urban forms that were diachronically adapting to the needs of a very diverse sum of generations. The walled city lies consolidated since the late fifteenth century, and integrated in the 40s of last century the first Urban Plan of the city written by Étienne de Gröer. This plan and the sequential integrated a spatial structure based on urban axes dating back to the Roman Cardus and Decumanus in the Roman times. These urban axes determined by redrafting the insertion of new pro-active roles in the case of pre-existing axes. The formation of new urban fabric took place with the creation of new axes, obtained at the cost of drastic demolitions in the dense and consolidated hull. New urban centres were created extramural opposing the proposal made by de Groër who advocated the establishment of a city walled garden surrounding the nucleus.*

Key Words: Urban plan, urban development, axes.

Introduction

Étienne de Gröer ⁷¹ preliminary urbanization plan of the city of Évora

The preliminary urbanization plan, designed by the architect – urban planner Étienne de Gröer prepared to Évora, which had its beginnings in 1942, was approved by the Town Hall in 1945 and sanctioned by the government two years later. There de Gröer proposed different types of interventions for different urban scenarios:

Walled city area – is an area consisting of buildings of various kinds, and that over the centuries has undergone a process of gradual consolidation. The author advocated the natural continuation of its densification, the reformulation of some not very dense urban fabric as well

⁷¹ Étienne de Gröer was born in Warsaw in 1882. He obtained his degree in Architecture from the Imperial Academy of Fine Arts in St. Petersburg. About 1920 he moved to France where he collaborated on numerous development urbanization plans and in various cities. In 1936 he was naturalized French and joined the Institute of Urbanism of Paris, where as a lecturer was responsible for the subject area where it was taught the principles of the garden city. Later, in the 1930s and 1940s, he, with the architects Donat-Alfred Crouch and Luigi Dodi, was invited by Duarte Pacheco to make development urbanization plans in various cities in Portugal, introducing the new urban principles that then were in force in Europe, of which we can underline the concept of the garden city that had been set by Howard Ebenezer. He became one of the main planners of the new State, being in charge of the preparation of preliminary plans or land development plans of various cities that stand out among other: Abrantes, Setúbal, Beja, Braga, Coimbra, Évora, Luanda, Sintra and Costa do Sol, with the guiding principles that governed, aiming to preserve the historic center and consider the expansion of cities, simultaneously reserving areas for essential economic activities.

as the opening of some streets which would take the appropriate requirements of the new era introducing transverse profiles, enabling a road traffic that he anticipated as rather heavy⁷².

The constitution of such axes of movement, inside the walled city space, would allowed the constructive reinforcement along their paths, according to the author, and create a more intense and adequate urban image to the demands of the new times.

The fact that such pathways strategically crossing the urban fabric, through its main centres of city life and simultaneously connecting with existing doors in the surrounding wall allowed the union between interior and exterior as well as easier access by the people that would live there and of course also a greater enjoyment by living of all the urban space .

At the inner urban space of the walled city the typology for built solutions focused essentially in continuous urban facades. Those buildings were broadened mostly by the scrapping of old hull built. Such proposals for interventions were focused on private property intended to be implemented individually by their respective owners.

In the interstitial spaces between the walled area and the new urban area surrounding the walls were provided by equipment areas, in key points, for use by residents in both areas. Such equipment was essentially schools and markets. These would have to ensure not only pedestrian access for the resident populations in its area of influence but also effective response to the distant residential areas: to this end, these spaces must always be located along the structural axis, close to the main gates of the ancient city and they should be located or from inside or immediately in the surrounding area and should also having parking areas next to them.

The new urban perimeter surrounding the city walls

Outside the entire walled urban space, that at that time was still very little occupied, de Groër proposed the construction of a new urban area⁷³ with characteristics of “garden city” surrounding the limited ancient core of the metropolis to the existing date by creating a kind of a “lung” (Brito, V., Ferreira, CT 2007) that would allow a better environmental quality⁷⁴.

⁷² The proposal to open an internal circular to Praça do Giraldo that encircling the south, the road traffic diverted allowing greater enjoyment of the space by pedestrians. This proposal, however, planned the demolition of large urban continuous long established and notorious asset value whereas its densification occurred until the fifteenth century. As for the space formerly occupied by the old monastery of Sta. Catarina, now demolished, it would be aimed at building a central hub of public transport.

⁷³ The preliminary plan of Étienne de Groër had in its genesis a new technique of urban planning based on demographic projections and integrating economic analysis. It also included zoning (advocated by Le Corbusier and the set of technicians who had been in the genesis of the Charter of Athens – reflecting his knowledge of what was happening in Europe both in the urban and architectural level) and new forms and urban programs. The preliminary plan is still held by the CME, and is composed by four plants referring to: “Plan de zones schema des grandes voies” dated 1942; “Anteplano (preliminary plan)” dated 1945; two undated drawings: one referred to as “zone plan” and the latter as “Plant of presentation.” Charter of Athens, Athens Charter about Modern Urbanism – Athens 1933 this IV International Congress of Modern Architecture, resulted in a letter which was defined as the criteria of modern urbanism.

⁷⁴ To be noted that for the city of Lisbon: “From Groër defends containment of urban development through the establishment of a green belt, called rural protection area, with an average width of 3 km. The main objective of the green belt would be to provide the city with a permanent reserve of fresh air, and in second place, isolated from the surrounding urban formations and prevent melting with these” Brito, Vasco; Camarinhas, Catarina Teles Ferreira, “Elementos para o estudo do plano de urbanização da cidade de Lisboa (1938), Cadernos do Arquivo Municipal, Direcção Municipal de Cultura/Departamento de Bibliotecas e Arquivos/Arquivo Municipal de Lisboa, n.º 9, 2007, pp. 182-183; see also Simplício, Maria Domingas V. M., *Evolução da Estrutura Urbana de Évora: o Século XX e a transição para o Século XXI*, where on p. 4 it reads: “The growth of extramural urban area was, however, very slow until 1940. A map dated 1930 points just beyond the presence of the aforementioned wards, all of them very small in size and located near the intramural city, small parts of the wards of Chafariz d' El Rei and Almeirim and the principle of the Poço Entre as Vinhas (now Bairro da Sª da Saúde)”.

In planned urban space, the building typology proposed consisted of detached, semi-detached or isolated dwellings, where free private land contributed to the creation of a continuous green environment for the entire rural surrounding area (Simplicio, M. D. V. M., 2009). According to the areas of each of the respective batches were allowed constructions and those contributed to the distribution of socio economic hierarchy of the future population that would reside in the area. Some wards have social housing such as the Bairro da Câmara where the buildings are located in twinned lots although had building areas and compartments of diminutive dimensions ensuring reduced costs.

Some of the lots in the new area to urbanize consisted at that time by rural land for which de Groër advocated different urban typologies that actually were informally constituted. Such plots were subdivided into parcels described as “avos” usually “sold” at low cost, or even donated, by the owners of the estates to rural workers of its land thus creating subtle ties of dependence because those “plots” were still legally belonging to their rightful owners despite sometimes these workers have been building their houses on those lands. We may refer as examples of these wards Almeirim (east of the metropolis), Bacêlo, Coronheira, Granito (located north of the city), and Casinha (located in the west of the city). These cadastral underlying situations were not considerate when de Groër plan was developed and approved (Carvalho, J., 1990).

Present

Having this as a groundwork plan, and after successive urbanization plans that introduced updates resulting from new requirements we came into this reality as one can see is substantially different from that recommended by de Groër proposal in the 40s of XX century.

Walled city area – for the space in question, de Groër opted for the maintenance of the medieval urban fabric without significant interventions (one of the principles advocated by de Groër in urbanization plans in which he participated) that nothing could jeopardize the unity of urban space. The rehabilitation of the buildings was aspirated, though not a fully realized goal. The private property being in possession of more than one owner, due to successive inheritances, substantially delayed this aspiration yielding properties and punctually kept them up slightly degraded. The level of outstanding public spaces interventions were being carried out in the most emblematic squares of the metropolis. In the buried infrastructure existed special care in replacing it considering its age and current requirements in particular with regard to the water, sewer, gas and optic fiber.

In more recent times the decrease of economic power or the population either of the Town Hall or the housing cooperatives, contributed to the decrease of urban interventions of social nature. Alternatively housing cooperatives triggered more targeted interventions to classes of larger economic power by tampering with the original spirit of intervention programs and being example the allotment of CTT (Correios de Portugal) situated in the walled interior.

The installation of hotel properties located within the historic center, or in large spaces still vacant as was the case for example of the Hotel Mar de Ar Wall built in the old Quinta da Palmeira, or even reusing old buildings such as the Hotel Mar de Ar aqueduct installed in the Palácio dos Sepúlvedas that was adopted for the new requirements resulting of the observed from the growing tourist demand.

New urban perimeter surrounding the city walls – Urban space delimited by increasing and actualization of urbanization plans was structured by building a set of streets, some of radial nature, other circulars that allow the interconnection of various districts scattered throughout the area surrounding the historic centre. It should be noted that part of this road structure has not been fully realized for various reasons.

Regarding to the housing typology, mainly directed to the lower classes, there were promoted by the state, social housing developments built vertically countering all the original spirit of the 40s. That was the case of the development of the Cruz da Picada (located to the west of the city) the largest urban complex built vertically for social rental which projective

features had not appropriate social and cultural characteristics for the population that would inhabit it. Concerning private projects there were implemented with some brands of typologies features of single-family, semi-detached dwellings or individual, as the wards of Tapada and Vista Alegre, and dated to the mid-twentieth century being located to the west of the city (Carvalho, J., 1990).

However, all the vast space surrounding the city walls was increasingly taken over by new illegal wards that after April 1974 were successively converted and legalized through municipal lots or detailed plans (Carvalho, J., 1990).

Later, in the 80s of the twentieth century, the Tapada and Vista Alegre as they were already sold out at the level of building plots, there were provided the triggering of a new process of subdivision with identical and temporally characteristics adapted to new generations yielding characteristics the allotment of Vila Lusitano situated to the west of the city.

It was however at the level of C.M.E. (Town Hall of Évora) and of the housing cooperatives that much of the surrounding area was built through the creation of lots intended for housing at controlled costs that, in some individual cases, came to take on the characteristics of evolutionary housing, as exemplified by the case of Malagueira (to the west of the city), some lots in Granito Centro and Bacêlo (both to the north of the city). Among the various operations of the allotments with controlled costs⁷⁵ as we can mention the example of Malagueira, António Sérgio, Casinha and Alto dos Cucos (all to the west of the city) and Granite Centre among others (Carvalho, J., 1990). These are some examples that ensured a cohesive and quality architecture and urbanism greatly due to the conditions that such types of programs demanded from their promoters.⁷⁶

After nearly seven decades passed between the proposed by de Groër's preliminary plan, and through the development and implementation of various development schemes and detailed plans that sought to resolve the problem posed by the existence of many illegal housing units genesis dispersed and separated the walled core.

With current legalization, infrastructures and densification has been a challenge only in part outdated. Its relationship with the historic centre by the solution of building urban axes was increased by its integration as it would be an effective and inexpensive method of obtaining continuous urban image over long distances.

Similar increase of the urban area through private initiatives significantly widened, though accomplished through a whole set of new illegal buildings consisting of “lots” of large dimensions – the so-called “small farms” – coming again hamper the treatment of space, making the hybrid relationship between urban and rural. It will be an overview that new decades and new generations will have to equate making the reality of today in utopia of tomorrow.

With regard to collective facilities scheduled on the edge of the urban area they were located according to the growth of housing units in development, emphasizing schools, on their various levels of education, parish councils, sports amenities and cultural facilities among others, day-care centres and the construction of a new cemetery thereby responding to the substantial increase in estimated population.

⁷⁵ The quality of construction remained that finishes being made with less expensive materials allow smaller final costs. We must mention the existence of financing contracts by the INH (Instituto Nacional de Habitação) and where the municipality also actively participated with the transfer of land at low cost in exchange for getting some infrastructures to be allocated to the poorest households, for social renting, or even self-lots in the case of individual batches.

⁷⁶ It was required that the project should be prepared by architects, with special attention to integration in the urban fabric.

Conclusions

Overall, from what was proposed in the de Groër's preliminary plan, some of the recommended solutions have been implemented, such as plots of residential areas being the example of Bairro da Câmara, and Bairro da Tapada.

Regarding the proposed road system, many of the main roads have suffered notable adjustments in terms of location and route. The cross sections also suffered adjustments resulting from the new urban concepts.

The proposed architectural typologies, with detached single family dwelling remained in some cases. With the introduction of new social concerns due to the Revolução de Abril, pilot experiences were introduced, such as the case of the Bairro da Malagueira, where it was achieved a high constructive density with single-family residential lots. Another way of trying to address the problem of housing shortage was completed in the Bairro da Cruz da Picada, state initiative to social renting, using a project type of housing in height, which was implemented in cities across the country.

As for equipment, the proposal for a central trucking zone adjacent to the Praça do Giraldo was relocated in Rua da República, inside the Old town, and was later built on the municipal lands adjacent to the Cemitério dos Remédios.

The construction of a Municipal Market proposed for the Portas de Alconchel, was relocated with a much wider dimension as a supply market of the entire region, close to Bairro de S. José da Ponte.

The utopia proposed by de Groër's preliminary plan was completed in a substantially differential way due to the natural socio-economic development of a society that has undergone significant structural changes due to very profound political changes that have altered the existing paradigm.

The new political paradigm allowed new urban experiences, some of which exemplary, as the case of Bairro da Malagueira.

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Figure 1. Évora. Urbanization plan of de Groër – 1945.



Figure 2. Évora. Urban area in 2014 (Source: Google Earth).

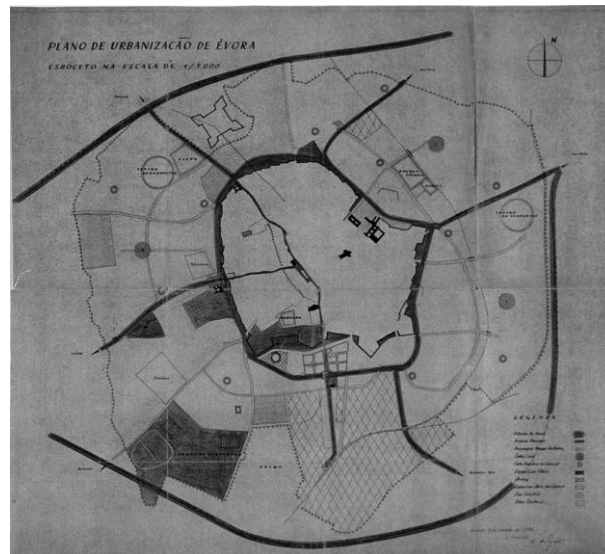


Figure 3. Évora. Urbanization plan of de Groër. Road structure. 1945.



Figure 4. Évora. Urbanization plan of de Groër. Type of housing proposed. Bairro da Câmara.



Figure 5. Évora. Bairro da Câmara. Present days (Source: Google Earth).



Figure 6. Évora. Urbanization plan of de Groër. Collective facilities.



Figure7. Évora. Hotel unit in the intended location of the market (Source: Google Earth).



Figure 8. Évora. Urbanization plan of de Groër. Proposed new residential areas.



**Figure 9. Évora. Urbanization plan of de Groër. Proposed new residential areas.
Bairros da Tapada e Vista Alegre.**



Figure 10. Évora. Bairro da Malagueira (Source: Google Earth).



Figure 11. Évora. Bairro da Cruz da Picada (Source: Google Earth).



Figure 12. Évora. Location of supply market (Source: Google Earth).



Figure 13. Évora. Circular roads that were built (Source: Google Earth).

Campo Alegre: the evolution and persistence of a territorial intent

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Abstract. *The decision to construct the Arrábida Bridge, induced the need to rethink the area of Campo Alegre (Porto) which led to the conceiving of the “Urbanization Plan of Campo Alegre – Future Entrance to the City by the Arrábida Bridge”, rendered by Januário Godinho. Campo Alegre had been, until that time, characterized as a set of private gardens that structured a Romantic landscape. The conceived Plan renders its transformation proposing a new collective open space linked with those existing to form a co-ordinated public park related to the new road system and the new proposed building ensembles. With this design Januário Godinho interprets Campo Alegre’s essence through understanding the environmental character of the place in a contemporary way.*

Key Words: place, garden; park, Porto, Januário Godinho

Premise

The object of this paper is the “*Urbanization Plan of Campo Alegre* [Merry Field] – *Future Entrance to the City by the Arrábida Bridge*”, commissioned by the Municipality of Porto and designed by the architect Januário Godinho (1910-1990), between 1951 and 1955.

In the wide range of different studies about Porto or the professional practice of Januário Godinho there are few that investigate specifically this Plan. Until today, the only identified pertinent reference is “*Campo Alegre: from the New City to the University*” (Guedes, 1995).

This magazine article focuses on the Plan mainly through “*Reports and Management Accounts*” of the Municipality of Porto (1954, 1956-59). It summarizes, without deeper study, some implementation issues associated to the Plan: the State and Municipality responsibilities; the affected University properties; the land expropriation process and the University facilities proposal for the area.

The article also addresses the Plan as a transforming action of Campo Alegre’s form and through this point of view, we might interpret the following: i) the exclusive responsibility of the local planning authority for the proposal, enframated by the City Plan: “*Plano Regulador da Cidade do Porto*”, developed by the engineer Antão de Almeida Garrett and approved in 1952; ii) the resolution of the entrance of Porto by Arrábida Bridge and its surrounding urban areas as the Plan’s main objective; iii) the change in land ownership, from private to public domain as the main design premise; iv) the consequences of the partial implementation of the Plan, execution of the first phase only, which corresponds currently to the major road system (Figures 1 and 2).

Therefore, recognizing the significance of this Plan in the current definition of Campo Alegre’s urban form, this paper aims to deepen its understanding. The interpretation presented is concerned essentially with the relationship between the Plan and the territory to which it was conceived. We propose to demonstrate that, despite the Plan’s intent to radically alter Campo Alegre, in its transformation, some of the the main features of the place still persist, even though its form may change.

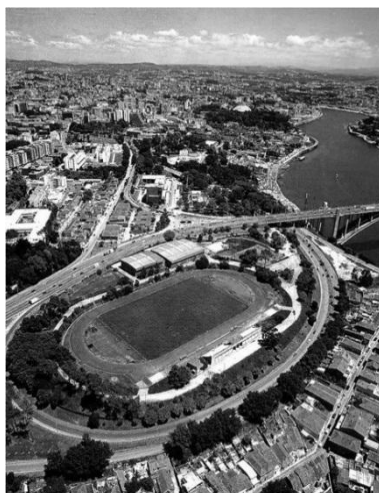


Figure 1. Campo Alegre, 21st century (source: *O Porto visto do céu*, 2000).



Figure 2. Campo Alegre, 21st century (source: *O Porto visto do céu*, 2000).

Urbanization Plan

Since the intent of a new crossing over Douro River and the consequent setting of the Arrábida Bridge was officially proposed (1945), the design of the new road network and the urbanization of Campo Alegre, became a major issue for the Municipality.

These studies were the responsibility of the local planning authority. However, the non-exclusive dedication of the municipal services to this plan compromised a comprehensive and global solution (*Contrato*, 1951), worthy of approval.

In 1949, with the completion of the urban plans for the territory on the south end of the Bridge (Vila Nova de Gaia), the conclusion of the studies for Campo Alegre became most urgent.

The minister of Public Works and Communications, Frederico Ulrich (1947-54) had suggested hiring an architect from outside the local planning authority to conclude the studies for Campo Alegre. On one of his visits to Porto, with the purpose to analyze the activity of the local planning authority, the Minister recommends Faria da Costa (Távora, 1949) who was, at that moment, the most qualified architect from local planning authority of Lisbon (Lôbo, 1995).

Subsequently to the suggestion of the Minister and the positive assessment for the construction of Arrábida Bridge, from the Superior Council for Public Works and Communications, in 1950/51 (Cruz, 2001), the Municipality of Porto invites Januário Godinho, one of Porto's architects also recognized by its urban practice, to develop the Urbanization Plan for Campo Alegre (*Contrato*, 1951).

The invitation was addressed to Januário Godinho in 1949/50; with the main terms of the contract presented in 1951 and the work beginning in 1952.

When Januário Godinho started Campo Alegre's Plan, he was 42 years old, had completed 2 decades ago the Course of Architecture at the School of Fine Arts of Porto; and for nine years had developed plans for the urbanization of cities in the north of Portugal. His name was on the list of architects qualified to work in urban planning by the National Buildings and Monuments Committee, although he had no specific studies in town planning (Lôbo, 1995).

The State considered Januário Godinho an expert in solving problems such as the ones in Campo Alegre – 'the government had great consideration for the way he had solved the urban planning tasks he had been entrusted with' (*Contrato*, 1951).

According to the contract for the Urbanization Plan, Januário Godinho would submit to the Municipality of Porto, first a Preliminary Project and then the Definitive Plan.

The first was intended to provide advance knowledge about the way the theme was to be interpreted, to outline the adopted design and the guidelines for the Definitive Plan. The second was intended to develop, describe and regulate, with detail and accuracy, the approved Preliminary Project so that there would be no doubt when its implementation would occur (*Contrato*, 1951).

Januário Godinho presents the Preliminary Project for Campo Alegre on August 1954 (Figure 3). The study was approved by the local planning authority, the National Road Authority and the Minister for Planning and Territorial Administration (*Parecer*, 1954; *Informação*, 1954). In its report, the National Road Authority takes the responsibility for the construction of the road that, through the Arrábida Bridge, would connect Porto with the coastal cities north and south, thus, becoming part of the national motorway network (*Informação*, 1954).

With the approval of the Preliminary Project by the committees, on July 1955, Januário Godinho presented the Definitive Plan (Figure 4) and its economic study (Guedes, 1995). During the presentation he defined the intent of his proposal as a "piece of architecture" (Távora, 1995) for Campo Alegre which would be approved by the local and national authorities.

In the following years, Januário Godinho would issue technical reports on solicited changes to the Plan, presented by the responsible authorities (*Parecer*, 1957; *Informação*, no date) and would study its reformulation in order to integrate a set of University amenities (*Programa*, 1957).

In 1956, the construction of the Arrábida Bridge triggers the expropriation procedure of private terrains for the implementation of the first phase of the Plan – the major road network (Guedes, 1995).

The procedure was prolonged and complex (Guedes, 1995), in a way that calls into question the fulfillment of the other planned phases. Consequently the implementation of the Plan was never completed.

The execution of the Plan's first phase did not solve the pressing urban issues present in Campo Alegre. Therefore, they remained an important topic of Porto's future planning. Years later, the "Plano Director da Cidade do Porto", coordinated by the architect-urbanist Robert Auzelle, between 1958 and 1962, will once again study the urbanization of Campo Alegre.

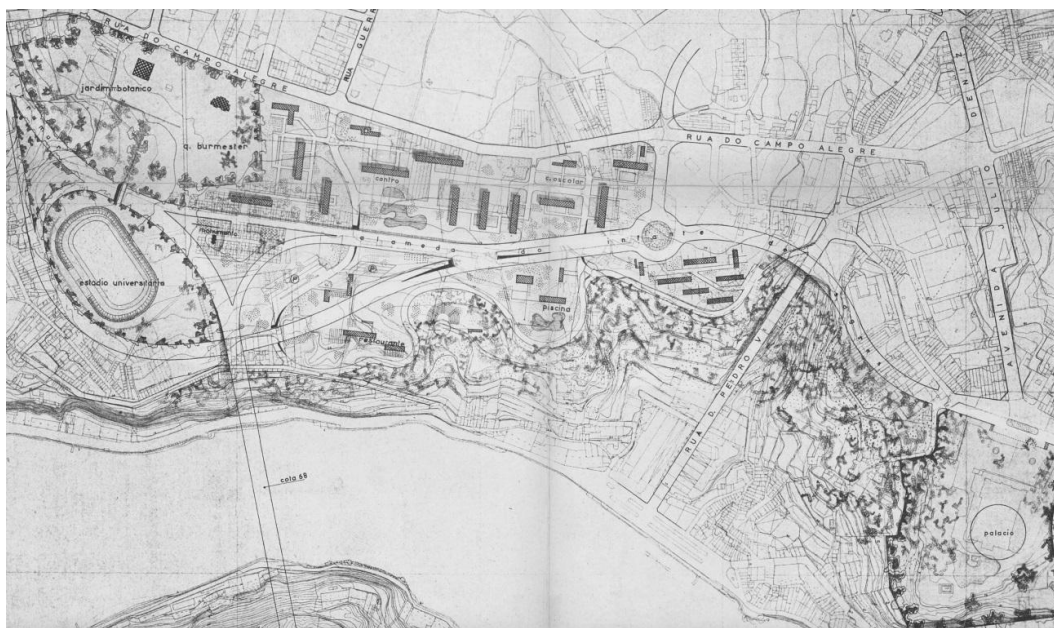


Figure 3. Preliminary Project (*Esboceto-Programa*, 1954).



Figure 4. Definitive Plan (Oliveira, 1969).

Place: a sum of private garden plots

The Urbanization Plan for Campo Alegre included two distinct areas of action inscribed in each other: one extensive regulated by general principles of urbanization and the other, smaller in size and inscribed, where the Plan proposed a “complete and radical system of urbanization” (*Plano*, 1955). This area, with deeper development, corresponded to Campo Alegre – considered by Januario Godinho as “a privileged territory” that “the new bridge over the Douro River and the associated road network, would certainly change completely” (*Plano*, 1955).

Campo Alegre’s site corresponds to the cliff on Douro’s riverbank, located at the point where the distance between the River’s margins decreases, just before the River’s mouth.

The area of the territory studied by the Plan is larger than 75 ha, facing the River over more than 1500 m. The boundaries are defined by Campo Alegre Street in the north, Douro River in

the south, Cristal Palace Garden (1865) in the east, and, in the west, the Botanical Garden (1875).

The general configuration of the site alludes to a polygon comprised of a convex section with a pronounced curve southwest and a sequence of ledges, facing the River that characterizes its perimeter to the east.

Campo Alegre is composed by two different topographical forms: the plateau, located at the top of the cliff, between 75 and 60 m; and the steep slope, between 60 and 0 m, accompanying the course of the River. In the south-west, this slope is characterized by a rocky mass and in the south-east, it is shaped by a sequence of natural terraces.

In 1952, the area of Campo Alegre was at the outer limits of the main urban areas, between the City center, at less than 2 Km, and the communities near the seaside.

Both the Campo Alegre Street, at the level of the plateau, and the road near the waterfront established important communication connections between these urban areas reinforced by public transportation (tram and bus) that also circulated through these routes.

In general, the land division in Campo Alegre presented a rural pattern. The territory was divided into large plots, organized in a system ingrained in Campo Alegre Street and on some ancient milestones; this system interpreted the local topography (Ramos, 2013).

In certain parts of Campo Alegre this rural pattern had turned into an urban one, namely with Campo Alegre Street, Entre-Campos Street and in the Arrábida Neighborhood.

Along Campo Alegre Street, some rural plots had been divided into new lengthy and narrow urban parcels, perpendicular to the street with a constant front dimension.

Entre-Campos Street was outlined through rural plots, by a group of local owners who proposed to transform their farming land into urban parcels where, years later, the State/Municipality constructed semi-detached and terraced low cost housing (Colônia Operária Viterbo Campos, 1915; Bairro Sidônio Pais, 1918-20, 1922-23).

Complementarily, near to an important industrial area at the time (Lordelo do Ouro), and very close to the rocky-mass, but away from the riverside, a working-class neighborhood, consisting of terraced housing, was being constructed - the Arrábida Neighborhood.

The population density, in average, was low hence Campo Alegre was a sparsely populated area due to the fact that building concentration existed only where the field system had been updated, while in the other areas, the buildings were detached and dispersed.

Campo Alegre was punctuated by poor and ephemeral constructions, to support agricultural and gardening practices, camouflaged in the landscape, and by a group of small palaces, disengaged from the rural surroundings.

In the 19th century, Campo Alegre was a place of sublime nature and picturesque qualities, where many foreign families of merchants and industrialists – including English, Danish and German – cultivated a Romantic lifestyle.

These families built their small palaces and gardens, with exquisite greenhouses, in existing rural plots. Many of the gardens, apart from native vegetation, contained special plant collections from all over the world, namely big trees which formed luxurious arboreal masses. These estates were: Casa Andresen, Casa Burmester, Casa Primo Madeira, Quinta da Esperança, and Casa do Gólgota.

Casa Andresen was purchased by the State in 1950/51 with the purpose to create a Botanical Garden (1951), a University Stadium (1951-53) and a series of residential and functional buildings for the University. Casa Burmester was also handed by the State to the University (1957) as compensation for the area reduction of the Botanical Garden, motivated by the necessity to construct the new road network associated with the Arrábida Bridge.

Therefore, in 1952, Campo Alegre was a huge greenery, composed of a series of private gardens between the Cristal Palace Garden and Botanical Garden. Campo Alegre's landscape was characterized by the estates of the small palaces, clashing with the low cost neighborhoods, the vast plateau, the steep rocky mass and the sequence of natural terraces, all largely cultivated and strongly arborized.

Through this territory, the Arrábida Bridge, as the second car crossing to be built in the City, would link the major coastline cities north and south of the Douro, transforming Campo Alegre not only into a new entrance of Porto, but also into a forced passage point for the main national highway.

Under these circumstances, the “Plano Regulador” (Figure 5), which summarizes the previous studies “Ante Projecto das Comunicações Regionais do Porto” (1945), “Ante Plano Regional da Cidade do Porto” (1946), and “Plano Geral de Urbanização da Cidade do Porto” (1947/48), all rendered by the local planning authority, programmed the City expansion for Campo Alegre in the following way (Garrett, 1952): i) identified existing public or private open spaces and defined them as being of public interest – the Cristal Palace Public Garden and the Botanical Garden; Casa Burmester Garden and some estates on the steep slope, namely, Quinta da Esperança and Casa do Gólgota gardens; ii) defined the traffic facilities in Campo Alegre, associated with Arrábida Bridge; iii) suggested the construction of a residential zone, where non residential buildings were only admitted in specific areas.

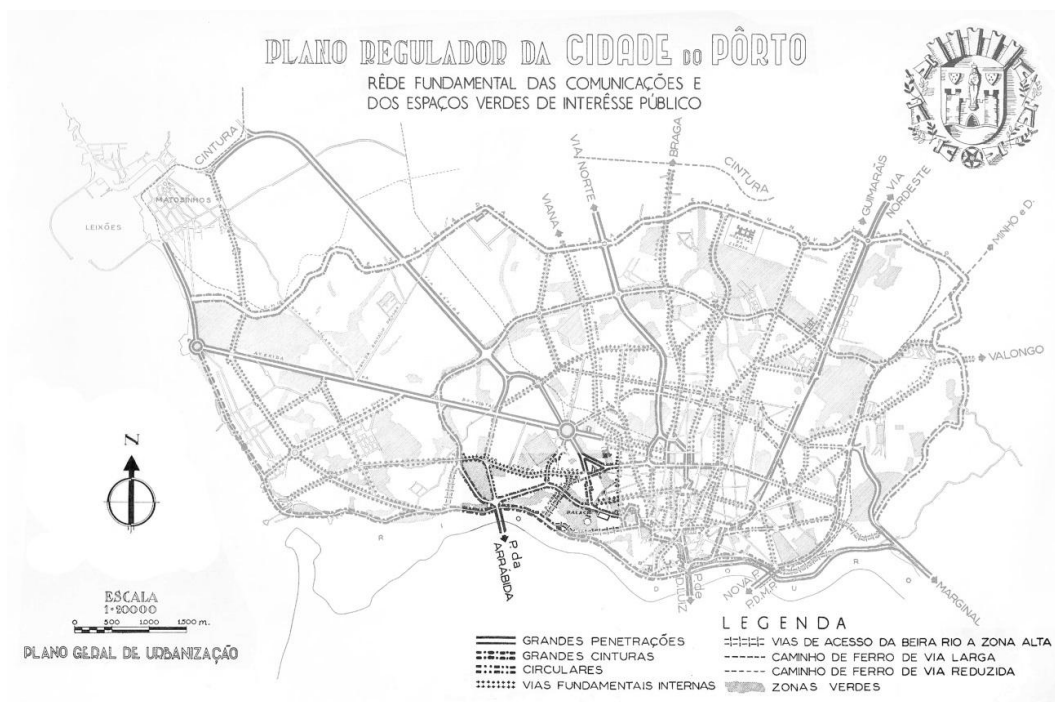


Figure 5. “Plano Regulador”: the proposed roadway network and the open spaces of public interest (Garrett, 1952).

Intent: a co-ordinated public park

The territory between the Cristal Palace Public Garden and the Botanical Garden was for Januário Godinho “of the greatest difficulty, in all aspects, due to constrains of all kind, consummated facts, that by a singular coincidence seemed to have met in order to render useless a rare opportunity for the future of Porto” (Plano, 1995). These restrains were: the rugged terrain; the open spaces of public interest; the location of Arrábida Bridge; the low cost housing ensembles; the commitments between the State and the University; the importance of the programmed road network; and the symbolic significance of the planned urban landscape – a fresh new image of Porto.

On this complex territory, Januário Godinho starts with the observation of Campo Alegre from the opposite riverside which would become one of the main viewpoints of Campo Alegre

after the construction of the Arrábida Bridge. From Vila Nova de Gaia, Januário Godinho might have read Campo Alegre as a sum of private garden plots. Through balancing this specific quality of Campo Alegre with the conditions present in “Plano Regulador”, Januário Godinho proposes the implementation of a co-ordinated public park, related to the new road system and the planned building ensembles.

Greenery

In the first drawings, Januário Godinho renders Campo Alegre as the “south park of the City” (*Plano*, no date). He foresees the entire territory coated with vegetation and restricts the construction areas to Campo Alegre Street and the surroundings of the University Stadium.

The proposal rendered buildings as elongated rectangles organized in a straight line, perpendicular to the river front, in an equally spaced layout. Taking into account this distributional pattern the scheme might have been organized with high-rise buildings attributing to Campo Alegre a closed architectural image of compacted vertical masses sited in an immense greenery, through which the major road network would be designed.

In the subsequent studies of this Plan, there was a progressive increase of the built area with consequent reduction of the open public space.

The main aim of “Plano Regulador” was to implement a residential area in Campo Alegre and although it pointed out some open spaces of public interest, the design did not include an open area of greenery, where anybody can go to walk, play, etc.

Therefore, this increase in density may reflect a gradual adjustment of the proposal to the “Plano Regulador” guidelines and/or a response to the financial burden that the implementation of the Plan implied for the Municipality (*Plano*, 1955). The draught of Januário Godinho required a global land expropriation which meant a huge investment of municipal funds that would need an equity return, incentivizing higher construction density.

However, even with considerable differences in land use between the diverse versions of the Plan, Januário Godinho never once deviated from his co-ordinated public park premise – the open space always dominated the constructed area.

The Plan stipulated that the construction of residential buildings, sponsored by private stakeholders, would be permitted only within the defined polygon according to the strict Municipality regulation. Apart from the building polygons all the remaining areas were defined as greenery for public use (*Esboço*, 1954).

In the words of Januário Godinho: “the overview [of Campo Alegre] will be a curtain of greenery, revealing by transparency various kinds of architectural elements. The entrance of the City will therefore feature a wide and majestic balcony projected over the river, overlooking the sea” (*Esboço*, 1954).

Traffic Intersection

Januário Godinho designed the road network at the exit of Arrábida Bridge based on the directives of the “Plano Regulador”. The proposed road network establishes the connections between the points referenced in the City Plan. However, the solution in Campo Alegre’s Plan deviates from that of the “Plano Regulador” in the way it solves the different traffic intersections.

The “Plano Regulador” stipulated from the Arrábida Bridge three road networks (Garrett, 1952): “Ultramar Avenue”, the western section of the City’s ring road, connecting the north of the country; the “new Avenue”, an extension from the Bridge to the North, connecting the City’s seaport; and “Infante de Sagres Avenue”, the eastern section of the City’s ring road, connecting the center of Porto. The “Ultramar Avenue” and “Infante de Sagres Avenue” were designed in continuity as a single gesture.

To design the intersection of the different road networks, Januário Godinho proposes a solution with the most modern research on traffic layouts; these schemes, which included

Spanish and Dutch press clippings about Detroit and Ohio intersections, were part of the Plan's study process.

According to the "Ante Plano Regional da Cidade do Porto" the road network in Campo Alegre should be extremely efficient – saving time, energy and money; allowing maximum performance in speed and traffic flow; improving the traffic circulation (*Anteplano*, 1946).

Therefore, Januário Godinho segregates the fast long-distance traffic from traffic of purely local nature. He seeks to eliminate intersections providing uninterrupted traffic flow by: always favoring intersections at different levels between main and secondary roads; only allowing the contact between them in specific designated points; and avoiding construction along the fast long-distance network (*Esboçeto*, 1954).

Based on these assumptions, the Plan proposed the following deviations from the scheme outlined by "Plano Regulador": i) canceled the "new Avenue" – Januário Godinho verified that the proposed road would create various intersections, something he intended to prevent (*Esboçeto*, 1954); ii) changed the type of traffic intersection at the exit of Arrábida Bridge – Januário Godinho noted that the proposed roundabout solution, was unsatisfactory economically and aesthetically. It entailed the partial demolition of the University Stadium and required the construction of a high retaining wall, a "real dam between the plateau and the slope of the Douro River" (*Esboçeto*, 1954).

For the traffic intersection, Januário Godinho rendered a flyover scheme (*Esboçeto*, 1954). With this solution, he proposed to divide the "Ultramar Avenue" and "Infante de Sagres Avenue" in a system which permitted so many passageways as the route directions generated by their direct intersection. This solution, although less compact than the roundabout one, allowed to deal with the territory constraints in an "elegant way" (*Esboçeto*, 1954).

For Januário Godinho this scheme was "natural, simple, open and, as far as possible, attached to the ground, eliminating the construction of stone walls, of colossal slopes" (*Esboçeto*, 1954), or multiple and costly works of engineering, avoiding the destruction of trees, reducing to the minimum the intervention on the University grounds and the demolition of houses in Sidónio Pais and Arrábida neighborhoods (*Esboçeto*, 1954).

Januário Godinho designs this flyover intersection in the following way: "Ultramar Avenue" and "Infante de Sagres Avenue", close to Arrábida Bridge, are divided each into two branches. One of these branches incorporates the Entre-Campos Street, crossing the Sidónio Pais Neighborhood and passing north of the University Stadium. The other, interpreting the convex shape of the territory through its pronounced southwest curve, is outlined between the southern boundary of the Stadium and the Arrábida Neighborhood; disregarding the area that lies between these two branches – characterized by University Stadium, part of the Sidónio Pais Neighborhood and different road extensions – this scheme divides the territory into two parts leaving to the north, the plateau, and to the south, the slope.

Therefore, by interpreting Campo Alegre's morphology and outlining the different qualities of its major topographical forms, Januário Godinho's design clings to the terrain.

This assertion is corroborated by the way the Via Panorâmica Route was designed on the slope, replicating the movement of the 60 m contour line and dividing the territory between the "Infante de Sagres Avenue" and the Douro's riverbank in two parts: the south where the steep slope inhibits construction and the north, an area which, although on the slope, still had acceptable construction conditions.

Januário Godinho's option of not proposing a pathway across the slope, connecting the plateau with the riverbank also reinforces this observation. A pathway with this direction would hardly cling to the terrain, so he does not consider it, in his design. Alternatively, the difference in elevation between the plateau and the riverbank would be solved by the elevators that would be included in the Arrábida Bridge's project.

Buildings

In the words of Januário Godinho: “[in Campo Alegre] the system of grouping the blocks [is carried out] according to the nature of the terrain” (*Plano*, 1955).

Regardless the building’s vocation, density of construction and housing type, which varied throughout the different phases of the Plan, Januário Godinho organizes the buildings according to the following principles: on the plateau, north of the “Infante de Sagres Avenue”, the type and shape of the buildings were always identical, high-rise rectangular elongated residential blocks (8-12 floors), and its organization followed a single principle of composition with the blocks placed parallel and/or perpendicular to each other. These buildings occupied the best view and solar exposure of Campo Alegre, constituting “luxury residential units” (*Plano*, 1955); on the slope, south of “Infante de Sagres Avenue”, the type and shape of the buildings were variable and its organization resulted “disarticulated for better adjustment to the characteristics of the terrain” (*Plano*, 1955). In the Preliminary Project, Januário Godinho proposed the construction of cultural, sports and leisure facilities along the Via Panorâmica Route: a municipal swimming pool, a restaurant and an amphitheater of greenery for outdoor performances (*Esboço*, 1954). In the Definitive Plan, the margins of the Via Panorâmica Route were occupied by residential construction for the middle class with the exception of a small area designed as a center of leisure and sport. The residential buildings were planned as 4 stories high blocks (eventually 8), with different shapes in plan and associated according to different strategies, suggesting the construction of small residential ensembles with different morphological characteristics (*Plano*, 1955).

Thus, the nature of the terrain not only influences the system of grouping the blocks, but also the type and shape of the buildings and housing categories, as if Januário Godinho recognized through the nature of the terrain differentiating characteristics that influenced the buildings and, in particular, the type of residential units.

This idea is stressed in the Preliminary Project by implementing the municipal swimming pool and the restaurant in special topographical points of the territory. These public facilities were designed for the ledges that characterized the south border of Campo Alegre. Sticking out over the riverbank, the swimming pool and the restaurant would offer panoramic views over the future bridge and the Atlantic Ocean.

Purpose: a territorial interpretation

Through this current interpretation, we may synthesize the following considerations concerning the “Urbanization Plan of Campo Alegre – Future Entrance to the City by the Arrábida Bridge”: i) the general idea of Januário Godinho’s Campo Alegre, deviates from the principles established by engineer Antão de Almeida Garrett, emphasizing different disciplinary perspectives on the meaning of Campo Alegre in the City structure; ii) the Plan constitutes a singular exercise that interprets the essence of place by prolonging and underlining the features that Januário Godinho considered to be its core qualities; iii) by the proposal of a co-ordinated park, the Plan prolongs the existing dominion of luxurious arboreal masses over the constructed area that was characteristic of Campo Alegre’s setting in 1952; iv) the gardens, beforehand fields, are transformed into a greenery system, linked to the existing public gardens (the Cristal Palace Garden and the Botanical Garden) and related to the new road network and proposed building ensembles; v) the park’s design outlines the existing morphology and altimetry qualities of the territory, organizing the buildings and the major road network through their reinterpretation; vi) by the introduction of a public park theme, the Plan highlights the predisposition of Campo Alegre, through its topological and geographical qualities, to assume the special condition of a public space in the City of Porto.

These conjunctions permit the understanding of a certain architectural way to interpret the notion of place by identifying the evolution and persistence of a territorial purpose.

The Plan does not copy a model or an old solution, on the contrary, it recognizes the primary structural properties of Campo Alegre – respects its location, general spatial configuration, and its synthesized image – interpreting it in a contemporary way. Consequently, the proposed solution conserves the identity of the place emphasizing its material substance, shape, texture, and colour - its Romantic environmental character.

Therefore the Plan seems the outcome, in one hand, of the extreme attention Januário Godinho pays to the place, and on the other hand, of a sheer spatial force of Campo Alegre that guides Januário Godinho towards the accomplishment of its essence in a new historical context.

Acknowledgments

This work is within the PhD Research in Architecture, underway at the Faculty of Architecture of the University of Oporto. This dissertation is funded by Fundação para a Ciência e a Tecnologia (SFRH/BD/85547/2012).

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Is there a transversal organic pattern? Favela and its diachronic relations

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Abstract. *This paper explores Favela's spatial configuration within contemporary city searching for a diachronic relation in its complexity. And as an informal and organic space, favela must be observed by its collective emergent and spontaneous actions. It is important to understand its specific organic behavior as responsible for the inherent complexity and enormously meaningful for urban quality. To explore these similarities in organic form, a comparison is made between medieval Portuguese towns, Brazilian colonial cities, and contemporary favelas in order to infer diachronically the existence of a common configurational type. Space Syntax is the theoretical and methodological approach adopted. Findings show that favela as definition of a city space is much closely related to its configuration than with its socioeconomic status. Its organic genesis and spontaneous development are responsible for space qualities, and so, any settlement without it can't be consider similar. There is also, a transversal organicity which forbids favela to be considered an innovative (in)formal phenomenon – it takes part in the organic form genotype. The space being defined as Fractal and Synergic – internal scales relating in harmony, being complex and spontaneous – justifies its less immediate seizing but allows more intuitive use of space and more natural paths.*

Key Words: favela, organic form, spontaneity, configuration

Introduction

The present paper focus on favelas spatial configuration aiming to understand it not only as a contemporary city phenomenon, but also, as part of organic and spontaneous city form through history. It seems that favela points out an original spatial logic due to its scale in cities today. But it is intended here to explore whether it is effectively new in urban space or not, considering its informality but also its self-constructing nature.

For that reason a comparative study is conducted through this paper, in order to comprehend if informality behaves similarly in its spatial organization (if it can be named after favela all the times, as we commonly see), and if its configurational patterns are related to other self-constructed settlements. The actual planning logic frequently is far more simplifying than these complex structures, and so, already in its genesis, favela tends to be a misunderstanding complex space. Therefore the interest of this comparison and analysis is also to state what appear to be successful patterns in space when such complexity is allowed. Irregular city areas tend to gain from spontaneity what top-down (illegal) processes can offer them. This is the hypothesis to explore.

Favela is also city, despite its differentiated rules, its proper rhythm and crazy dimensions (Jacques, 2001) that apparently foreclose legal standardization. The complexity in space and formal rules not belonging to top-down methods in city brings favela close to incomprehension. Mostly due to its self-construction and self-organization spatial structures (Sobreira, 2003). Its *modus operandi* is bottom-up and that explains its difficulty of perception through top-down perspectives. This city is informal but also spontaneous and emergent, and above all it's a space belonging to its own time, creating itself through a roll of individual actions collectively driven by negotiation (Johnson, 2001).

Historical relation among organic settlements seems to interest as a way of studying *favela* not as a new element in city space but as a proper type of space in city, since ever. It is intended to test the hypothesis that once self-constructed space presents common patterns in its configuration despite its epoch or even cultural context. The option for Medieval Towns deals with the symbolic appeal of such cities once most of them are highlighted paradigms of the organic form, ideal to confront in the search for a diachronic relation. As well as the original colonial sites in Brazil, being another moment in organic city production.

Despite all its problems associated with social, spatial and symbolic segregation, *Favela* represents a complex living space, constantly being adapted. Based on this, the following paper will focus on studying the elements these forms contain for such a resilience and quality, why this natural implicit order appears in spite of the apparent “chaos”. This work is funded on the premise that contemporary *Favela* is nothing but a particular moment in the organic process for city space, as for its connection to the intrinsic knowledge of creating space that tend to go beyond time and History (Guerreiro, 2010).

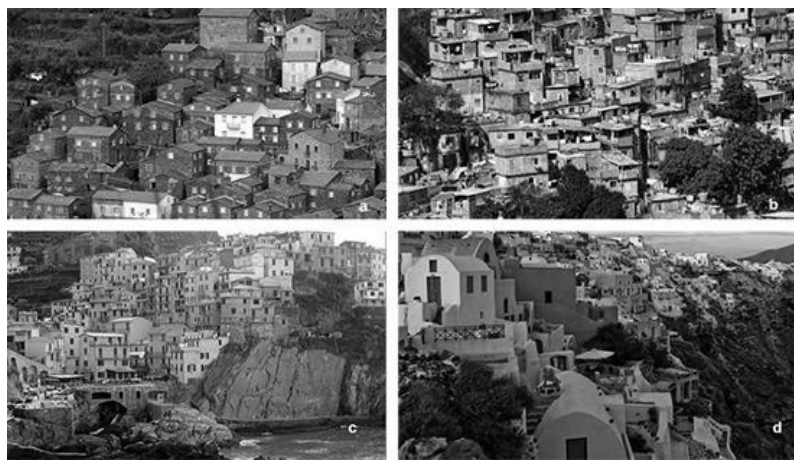


Figure 1. Different spaces with similar configurations (a: Piódão, Portugal; b: Rocinha, Rio de Janeiro, Brazil; c: Manarola, Italy; d: Santorini, Greece) (source: Google Images).



Figure 2. Organic illegal Settlement: Favela (Morro do Timbau in Rio de Janeiro) (source: Google Maps).



Figure 3. Illegal Allotment (Sol Nascente in Ceilândia - Brasília) (source: Google Maps).

The set of images in Figure 1 shows clearly this continuity in a constructing and urbanizing process: it deals with the similarity of an organic pattern through time. Santorini in Greece, Rocinha in Brazil, Piódão in Portugal or Manarola in Italy, just to mention a few, are great examples of culturally and socially distant contexts but apparently similar in configuration, e. g., the way in which parts of a city are associated, producing specific relationships.

In this paper informal means everything which is not official or legally regulated, as in the construction of *Favelas*. But informal might also mean being close to a specific context and acting naturally within it (Houaiss, 2012). It can also mean a space being prefigured without implicit rules from an urban plan. It is informal because it is not following legal rules but natural ones, self-organizing itself (Salingaros, 1998). It turns “spontaneous” as it behaves emergently – “spontaneity” being an “implicit will determining itself to act” (Abbagnano, 1998) and emergent the evolvement process provoking it. So, when *Favela* and informal settlement appear to be synonyms, in the context of this research, there’s a “spontaneous” and emergent process from behind, guiding the resultant urban form. This leads to the argument about different types of illegality and the will to relate *Favela*’s concept strictly to bottom up order, once irregular settlements, as allotments, have nothing similar to organic displacements (Figures 2 and 3). It seems important to state such perspective because commonly *Favela* is mention as a social and economic status and not related to a specific type of form in space.

In order to achieve the aims of this discussion, the paper is organized in three sessions. The first one deals with methodological approaches, presenting how research was conducted through a comparative strategy in order to verify the possible existence of similar patterns. The second part takes care of the discussion about *favela*’s form by comparing different settlements and searching for patterns in space organization. It intends to bring form as an argument to distinguish illegal urban areas. Then, the third and last session discusses the results of the comparative process with the 22 study cases, from different epochs, in an attempt to observe spatial patterns in space through history. This will ensure the differences established in the previous part explaining space in its various organizational orders.

Methodological Approach

Regarding the theoretical, methodological and instrumental aspects, the work is guided by The Theory of the Social Logic of Space or Space Syntax (Hillier and Hanson, 1984), based on the Axial and Segment Maps (which represents the potential accessibility of a line according to its topology in the urban system) from each case study. Structured on a systemic perspective, Syntax intends to relate space and society, assuming an intrinsic relationship between both.

Space, understood as a social feature, is at the same time caused by and the cause of certain social dynamics – therefore it can be seen as dependent and independent variable (Medeiros, 2013).

The above mentioned maps (linear representations of street systems, considering the smallest number of the biggest lines) allow to quantify and observe the potential performance of space concerning its topological relationships. The obtained values are converted into a chromatic scale that distinguishes different levels of potential accessibility in the network, resulting from its configuration (Medeiros, 2013). The analysis, developed in Depthmap® software, offers variables (cf. Holanda, 2002; Medeiros, 2013) and some of them are relevant to the comparisons intended here: Global and Local Integration (the level of accessibility analyzed globally – when the system as a whole is considered – or locally – when only the nearby lines are processed), Connectivity (number of connections in each axe of the system), Number of Axes, Mean Depth (what is related to the number of steps which is requested, in average, to reach each line from all the other lines in a system; due to distinct connection types and the distribution of lines, the system can be “deep” or “shallow”), Line Length, Synergy (the correlation among local and global properties, based on the correlation between Global and Local Integration), Intelligibility (legibility of a system from any point, considering the correlation between Connectivity and Global Integration), Segment Mean Length (dimension between two consecutive nodes) and Angular Choice (the priority chosen segments within all system routes, covering small angle deviation).

In order to explore the issue, the analysis considers 22 case studies: the historical grids of Lisbon, Porto, Santarém, Óbidos, Marvão, Castelo Novo, Castelo Rodrigo, Linhares, all in Portugal; the colonial sites of Tiradentes and Goiás Velho in Brazil; and the contemporary Favelas Cova do Vapor in Portugal, Vidigal, Jacarezinho, Providência, Timbau, Heliópolis, Jaqueline and Jardim de São Luís in Brazil, and yet, the partial maps of Favelas in Luanda (Angola), Beira and Maputo (Mozambique).

Is there a spatial pattern for favela?

Paola Berenstein Jacques assumes in her book, the vision of *Favela* as a physic labyrinth and deals with the concepts of implicit knowledge and tenure in informal space dynamics to walk through it understanding the essence (Jacques, 2001). Christopher Alexander also mentions (decades before) this common ability to build within specific emergent and ancestral patterns implicit to man’s action (Alexander, 1979). This happens due to the “bottom up” process that seems to be implicit in the building action as in the effective acknowledgement of space to users. At first sight its complexity appears difficult to read, specifically through formal rules learned from modern urbanism that simplify spatial relations (Salingaros, 2006).

Being an implicit order, fractal geometries are responsible for the organization of organic cities as they are in nature and life, and rules as self-similarity in these spaces might be the key to understand this unplanned order (Guerreiro, 2010). And so, favela as an informal and emergent process, seems to have a particular behaviour in space, as follows.

Figures 4 and 5 are the first step to understand the presented study cases and the result of a comparison based on space syntax analysis. Segment and Line Length (consequent from segment and axial maps) are useful to understand each system’s dimension, being then aware of its differences in scale. As we can see, there are very distinct sizes in the cases chosen but once looking at favelas, it remains in a row, showing similarities in size. The only unequal case is Sol Nascente, illegal allotment in Ceilândia, Brasília, whose line and segment length are far from the other irregular settlements. This uncovers the particular reason why this case was chosen: often called *favela*, Sol Nascente seems to have a distinct spatiality when related to organic illegal spaces, and so, it is intended to explore spatially, the conceptual discussion above.

The Integration of a system means its accessibility potential from all its parts to all its parts. Therefore, as much integrated a system is, the easier its access appears to be. Figure 6 shows

precisely the Global Integration levels of all studied cases, after normalization (a mathematical technique to reduce scale differences among systems and reinforce similar properties or differences despite dimensions) and the Figure 7 the Local Integration (the same properties analysed at a small scale in the system). This might mean a true configurational similarity among settlements, once we can see in both graphics a permanence of close values. The only distinction in Local Integration is Sol Nascente its values appear higher than the rest which can be related to its straight line grid that rapidly connects the local parts to each other despite a truly inefficient relation at global level due to the innumerous dead ends (Figure 8).

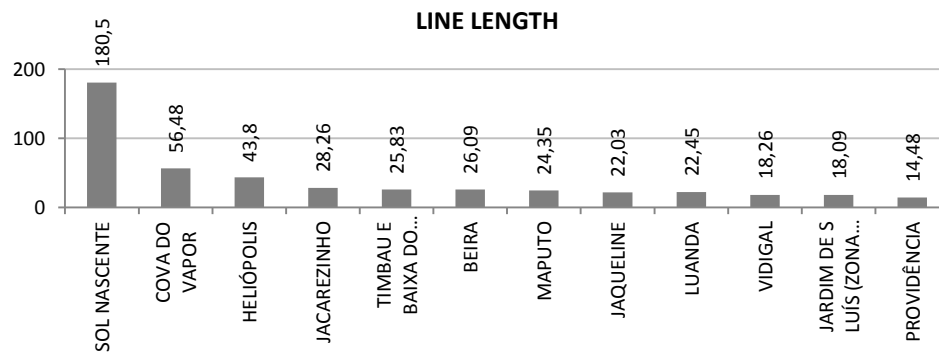


Figure 4. Line Length (source: Author).

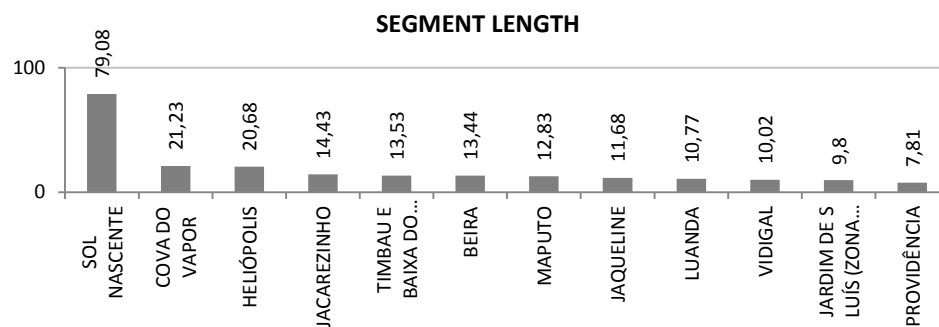


Figure 5. Segment Length (source: Author).

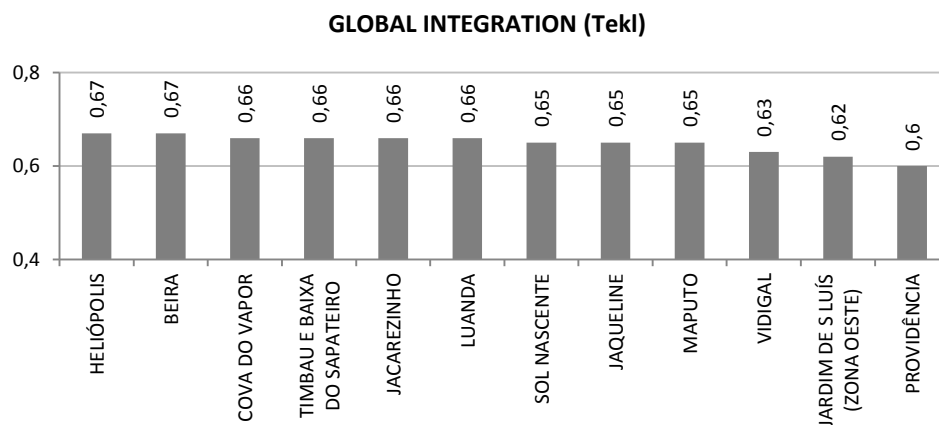


Figure 6. Global Integration (source: Author).

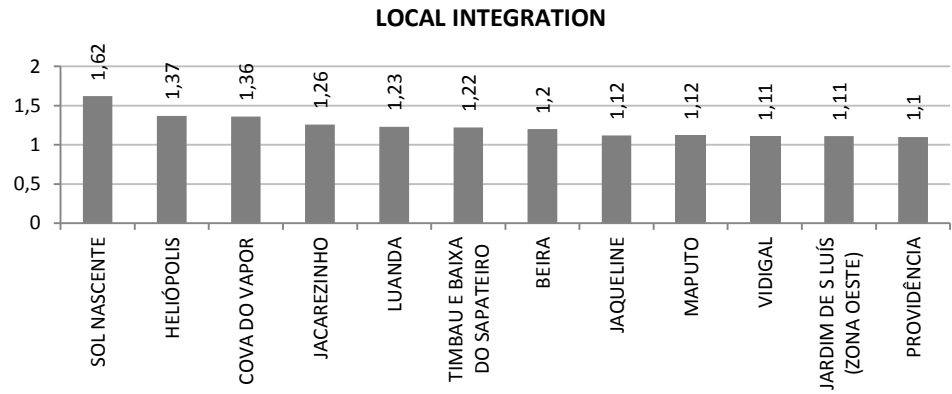


Figure 7. Local Integration (source: Author).

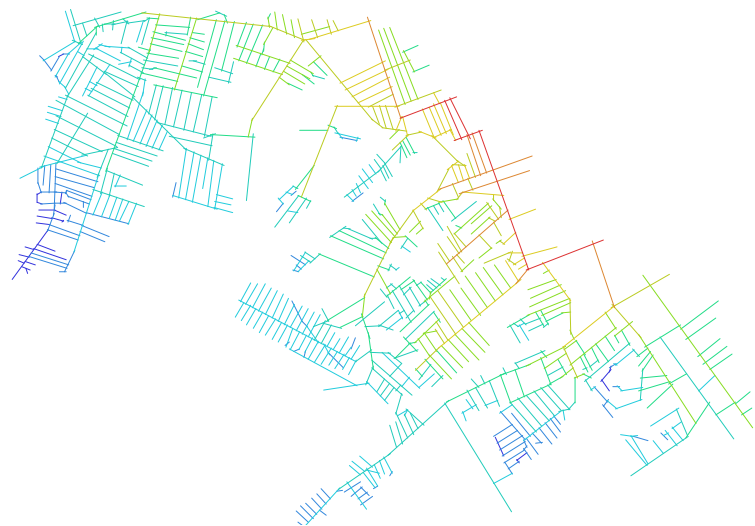


Figure 8. Sol Nascente's Axial Map (source: Author).

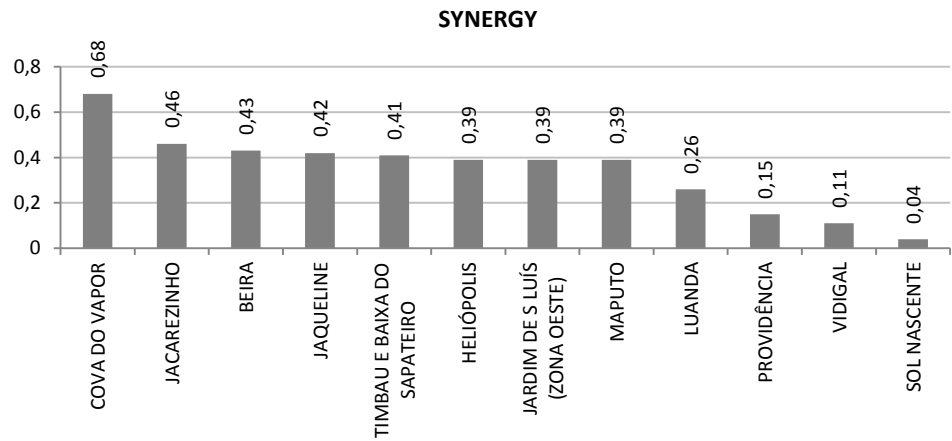


Figure 9. Synergy (source: Author).

Figure 9 presents Synergy levels from the studied *favelas*. Synergy is about the interaction ability between local and global levels of a particular system, which means a way to understand how small centers do interfere with global centralities – how the parts are affecting the whole. Looking at the presented values Cova do Vapor seems to have the highest synergic dynamic within its system, and Sol Nascente appears to have clearly the lowest. Vidigal and Providência are the next lower cases, which might be related to its topography once they seem to be the most extreme situations (hilltop *favelas*) in this sample. Apparently its synergy tends to decrease when declivity rises because some connections turn impossible to emerge. Nevertheless Sol Nascente is a very particular case, it presents itself in a much less declivity situation and the absence of interaction within its parts appears to come precisely from its design, created as a row of dead end streets through different directions. Observing its axial map (Figure 8) it is possible to understand the impossibility of such characteristic in this space – the parts are barely interacting with each other.

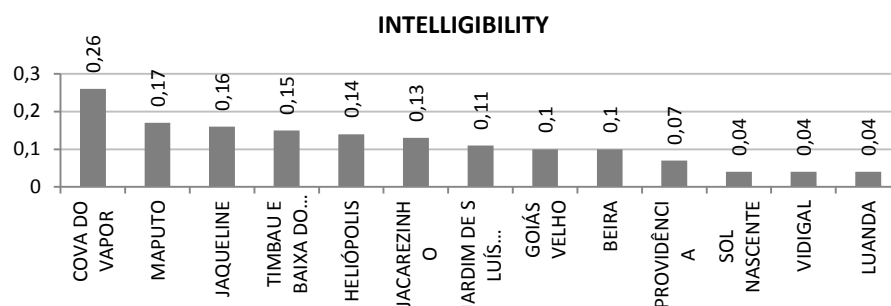


Figure 10. Intelligibility (source: Author).

Intelligibility means the ability to perceive space wholeness while standing in a single part of it, its easiness for being read. Looking at the Figure 10 it is possible to see that values tend to be low in this case: favela's complexity and spontaneity are responsible for a variety of spaces that forbid a clear perception at a first moment. This is possibly the greatest reason why it is so frequently considered labyrinthic (Jacques, 2001): protection from the outside is a demand for the space dynamics, therefore, it cannot be read easily. The clear perception of space is left only to the inhabitants, which explains such small values. But again, Cova do Vapor seems to have the highest levels: despite its complex structure, the small dimensions of the settlement (Figure 14) tend to favour its perception (as the correlation study in the next session will show). Luanda, Vidigal and Sol Nascente have the lowest values. Once again the topographic situation of Vidigal appears to be its greatest argument, causing its fragmentation. Luanda, on the other hand, seems critical by its dimensions (1385 axes) and depth (16.81), its size reveals a much deeper and complex structure. As we will see scaling properties of favelas frequently tend to increase some of its characteristics in the growing process. In Sol Nascente the opposite happens: its straight grid and dead end streets emphasises an inefficient communication among parts, and so, a difficult apprehension of space as a whole. A possible lack of organized complexity (Salingaros, 2006) in an illegal space designed to enter a regular system of allotments as seen in Figure 11, when the settlement's axial map is shown connected to its closer context – Ceilândia. The top-down dynamic is based in Brasília, not only in its original plan but also in its periphery – irregular areas like Sol Nascente only seem to replicate a model in a clear attempt to interact.

The comparison of these maps and values expresses a clear similarity among most of the cases which reveals the hypothesis of the existence of favela as a particular set of spatial patterns. A particular pattern of space organization for what we call favela. Sol Nascente is clearly excluded. Its lack of synergy when it seems to be one of the greatest advantages of spontaneous settlements, responsible for a successful internal performance in space, accuses the

presence of an entirely different process and order (top-down). Figure 12 shows, complementary, how the Latin America's biggest favela (Furquim, 2013) is much more likely to be a huge complex of illegal allotments whose spatial dynamics respond to other specific rules, possibly those of land regulation.

Such finding allows rethinking favela as a concept used to mention illegality in urban space and its socio-economic issues in a global sense, without questioning its genesis or configuration. The absence of spontaneity in space conformation tends to create inorganic and less flexible configurations, a very different situation from those seen before. Urban form entering as a factor in diagnosing illegal areas points out the impossibility to name such different spaces the same. Favela is here defended as the complex and emergent phenomenon that results in organic spaces built spontaneously.

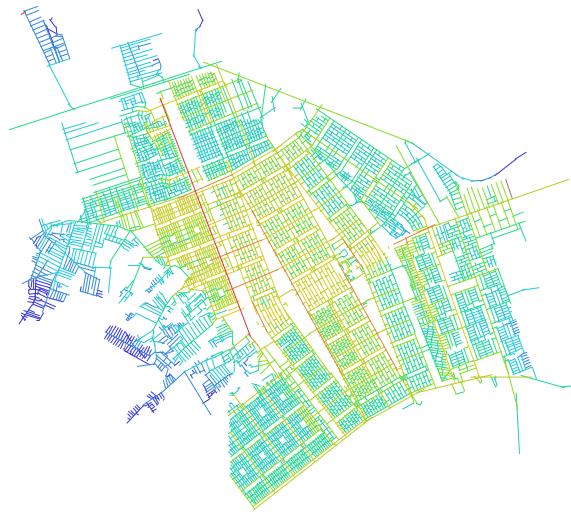


Figure 11. Sol Nascente's Axial Map connected to Ceilândia (source: Sol Nascente's Axial Map: Author; Ceilândia's Axial Map: Medeiros, 2013).



Figure 12. Streets in Sol Nascente (source: Author).

Favela aligned diachronically to historical city

The previous analysis as stated the tendency to assume a specific spatial pattern to favela whose spontaneity and emergency are essential characteristics and inorganic urban forms tend to be excluded. Based on this it is possible to move towards a diachronic study inquiring favela's relation to organic historical city.

It is believed in an organic process belonging to a long tradition in city form, connecting medieval towns in Portugal to colonial cities in Brazil. Excluded by modern thought where its scientific principles were looking for a rational and orderly perspective (Salingaros, 1998). In

contemporary city, favela seems like a similar phenomenon, far from the top-down dynamic of formal system. And so, the data from studied favelas is compared to medieval towns in Portugal and colonial cities in Brazil.

Analysing at first the settlements dimensions it's possible to observe a clear variety in number of axes (Figure 14) as in line length (Figure 13) proving the scaling differences one could forecast in such a comparative (diachronic) work. Towns and Favelas are substantially unequal in dimensions and commonly it depends on various factors as population, available space and site specificities, or even cultural differences (as in medieval Christian public space in opposition to Islamic one). Nevertheless these metric differences are not impeditive of a similar structure for spatial relations in space. Global measure for Integration (the accessibility potential in space), when normalized to observe topologically without its metric specificities (Figure 15), shows an apparently strong similarity in space accessibility as a whole.

Local Integration (Figure 16), meaning the same accessibility potential but at a local scale (as in a district scale), points also out a pattern of movement similar through the Portuguese towns and the Favelas. Values vary between 1.81 and 1.1, which doesn't seem a meaningful distance to the research. It is also important to state that Óbidos is the only town expressively more accessible at a local scale, but very close to Santarém is Heliópolis already (São Paulo's Favela). The less integrated space is Morro da Providência in Rio de Janeiro.

The internal dynamics of analysed systems is also possible to observe through Synergy, a correlation measure which relates Local and Global Integration in order to evaluate how they seem interdependent or not. In this case (Figure 17) there seems to be a pattern of good synergic spaces in the sample, despite these three lowest cases, Medieval Lisbon and Providência and Vidigal, two top of the hill Favelas in Rio de Janeiro. Another curiosity is Cova do Vapor, an illegal settlement in Portugal, being within the most synergic spaces, which seems to indicate that despite epochs, organic spaces behave similarly.

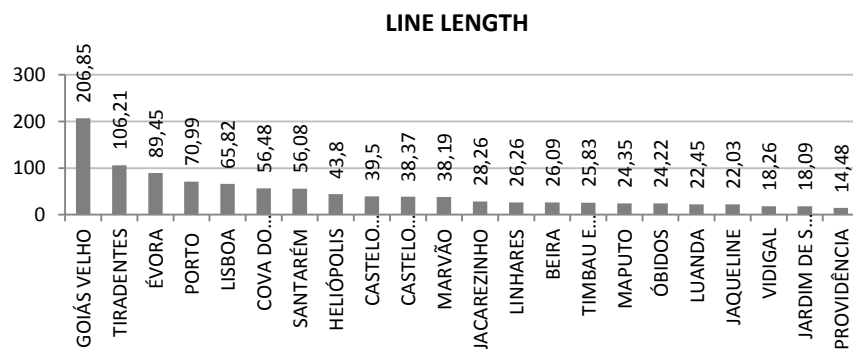


Figure 13. Line Length (source: Author).

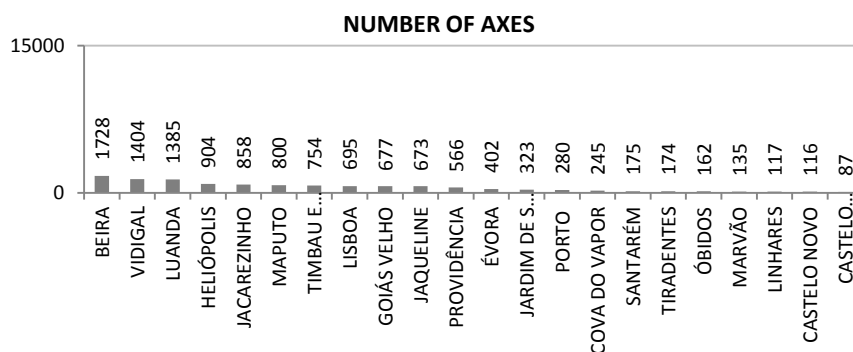


Figure 14. Number of Axes (source: Author).

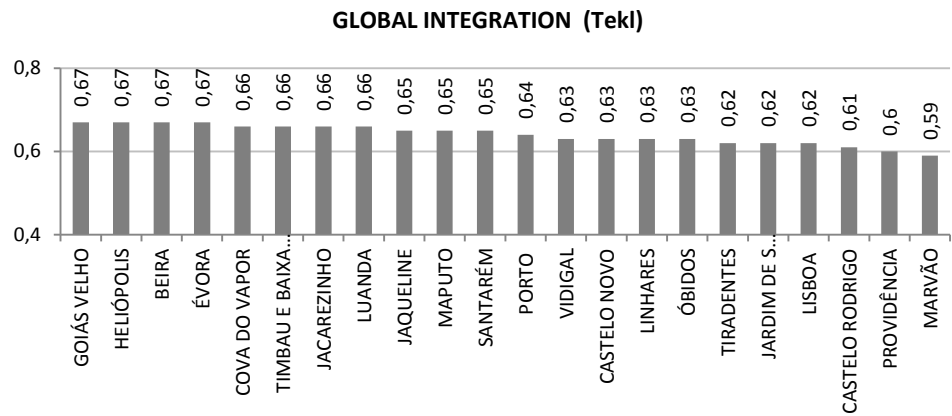


Figure 15: Global Integration (Normalized values) (source: Author).

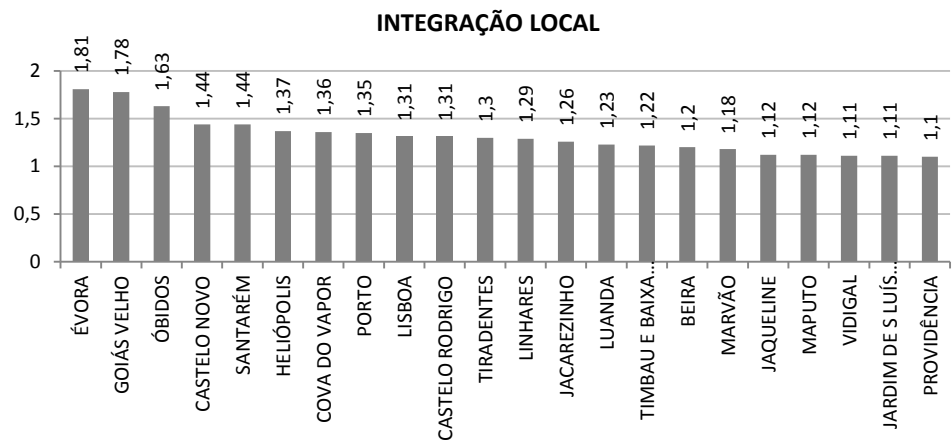


Figure 16. Local Integration (source: Author).

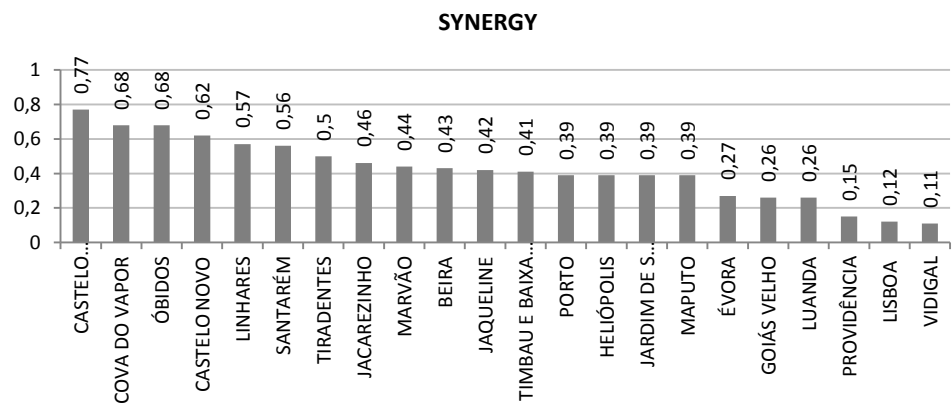


Figure 17. Synergy (source: Author).

The long argument in this text about complexity in Favela as in historic towns finds another good issue in the study of Intelligibility (Figure 18). Intelligibility is the ability to read the whole space by standing in just one point of it, and empirically is clear the difficulty to understand that easily a space like Vidigal or old historical Lisbon. That is why the values present such low result. Although, this specific case proves a clear difference between contemporary Favela and old towns: the old settlements are much easier understood than nowadays Favelas. Which is why the correlation between Intelligibility and Number of axes (Figure 19) appears next in the sequence: old towns are much smaller, and Favela's scale turns it deeply difficult to apprehend directly. The result is a 54% correlation between the dimension of the system and Intelligibility, meaning that size highly explains (c.f. Medeiros, 2013) the low levels in Favelas.

In consequence, the same process was repeated to Mean Depth, a measure that explains segregation in space, how difficult or easy it can be to access a specific axe in the system (Medeiros 2013). Settlements can be deep or flat depending on the high or low result, and it makes comparison possible in the sense of seeing space as a labyrinth or not. In this case, as Figure 20 can shows, Favelas are much deeper systems than old Portuguese towns. Nevertheless, such a reality can be again explained by the system dimension correlation (Figure 21): Space tends to be more labyrinthic as bigger it gets. The same structure of spatial relations can be more complex as it increases in scale.

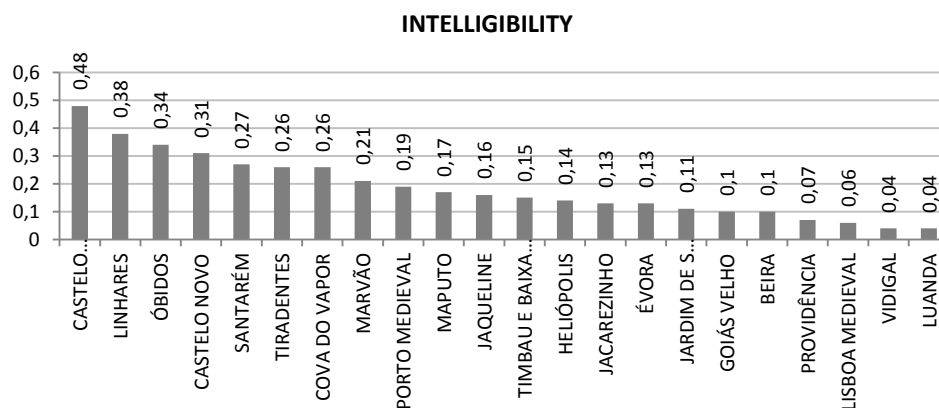


Figure 18. Intelligibility (source: Author).

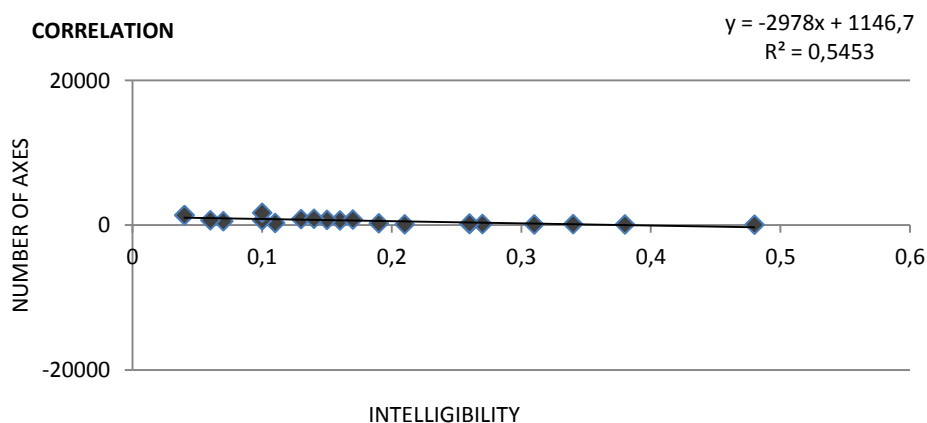


Figure 19. Correlation between Intelligibility and the number of Axes of each case (source: Author).

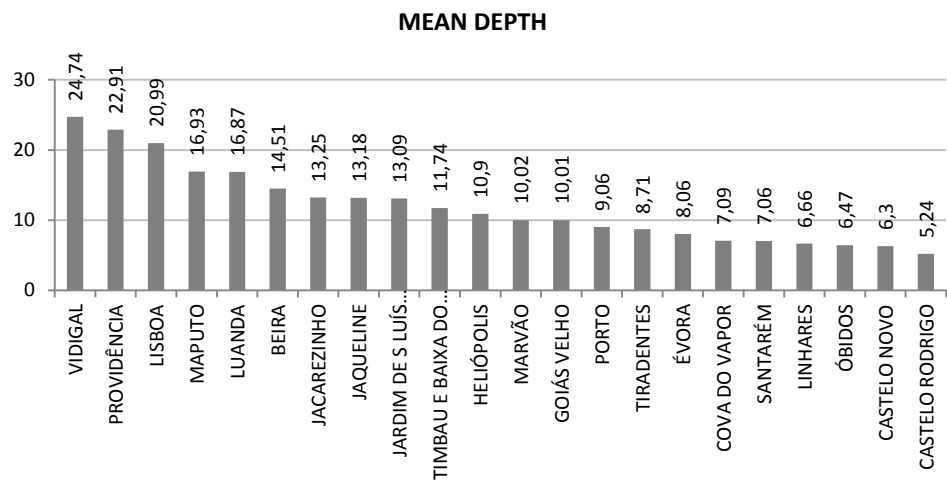


Figure 20. Mean Depth (source: Author).

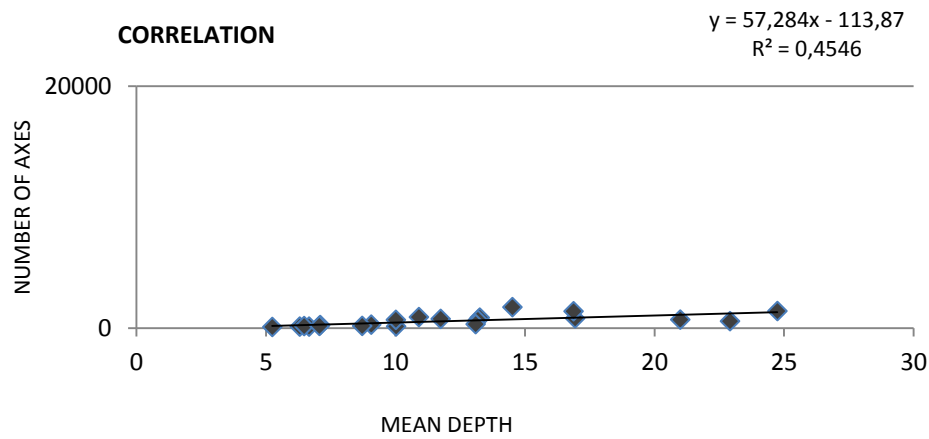


Figure 21: Correlation Between Mean Depth and the number of Axes (source: Author).

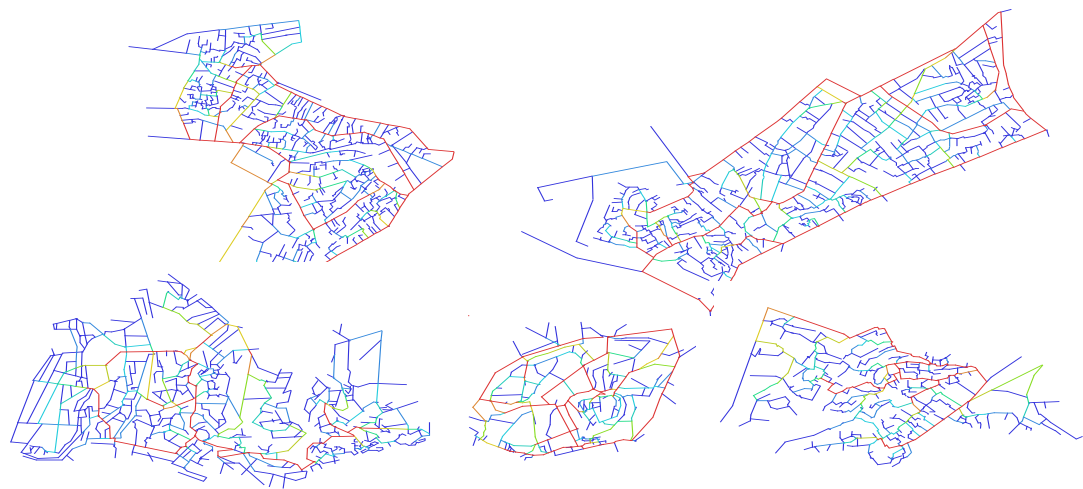


Figure 22: Angular Choice Maps (Top: Timbau and Jacarezinho; Bottom: Lisboa, Porto and Providência) (source: Author).

Finally, the image above shows the Angular Choice, an analyses that permit to understand how people tend to move in space. Choice means analyzing the potential for a street to be chosen within all the routes in the system, and so it can give us a good acknowledgement of how space is used. Favelas tend to be seen as labyrinthic spaces in the sense that it seems impossible to clearly walk through it. Looking at the images above (Figure 22) one can observe the clear structure of chosen axes for internal routes in space: all space is covered by an amazingly hierarchical net of paths. The complex space shows clearly here its self-organizing potential, and the similarities among epochs. The Angular Choice maps are a very important argument to prove the walkability of space and also the similarity between Favelas and Medieval Towns. There are clearly more used routes in each space, and the maps prove how much the space is (potentially) covered by movement and how connected these routes seem to be.

Historically and culturally different settlements present configurational similar relations (Medeiros, 2013). This is the critical point in the research: diachronically the organic pattern was responsible for the continuum know-how of making city and organizing its space. The proved similarities allow us to believe in an effective timeless way of building (Alexander, 1979), inherent to human beings and to its natural ability to adapt. Spontaneity and Emergence apparently lead the way to Natural Complexity (Guerreiro, 2010) existent in the unplanned or implicit organic spaces (Kostof, 1999). But remains the question: Is it possible to plan this type of organicity? This study points out the existence of a possible way to acknowledge these complex geometries unseen through simple observation. If Morro da Providência and Medieval Lisbon are equally chaotic seen from the outside and present the same self-organized rules in their spatial structure, these recognized patterns are potentially the clues needed to understand its spatial dynamics.

Conclusions

Favela is defined as a complex form dependent on a spontaneous genesis and a bottom-up order, as observed through the settlements comparison. Favela is often mentioned as a socio-economic particular reality in city, frequently not mentioning form and urban space. This paper intends to point out a distinction based on urban form issues: believing in space as influenced and influencing at the same time, organic favela and irregular allotment represent very distinct social dynamics. Favela, as spontaneous and emergent, acts in synergy and according to scale developing a dynamic relation in space within its parts.

Despite similarities, medieval settlements have smaller street system and its axes are commonly longer, resulting in a much complex space in Favelas. This emphasizes the hypothesis that scale has an important role in comparison: organic spontaneous structures present high levels of synergy, which appears to mean the existence of an harmonic relation among lower and higher scales in a system. That suggests that to grow it must also get more complex to ensure the needed levels of hierarchy the organic space need to work efficiently. Self-organization seems to be the origin of such amazing dynamic in space.

Contemporary city leads to absolutely different scales and dimensions, but the processes it is emerging from are possibly the same through city history. This is clearly a starting point and an experimental work, but findings surely point out directions to future studies: Illegal areas in city are not all the same (despite their similar socioeconomic problems), but those of organic and spontaneous genesis present such potentially successful space properties as the older towns we often are amazed to meet.

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The 'Ilhas' of Porto and 'self-improvement urbanism': the inhabitants as engine of urban transformation

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Abstract. *An 'Ilha' in Porto is a typology of low cost housing which spread within the city in the 19th Century as a result of the industrial development. The extremely small dwellings (around 4x4m) were established within backyards of middle class houses, connected to the street through a narrow corridor. Despite all public trials of destruction, more than 1.000 'Ilhas' still shelter more than 13.000 people within the city of Porto. The subject of this article is the analysis of the morphology of the 'Ilhas' of Porto, Portugal. The objective is to illustrate what the typology currently means for its inhabitants and for the urban space and propose methods of improving their living standards. The social and spatial dimension of the 'Ilhas' as an 'assemblage' of the city determines the research method, focusing on a) an analysis of the morphology and typology of a selected cluster of 'Ilhas' in different scales; b) participatory research involving the inhabitants, including interviews and observation of daily practices and community values.*

Despite the low quality living conditions, the inhabitants of the 'Ilhas' show an impressive attachment to their living space, forming a strong community. This quality is used as a foundation for the 'self-improvement' urbanism, where the community operates as the main engine of the urban transformation.

The main finding of the research is that the 'Ilhas' could be an inexpensive solution for the current housing crisis through the further development of the 'self-improvement' urbanism. This innovative approach includes strong public participation and an innovative position of the planner within the process.

Key Words: *Ilhas, social history, morphology and typology, urban anthropology, self-improvement urbanism.*

The morphology's historical development

The Ilhas have an unique typology within the urban tissue of Porto. This typology is a result of several specific events within the historical morphological development of the Porto, in physical, economic and social aspects.

During the 18th century Porto faced its first large population growth, a consequence of the economic growth (Teixeira, 1996, p. 19) caused by the success of the Porto wine and trade development with England (Porto Vivo, 2005, P. 27). In 1732, the city had around 30.000 inhabitants, and reached more than 60.000 in 1787. Porto went through a densification process within the boundary of the medieval walls, and only after 1760 the city expanded, in a planned development, to outside the former borders.

In 1763, the governor João de Almada, later followed by his son Francisco de Almada, started the expansion plans for the city, in a highly centralized decision making process (Monteiro, 2009). Concerning urban morphology, the 18th century was very important for the city. Under the governance of the *Almadas*, new streets were opened or restructured, and new public space was created in the oldest urban area (Rio Fernandes, 2005, P. 4). The economic growth was translated into a clear urban expansion. The medieval walls lost their military defence value, as a result of the development of artillery, and were therefore destroyed in almost all its length (Rio Fernandes, 2005, P. 4). Four axes were built: they irradiated from the old centre and pointed towards the main agglomerates of the outside region (Figure 1).

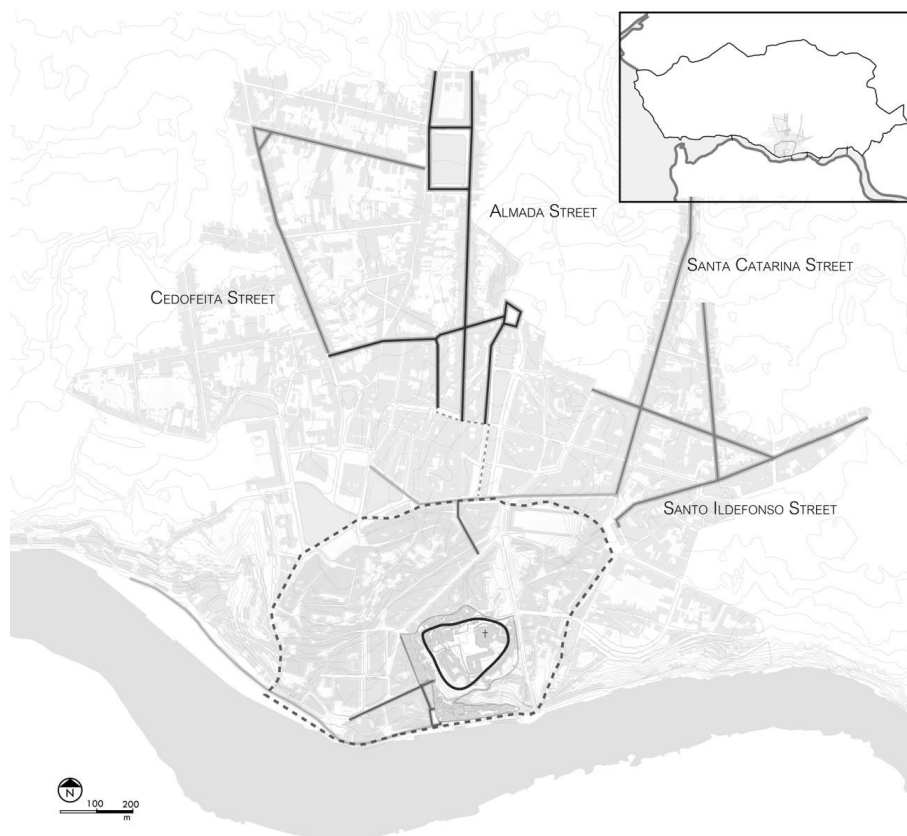


Figure 1. The Almada expansion: Porto in 1813, occupying the new axes of expansion.

The expansion plan of the Almadás in the 18th century defined several future aspects for the city of Porto, including the development of “Ilhas”. The new axes of development were then slowly occupied by new plots, where new dwellings for the higher classes were built. Besides defining expansion lines, the plan also created norms for defining the new plots. The focus of the plan was the street, and not the urban block (Ferrão, 1997). The pattern for new urban plots defined plots with narrow front lines and deep depth, making the maximum use of the new street infrastructure in its length. The façade of the plot was mostly 5,5-6 m wide and very long, sometimes reaching 100 m of depth (Teixeira, 1996). The dwellings had long backyards, differing from the pattern of the old compact medieval city (Figure 2).

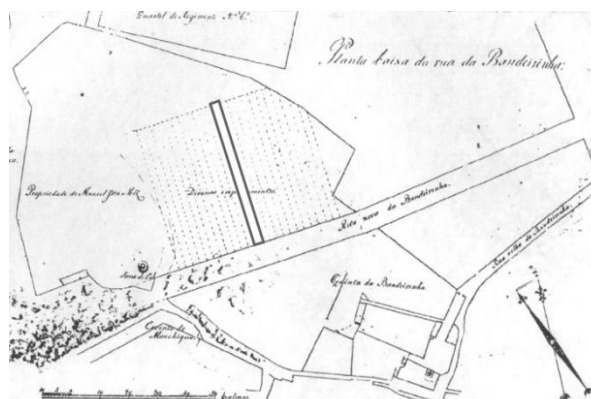


Figure 2. Map from the Almada plans. The long plots were placed along the new street, without a pattern of urban block (Nonnel, 2002).

After a period of low population growth caused by the French invasions (1803-1813) and the civil war (1832-34), the city started to grow again due to the industrial development and the arrival of immigrants from the countryside. Between 1838 and 1900, the population of Porto went from 59.000 to 168.000 inhabitants. In 1911, Porto had expanded its surface and had a population of 194.009 inhabitants (Pereira, 2003, P. 140).

According to Rio Fernandes (2005, P. 6) there are two main consequences for the high levels of population growth of this time. Firstly, the residents of the oldest parts of the city, who had financial sources, moved to large housing areas in the suburbs. The empty houses left behind were then occupied by the immigrants, and the centre faced a continuously densification of its buildings. Secondly, the main destination of immigrants, especially the ones coming from the rural areas, became the long backyards of profit seeker property owners, usually located nearby industrial areas. These are the *Ilhas* (Figure 3).

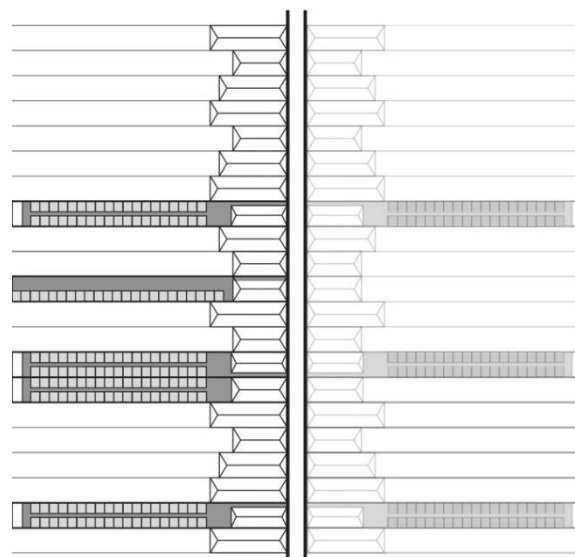


Figure 3. The main street, the front middle class houses and the *Ilhas* occupying the backyards.

The *Ilhas*

The new working class needed a new solution for low cost housing. In this context, the *Ilhas* appeared in Porto. *Ilha* is the Portuguese word for island, and that refers to the relationship of these dwellings with the urban space. They occupy inner spaces of the city, like small infill islands, surrounded by buildings from all sides. Porto 'grew inwards' (Figure 4), increasing its density through the development of the *Ilhas* (Pereira, 2003).

Besides, the urban plots had between 5,5-6 m of façade and a deep depth, and these long and narrow backyards were viewed by the inhabitants as an opportunity. Responsible for the construction of the *Ilhas* were not large developers, but small entrepreneurs with limited sources, namely the inhabitants of the front houses themselves. The higher social classes were, at this time, moving to even further from the centre, and the first expansion areas were occupied by the lower middle class (Teixeira, 1996).

The *Ilhas* were small scale and low quality constructions, with the only objective of providing cheap and fast housing. Most of the *Ilhas* were built not at once, but gradually, in a process of internal growth of the city through occupation of the inner space of urban blocks. The primary typology of the *Ilha* is composed by rows of small and single-layer houses, built in the

back side of middle class houses. The majority of the Ilhas had around 20 dwellings, with a single pavement and average size of 16 m². The small houses of the Ilhas were then built based on the façade space, forming lines of houses and corridors through all plots. The access to the street was usually made through a small corridor on the side of the middle class houses which faced the street (Teixeira, 1996). The sanitary facilities were minimal, shared by all houses, and usually located on the back of the plot (CMP, 2000). The Ilhas have all kinds of variations, but the original typology, which is still rather common, is showed on Figure 5.

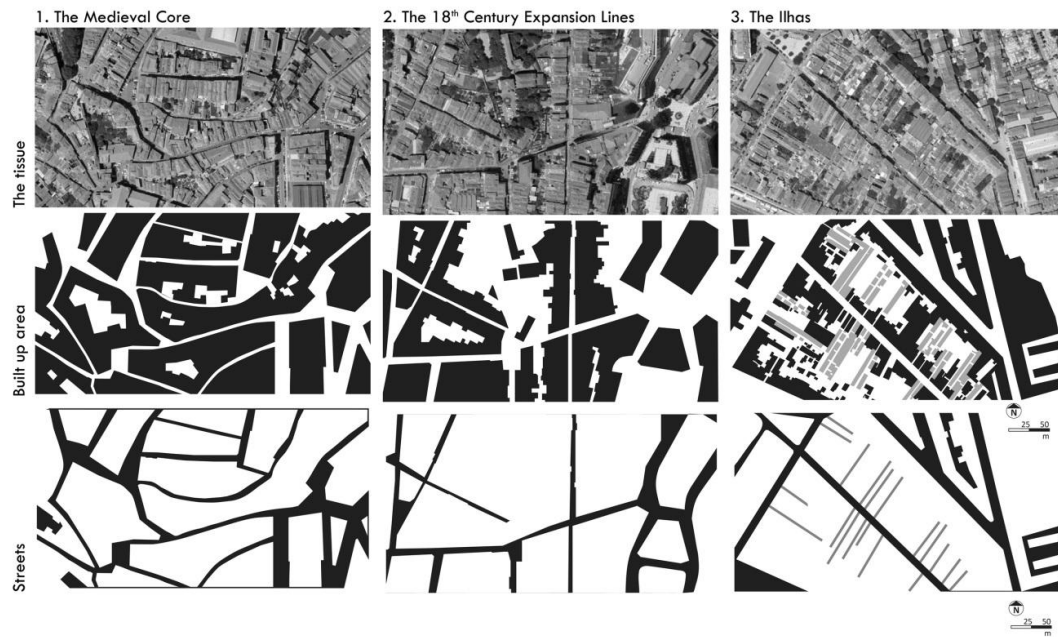


Figure 4. A morphologic comparison between the medieval city core, the 18th century expansion and the Ilhas: the city grew towards the inner-block space.

Within the most critical period of city growth, between 1878 and 1890, more than 5.000 dwellings in Ilhas were built. In 1899, the Ilhas were home to 35.000 people, 30% of the total population (Pereira, 2003). The city had around 168.000 inhabitants at that time (CMP, 2000). The largest concentration of Ilhas was on the eastern part of the city, near the industrial areas. Nevertheless, Ilhas could be found all over the city, but always with some proximity to an industry.



Figure 5. Ilha in detail: Impression of the dwelling size and how the residents outline the inner divisions of their homes.

Due to its construction characteristics, such as reduced size, cheap and low quality materials, common sanitary facilities and lack of sewage system, the Ilhas soon became famous in the city as insalubrious and sickening places (LEMOS, 1914). The high density of these housing areas, together with the lack of hygiene and sanitary facilities was a strengthening to the common diseases at that time, and helped the proliferation of tuberculosis, cholera, typhus and the bubonic plague (CMP, 2001).

The current situation

During the 200 years of Ilhas' history, several public programs have made trials to extinguish them. Most programs involved demolition of Ilhas and relocation of people to suburbs. The several programs of relocation of inhabitants through the years only changed the social segregation pattern in Porto. The form of segregation with the working class occupying central spaces, had a shift to a periphery pattern segregation.

In 2003, more than 40.000 people were living in social neighbourhoods (Pereira, 2003, P. 145) built to shelter the relocated inhabitants in the second half of the 20th century. Many of these neighbourhoods are currently considered 'problem areas' in the city due to high levels of criminality, and are now being demolished by the authorities. According to Pereira (2003, P. 145), "most probably, around 20% (...) of the population of Porto have inherited living conditions from the housing solutions – and lack of solutions – that were a consequence of the industrialization and urbanization process of Porto".

Nevertheless, after all the trials from the authorities to eradicate the Ilhas, they still exist in the city (Figure 6). Information available in 2001 pointed to an estimation of 13.500 people living in Ilhas, plus more than 6.500 people in similar living housing conditions (Pereira, 2003, P. 145). "In the classic form, there are still in the city of Porto 5.900 houses in Ilhas" (CMP, Pimenta; Ferreira, 2001).



Figure 6. Ilhas in 1940 (CMP, 2001) and 2012 (source: photo by author).

Problem definition

The Municipality sees the Ilhas, undoubtedly, as a major urban problem. They have demolished the majority of Ilhas located in public ground in the last years. In June 8th, 2003, it could be read on the first page of the newspaper “O Comércio do Porto”: “Last municipal Ilha breaks down this month” (Cited in Pereira, 2003, P. 147). The authorities declare that ‘the large and critical problem of the private Ilhas in highly degraded conditions persists’ (CMP, Pimenta; Ferreira, 2001). The problem, according to the authorities, is formed by the high degraded conditions of the dwellings, unhealthy standards, the low income of the inhabitants and ‘the expectations of future profit with the liberation of the plots situated in privileged zones of the city’ (CMP, Pimenta; Ferreira, 2001).

Nevertheless, the demolition of Ilhas increases the demand for social housing. The higher demand conflicts with the current plans from the Municipality to demolish a large amount of the social housing buildings in the suburb of Porto. Both demolition plans, concerning Ilhas and social housing, are not followed by a plan of approach for relocation of inhabitants, resulting in a larger social problem. Furthermore, there is already a lack of social housing. Not only social housing for the real poor and needy families, who manage to be selected by the municipality and located within a social program. But a lack of affordable housing, with a minimum of living quality, for many inhabitants.

Objective

The Ilhas form an embedded living typology in the city of Porto, which survived destruction trials for centuries. Away from the judgmental description of the Ilhas as poor and undesirable spaces in the city, the objective is to illustrate what the typology currently means for its inhabitants and for the urban space and to propose methods of improving their living standards. Given that there is need for housing, how could the Ilhas represent a solution for the current social housing problem, while improving the living conditions of its inhabitants?

Methodology

As guiding principle in the further morphological research of the Ilhas figures the concept of ‘assemblage’. In morphology we see the struggle between holistic-universal approaches aiming at historical-organic patterns of the city and layered or piecemeal approaches, that make the city a collage of palimpsest. Assemblage, as applied in (human) geography, takes as point of departure the ‘contingent, non-necessary coming together of various phenomena, actors, institutions, or processes to form a stable bundle of relationships and capacities’ (CASTREE et al, 2013).

For the research of the Ilhas this has been translated into a more practical than theoretical working method, based on the principle of ‘going there to see, learn and understand...’, in which the following steps have been taken:

- i. take as point of departure the typology of the Ilhas in terms of houses, streets and blocks as described from the historical perspective;
- ii. take a specific cluster as representative location for of the phenomenon of the Ilhas;
- iii. involve inhabitants by doing participatory research –as a form of urban anthropology-, including interviews and observations of daily practices and community live;
- iv. define relevant scales of spatial analysis based on social and physical relationships for detailed morphological description and analysis;
- v. define the stability of social, physical and economical relationships of the Ilhas;

vi. take this stability as starting point to characterize the Ilhas and to define the actors which could be considered the agents of urban and morphological transformation.

In this way 'assemblage' is considered a procedural and a material concept, referring to formal object (research method) and material object of study: the morphology of the Ilhas.

Selected location

The investigation took place in a selected cluster of Ilhas in the central area of Porto. The São Victor street cluster was chosen because of its large size, and also due to its authentic character, where the Ilhas still kept their original form (Figure 7).



Figure 7. Location of São Victor street in the city of Porto.

The area of São Víctor street is located within Bonfim neighbourhood, and can be seen as a buffer zone. On the left side of São Víctor street, the city is lively and crowded, with the Old Town and the Centre of the city, with main touristic attractions and commercial areas. But towards the eastern side, a large cemetery followed by the railway form a whole different environment, already outside the main city route. São Víctor street is located in between, forming a transitional space. The privileged location in the city is indeed one of the strongest characteristics of São Víctor street. The Street is located on the eastern side of Porto, nearly to the City centre. The street is short (625 m long) and the Ilhas can be found only within a part of its length (367 m, between Praça da Alegria and Largo do Padre Baltasar Guedes). The street ends at a cliff, with a great view to the railway and the Douro River.

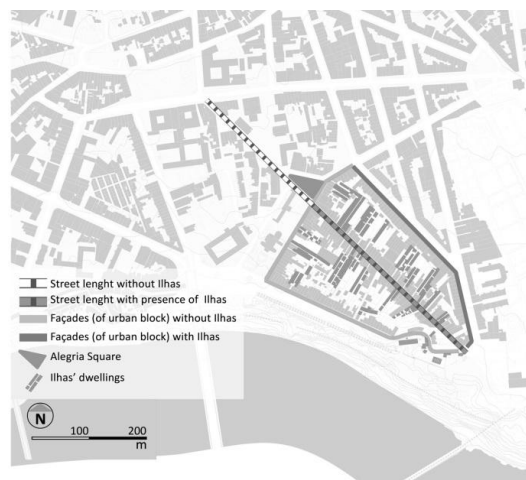


Figure 8. The Ilhas of São Víctor street.

The study area (Figure 8), formed by the group of urban blocks on both sides of São Víctor street, has a total of 1.388 inhabitants (data from the Census 2011 – INE, 2012). In an estimation based on observation combines with the aerial photos of the area, it can be assumed that the 29 Ilhas contain 280 dwellings. Given that the average household size of 2.6 people (data from the Census 2011, INE, 2012), the estimation results in around 730 people, from the total of 1.388 people in the study area, living in these Ilhas.

Some of the Ilhas are empty, but the majority is at least partially occupied. Their pattern follows the original Ilha typology, with small houses occupying the backyard of larger houses, connected to the street through a long corridor. Given that there is no official data concerning the Ilhas' dwellings, these conclusions come from a combination of aerial photos analysis and visits to the area.

Participatory research

The participatory research took place during field visits. The selected location was visited and observations of the public space were made in different time frames and different days of the week. During this visits, interviews with the inhabitants were made following an non-structured interview approach. They took place like informal conversations, when the inhabitants usually felt more confident to talk, without fearing that it could be an official interview from the Municipality (although some of them fearfully asked if it was a Municipal initiative). Besides interviewing inhabitants, other people involved in the subject were also interviewed.

The impressions

Despite the lack of living quality conditions, the inhabitants show an impressive level of satisfaction. Having some interesting conversations is not a difficult task on São Víctor street. Especially the elderly are quite sympathetic. They enjoy sharing their stories and their love for their living space. The most heard sentences in São Víctor Street are: "I will die here" and "I would never leave this place". The impression is that the value of the neighbourhood and its community is still lively present in São Víctor. The community is the first item mentioned in a description of positive aspects of the Ilha life. People know each other, families grew up together. There is a feeling of cooperation, company and friendship, which is strong especially for the elderly. They have been there for a longer period of time, and have tighter relations with the space and with the others. They also keep company to one another, since they are in many cases alone.

Furthermore, the high social control of the street provides safety, and the fact that the people know each other and see each other constantly is an obstacle for criminality. The high density added to the strong contact to the street only increases the general sense of security.

The dwellings surely need improvement in several aspects, but their environment is a success concerning one of the most important aspects for the inhabitants: the satisfaction of living where they live, and the sense of belonging to a place. Each Ilha is unique as a place. They have different stories and different names. Their names are sometimes quite out of the ordinary. They were named after a former landlord, a famous inhabitant, or a characteristic of the Ilha itself. The names give to the Ilhas a sense of identity and place.

The Ilhas of São Víctor street are a place for numerous problems, but they also have several positive aspects. The Ilhas have always been seen, either by the authorities or by the population, as a shameful city problem that needs to be vanished. The change of times ask for a change of point of view. The Ilhas should be faced and analyzed from a different point of view, associated to the current time of (deep) economic, social and political crisis.

Thus, positive aspects should certainly be equally considered.

Morphology and typology analysis – scales of space

Because the social environment forms the greatest positive aspect of the life in the Ilhas, the social relationships will be used as the main criteria for classifying and separating the different scales of space during the morphological analysis. From the most public to the most private space (Figure 9), the pattern of social encounters and the relationship between users and their space defines invisible boundaries within the urban environment which create different 'heterotopias'.



Figure 9. The impression on entering an Ilha.

From public to private

The group of social acquaintances from a person reduces gradually, from the most public space until the privacy of the household (Figure 10). The public space is opened for everyone, and a stranger would not be easily noticed in this scale. The collective space is more narrow, where the community formed by all Ilhas is able to meet, and a stranger who does not belong to the street is already perceived and observed by the users of the space. The communal space is the rather special scale of the Ilha corridor. Its level of privacy may vary according to the type of entrance of the Ilha, but the corridor is mostly more private than public. Finally, the household space provides privacy and protection to the resident.

Applying these scale division to São Vítor street and the Ilhas, the result is a hierarchy of three layers of space, divided according to the scales of privacy and level of social contact. The household space is not included. The main difference between these scales of 'publicness' of the spaces concerns who meets in the space, and which social relationships take place in them.

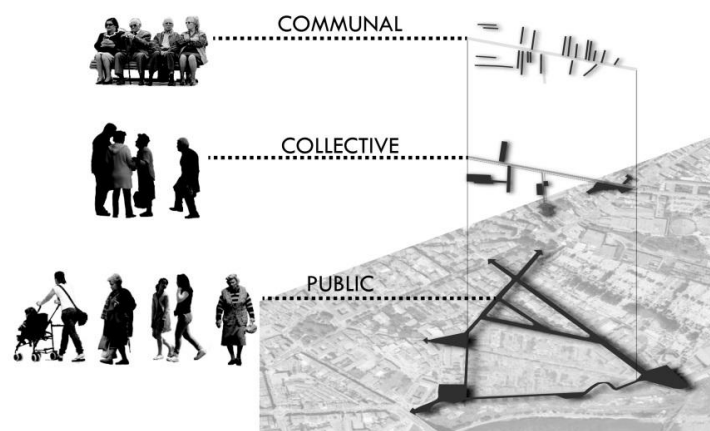


Figure 10. The social relationships defining the spatial scales.

Large Scale - The public space outside

This scale represents the room for social relationships between the residents of Ilhas and outsiders, which take place in the public space in the surroundings of the street. These spaces form the boundaries of the urban blocks where the Ilhas are located. These boundaries work as a type of barrier to the study area, and it represents the conflict between the urban block formed by the Ilhas of São Vítor and the surroundings.

The Ilhas have an embedded bad image within the city, as a result of their historical condition of unhealthy environment. The area forms a buffer zone in the city and does not relate itself to the very next surrounding area. The urban block is an 'island' itself. The challenge in this scale would be to increase the reciprocity between the block and the city, to make the Ilhas part of the larger urban scale.

Medium Scale - The collective space of the street

The collective space is still public – opened for all people. Nevertheless, it is a space already filtered by the first boundaries, forming a different heterotopia. The inner-block space of São Vítor street is mostly used by inhabitants, and a stranger passer-by is already noticed. These collective spaces include the street itself, with its sidewalks, and its adjacent spaces, such as open spaces, commercial buildings and the alley connecting the street to the riverside (and a beautiful view). The collective space is a key for the binding of the whole community, and where people from different Ilhas meet. As mentioned by an elderly lady in an interview: "In the past, this street used to be a large family".

But why 'in the past'? An increasing unsafe feeling and decreasing community status has been mentioned by several inhabitants, especially by the elderly. The amount of newcomers is increasing, as a possible result of the economic crisis and of the demolition of social housing buildings in the suburbs. Newcomers are often held responsible for the neighbourhood changes, because their relationship with the neighbours is not as strong as in the past generations. Thus we can speculate that a generation clash might be a part of the problem. As a result of less social acquaintances, the community status decreases and therefore the social control also becomes weaker. Re-establishing the strong social control from the past through incentivizing the community strength might be part of the solution for the decreasing security and social decay.

Small Scale - The communal space of the corridor

The corridor of each Ilha is already a private space, located within a private urban plot. Nevertheless, due to the use by several families, and in some cases the openness to the outside world, this space can be considered semiprivate, or communal. It is shared by all neighbours within the Ilha, and is also an extension of the household. The inhabitants place outside, in a thin line along their dwelling, several personal belongings which coexist with the neighbours in the narrow corridor. Laundry, plants, chairs, toys, and several other objects give to the corridor a 'private backyard' impression.

The Ilhas slightly vary in their morphologic features (Figure 11), with a variation regarding the level of connection with the street defined by the entrance to the corridor. The extra level of public-private transition provided by the corridor and the reduced size of this common space, makes from the narrow corridor become part of the dwelling. At the same time, it is an extension of the street, keeping the line between private and semi-public rather porous. The corridor of the Ilha is a distinctive space, since it represents the very basis of the community strength from the Ilhas. It gives an extra level of collective privacy to the Ilha, and is partially responsible for increasing the social cohesion, community strength, and is consequently improving the social control.

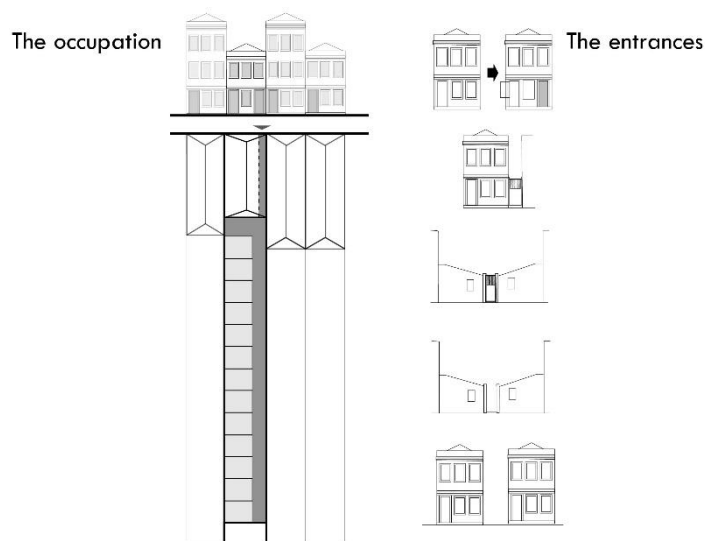


Figure 11. The degree of privacy defined by the entrance typology.

Concerning the dwellings, their dimensions are mostly very compact. Some of them have an extra pavement which was usually built by the inhabitants. Some families rent more than one dwelling, and make from both one larger house. The façades of the dwellings are painted in different colours, and some are covered by tiles. The differences between dwellings of a common Ilha show that the changes had been made by each inhabitant, and not by the landlord. Self-improvement can be found everywhere.

The strength of self-improvement

The Ilhas carry quite a heavy and dark image with their name. They bring an image of insalubrious places, of extreme poverty, justified by their historical existence as an urban problem. Even though Ilhas without sewage and dwellings without private toilets still exist, the situation improved, mostly as a result of efforts from the residents themselves.

Several Ilhas are equipped with private toilets and small extensions for the dwellings, resulting in more life quality for the inhabitants. The residents are usually proud of their accomplishments improving their houses. Mrs. Rosa, from nº 76, declared: “I have my own toilet and a second floor with bedrooms which I built up myself. The landlord does not do anything to improve the houses, everything has to come from us. If your roof is broken, if you want to paint the house, we do it all by ourselves”.

Mrs. Filomena, from the same Ilha, had the best house of all visited ones. Her home is an example of the self-improvement made by the inhabitants. Her family extended the dwelling, using a small space on the side of the house, where was previously an open area.

Now, her son has his own bedroom. Furthermore, they also built an extra pavement, where her bedroom is located, and a bathroom for the family. The house is well maintained, and she mentions: “We pay such a cheap rent that we can afford reforms, and we feel happy to improve our home”.

The differences between the building condition within the Ilhas are quite strong and visible (Figure 12). Based on some interviews, it can be concluded that the improved houses belong to the long term inhabitants, who reformed their space through the years, maybe even through generations. The houses without toilets and with the worst structural problems seem to have a more dynamic occupation pattern, with less permanency of residents. Many of them are now rented by people who arrived a few years ago, and have no funds for repairing the house. The main complaint from unsatisfied residents in Ilhas is related to the low quality of their

dwellings. If the quality is improved, the satisfaction levels rises, the attachment to the space gets stronger and consequently the level of residents permanency in the area also grows. It is a cycle of positive consequences.



Figure 12. Above, a dwelling improved by the residents own efforts; below, a dwelling that show signs of degradation.

Proposal – the self-improvement urbanism

The improvements made by the inhabitants themselves in their dwellings could be the reason that makes the Ilhas a resilient urban space. A better living environment plays a role in the satisfaction of inhabitants and permanency in the living space. As these effects have a strong influence on the great community standard of the Ilhas.

The extension of this practice to another dwellings – the ones which still need improvement – could be an inexpensive way of improving the qualities of such houses. The advantage for the landlord is the improvement of his property without any effort or investment coming from his side. The residents would work by themselves, as they have been doing for generations of small self-improvement, but this time in a greater scale. The advantage for the inhabitants is the possibility of improving their dwellings and rising their living quality standards. Furthermore, the group approach would boost the community integration and help solving the increasing social decay.

Mrs. Ineke Hulshof, from the office Hulshof Architecten, has several examples of successfully realized residential buildings developed under the concept of cooperative construction. During an interview in June 2012, Mrs. Hulshof was quite optimistic when asked about a possibility of cooperative building in the scenario of the Ilhas: “I believe that the people can do it themselves. There is always someone that knows how to build or knows how to fix a roof or a toilet, and they can teach each other. If well organized, they can surely do it” (Hulshof, 2012).

The self-improvement concept could go beyond the dwelling and reach the urban scale (Figure 13). The community is strong, and could be used as a basis for the urban transformation where the inhabitants themselves are the agents of change. Since it has never been an intention from the authorities of Porto on rehabilitating the Ilhas, but only to demolish them, an improvement plan for the Ilhas should not rely on tools like legislation support, and much less on public investment. In times of economic and political crisis, the interest in investing, coming

from the Municipality, became even less significant. Therefore, the methodology for such transformation should be planned with little or no governmental support.

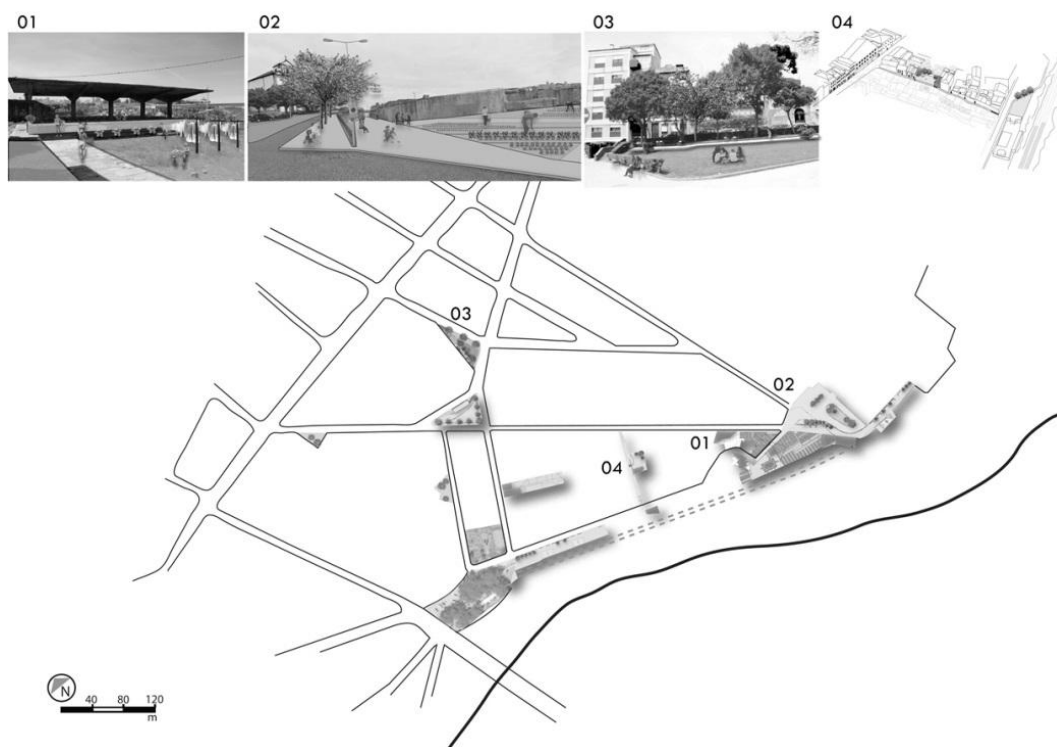


Figure 13. The self-improvement urbanism applied on the study area.

The urban issues identified in the scale analysis could be approached in the same method of self-improvement. In the large scale, the reciprocity between São Vítor street and its surrounding area can be increased through the enhancement of the use of the available public spaces by both social groups (residents and outsiders). Movable urban furniture have low costs and maintenance, and could be implemented by the community itself in strategic public spaces where the connection can be made with outside users for a more intense use of the space. The augment of connection between these groups would diminish the isolation of the Ilhas area and, in a longer term, would also diminish the negative image that the space has in the city.

In the medium scale, the collective space of the street provides room that could be used for the community incentives and connection between the older and younger generations. A great community incentive might be reuse available space, transforming it into common space that facilitate social encounters. Since their dwelling space is so small, extra facilities could be offered as an extension of their houses, just as the corridor space works. A shared outdoor laundry space or a community urban farm are possible ideas. The opinion of some residents was asked during some of the interviews. The idea of a shared cultivating area or space to grow chicken had positive reactions. People especially enjoyed the fact of producing their own vegetables and eggs and also spending an enjoyable time outside. Such simple activities could be implemented and maintained by the community itself.

Conclusion

Despite the low quality living conditions, the inhabitants of the 'Ilhas' show an impressive attachment to their living space, forming a strong community. This quality could be used as

foundation for the ‘self-improvement’ urbanism, where the community operates as the main engine of the urban transformation.

The main finding of the research is that the ‘Ilhas’ could be an inexpensive solution for the current housing crisis through the further development of the ‘self-improvement’ urbanism. This innovative approach includes strong public participation and an innovative position of the planner within the process.

Interviews

Ineke Hulshof, architect from Hulshof Architecten. Delft, the Netherlands. (June 2012)
Inhabitants of São Vítor street and Bairro do Herculano (November/2011 and May/2012)

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The 'ilhas' of Oporto, a fundamental component of the city's nineteenth century urban morphology

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Abstract. *The 'ilhas' are nuclei of working-class housing that were built on Oporto in the second half of the nineteenth century, in the period of greater industrial development of the city. The 'ilhas' were made up of groups of small houses, with an area of about 16 square metres, built along the back-gardens of middle-class houses (or which had been originally built as middle-class houses) in areas of the city that, given their proximity to industries located nearby, had begun a process of physical and social decay that would be further accentuated by the construction of these working-class houses. These houses were built either in a row, along the 5.5 or 6 metres wide urban lots, or in two rows, back-to-back or facing each other, when they occupied two of these plots. They were not unlike similar forms of working-class housing built elsewhere in Europe in the same period, and they would be replicated, by Portuguese emigrants, later on, in Brazil. Small areas, bad construction and a lack of the most basic infrastructures were translated into deplorable housing and sanitary conditions, endemic illnesses and high rates of mortality. Towards the end of the nineteenth century, it is estimated that between one-third and one-half of the population of Porto lived in these conditions. Despite these numbers, and the sheer presence of their inhabitants in urban life, most 'ilhas' were invisible from the formal city: built in the back-gardens, in the interior of urban blocks, their sole relationship with the street was by means of a door – no different from any door – on the façade of the middle-class building facing the street, that led to a corridor under this house and next to an open corridor along the back garden where the rows of small houses were built. In the existing city's cartography they were also absent. Their presence would only be acknowledged towards the end of the century, when a number of epidemics, and a new cartographic survey of the city, led to their formal recognition on the part of the bourgeoisie and the municipal authorities.*

Key Words: 'Ilhas', working-class housing, Oporto, nineteenth-century, industrial city.

General context of development of 'ilhas'

The 'ilhas' are a form of working-class housing which developed in nineteenth century Oporto. This kind of housing consisted of rows of small houses, built in the back-gardens of middle-class properties and with access to the street only through narrow corridors under the houses which faced on to the street.

With the advent of industrialization, and the consequent immigration into the city, the two main solutions to house the lower income groups were, first, to increase the density of existing buildings in the old neighbourhoods up to a saturation point and, second, the development of new speculative housing in the form of 'ilhas'. This later kind of housing consisted of rows of small houses, built in the back gardens of middle class properties and with access to the street only through narrow corridors under the houses which faced onto the street. Subsequent developments made this house form independent of the middle class housing and, in some cases, spread this typology into whole areas of the city, which became exclusive working class wards.

The first immigrants into the city were mostly young, unmarried men who could not find the necessary means of subsistence in the countryside, and salaried rural workers, and even small property owners, who were obliged to procure work in the city in order to survive. Initially, these men retained a link with the land, where their families remained looking after their plots

of land, and where they returned every weekend. During the week, they lived in lodging houses, in the old neighbourhoods of the city. This accounts for the high housing densities registered in the central parishes of the city – Sé, S. Nicolau, Victoria and Miragaia – according to the first census of population in 1864.

By 1881 just over one third of the population of Oporto was dependent on the industrial sector; nine years later, in 1890, that proportion had risen to nearly half of the total population of the city. Correspondingly, the years between 1864 and 1900 are a period of great increase of population in the city, most of it due to immigration from the countryside. Throughout this period the population in the central parishes of the city remained stable, and this new population became established in the outer parishes of Bonfim, Campanhã, S. Ildefonso, Cedofeita and Massarelos, where most 'ilhas' were built in this period. Thus, the housing of the workers in the overcrowded buildings in the old neighbourhoods and in the 'ilhas' corresponded not only to different periods of migration into the city but also to a different type of migrant; people living in the 'ilhas' being a much more stable, family-based population. The 'ilhas' soon became the dominant type of workers' housing in Oporto, and until the 1930's virtually the only way in which new working-class housing was produced. By the end of the century it was estimated that nearly one third of the population of the city – 168,000 inhabitants in 1900 – lived in 'ilhas'. According to a survey carried out in 1899 there were 1,048 'ilhas' with 11,129 houses and lodging 50,000 people (Teixeira, 1994).

Therefore, the 'ilhas' arose as a consequence of the industrial development of Oporto in the second half of the nineteenth century. That is evidenced by their dates of construction, after the 1860's, subsequently to the complete overcrowding of the old neighbourhoods, and coinciding with a period of great immigration into the city, their predominant location near the main industrial areas, and the social composition of their inhabitants, mainly workers.

The 'ilhas' were the result of a secondary process of urbanization, most times superimposed on older middle-class urban developments. The stage of development that is specific of the 'ilhas' is their construction, since the division of land and urbanization of areas of the city where 'ilhas' were built had taken place years and decades before, when the areas concerned were developed as middle-class neighbourhoods.

The 'ilhas' were built at the margin of Municipal by-laws concerning the building of housing. These by-laws were applied only to the constructions that were built facing on to the street; the 'ilhas', because they were built inside the blocks, escaped from their control. The attitude of the Municipality would be characterized till the end of the nineteenth century by a complete disregard concerning both its development and the serious problems that soon surrounded the existence of 'ilhas'. For the successive Municipal Administrations in nineteenth century Oporto, the bourgeois city was the only existing reality. The 'ilhas' were regarded as something exterior to that apparent reality, and therefore not considered or even mentioned in the Municipal policies formulated by successive Administrations. It was only after the epidemics of bubonic plague in 1899, which had its main focus in areas of 'ilhas' and subsequently spread to other areas of the city, that the Municipality took the first legislative and sanitary measures regarding working-class housing.

Built predominantly within the blocks of middle-class housing, these nuclei of working-class housing do not participate in the surrounding urban structure. The only communication of the 'ilhas' with the street was through a narrow tunnel corridor under the middle-class house facing on to the street. Quite often, the entry to this corridor was concealed behind a door included in the composition of the façade. In Oporto, the spatial segregation of working-class housing was not made through their location in different areas of the city. With a few exceptions of working-class wards in the Eastern part of the city, that segregation was made in terms of exterior and interior of the blocks: on the exterior, middle-class housing facing on to the street, the visible face of the city; on the interior, working-class housing built within the blocks, and invisible from the street. This physical "invisibility" of workers' housing had its translation, at the institutional level, in the disregard of the Council towards the construction and the existence of 'ilhas'.

The development of 'ilhas' took place outside the usual circuits of property and building promotion and by social classes other than those usually involved in such activities. The landed bourgeoisie of Oporto, who controlled the urban development of the city in the nineteenth century, was engaged essentially in land promotion for the middle-classes, and it did not invest in the construction of working-class housing. The construction of 'ilhas' was the result of the investment of small capitals on the part of the merchant petty bourgeoisie which had in the 'ilhas' a privileged field of investment for their small savings: a small initial investment and the certainty, assured by the great demand for this type of housing, of the rapid amortization of the capital invested and the obtainment of profits in a short time.

In this sense, the 'ilhas' are the result of processes originated in a subeconomy of small capitals of commercial origin. The holding of land in Oporto was subdivided in a chain of successive leaseings, and the provision of housing for the workers was left to those further down in the landholding hierarchy, to the lessees and sublessees of single plots of land. Working-class housing in Oporto was characterized by its fragmented character. It was the result of multiple small initiatives scattered all over the city, which found their formal expression in the 'ilhas'. The intense use of the land, the low building costs, and virtually no costs of infrastructures, ensured the maximum profitability of the capital invested and made the construction of 'ilhas' a field of investment open to small capitals.

Thus, the 'ilhas' were the result of marginal processes of housing promotion in the nineteenth century, but they were also the result of processes of marginalization concerning bourgeois housing areas in the city. In certain bourgeois areas of the city built in the first half of the nineteenth century, the ageing of these neighbourhoods, the encroachment of industries or working-class housing nearby, or the development of new bourgeois neighbourhoods in other parts of the city, led to a decline in the demand for middle-class housing in such locations. This process, which occurred in the second half of the nineteenth century corresponded to the marginalization of such older bourgeois housing areas, and created favourable conditions for the development of 'ilhas'. In fact, 'ilhas' were built predominantly in former bourgeois housing areas which, as a result of processes of functional transformation in the city, were marginalized by the class that initially inhabited them.

Spatial conditions

One of the main characteristics of the 'ilhas' is their construction within the urban fabric built in the late eighteenth century. This inward growth of the city, embodied by the 'ilhas' is one of the most important aspects of the spatial development of Oporto in the nineteenth century.

In the late eighteenth century the Governors of Oporto planned and carried out a series of public works aimed at the definition of the main lines of future development of the city. The main objectives of the Almadás – father and son, Governors of the city from 1757 till 1804 – were threefold: the construction of new residential areas for the rich merchant bourgeoisie outside the medieval nucleus, the establishment of new and better communications between the active business centre by the river and these new neighbourhoods, and the definition of new lines of expansion for the city. Four major axes of development, which would support future urban growth, were built. Together with the transversals that connected them, they defined the basic urban structure of the city beyond the old city walls.

The plans for these new urban developments, promoted by the "Junta de Obras Publicas", included joint elevations, sometimes corresponding to long street fronts, to which building promoters had to subject their own projects. Such plans were carefully designed taking into account the existing irregular parcelling of the land, and the dimensions of the different lots. In other cases, because land had been expropriated, the land parcelling was reorganized: its basis was a land parcel 25 "palmos" (5.5 metres) wide and usually very long, up to 100 metres. This narrow urban lot would be adopted in most new nineteenth century urban developments. In

addition to the curtailment of infrastructures' costs, this lot dimensions increased the number of possible constructions in a given street front.

The individual lot became in the nineteenth century the fundamental unit in the development of the city, giving free enterprise the greatest flexibility of intervention. Different parcels could be developed separately, by different people and at different times, with different typological characteristics, taking into account only the speculative interests of their owners and the market conditions. The regularity of the urban lots was at the same time the consequence and the logic pattern for the _capitalistic development of the city. Their regularity made all planning operations extremely simple, thanks to the simple multiplication or division of costs, prices and profits by the number of possible lots in a given piece of land. Land had become a commodity, and the development of the city subjected to market laws. On the other hand, this lot width. had a technical justification, based on the technology of construction at the time: this width corresponded to the maximum span of a wooden beam supported on the load bearing walls built at both extremes of the lot. The development of architectural models based on such dimensions, which master builders learned to build and repeated all over the city, contributed to the spreading of this urban typology.

The regular parcelling of urban land in lots with 5.5 or sometimes 6 metres of front width, or their multiples for bigger buildings, had direct consequences on the development of the 'ilhas'. This parcelling of the land was at the origin of the typological characteristics of this form of housing. In its simplest form, an 'ilha' consisted of rows of houses built along these narrow lots: in a single row when built in a single lot, in or in two rows when built in two lots. From these, other, more elaborate variants would evolve. Most times the 'ilhas' were built inside the blocks, occupying the back-gardens of middle-class houses. In some other cases, the 'ilhas' would occupy whole lots, coming up to the street.

The expectations of the Almadás as regards the urban growth of Oporto were not matched by reality, and in between the major axes of development built by the "Junta de Obras Públicas", large extensions of land remained empty till late in the nineteenth century. In certain locations, such areas were occupied by working-class housing. Sometimes superimposed on old rural structures, the development of 'ilhas' gave these areas a predominant working-class character, not mixed with middle-class housing developments. In such cases, although free from the limitations of lot sizes, it was still the typologies of 'ilhas' that were adopted.

Most 'ilhas' are located in an arch surrounding the old nucleus of the city within the eighteenth century extensions of the city. Greater concentrations of 'ilhas' were built near the main industrial areas: to the East, in Bonfim and Campanhã; to the West, in the areas of Lordelo and Massarelos; and to the North the nucleus of 'ilhas' of Bouça, Lapa, Leal and D. Joao IV. By the end of the century it was estimated that nearly one third of the population of the city – 168,000 inhabitants in 1900 – lived in 'ilhas'.

Stages of the process and social actors involved

The great development of private construction in the city took place since the middle of the 1870's, following an increase of Municipal works. The opening of new streets and new building fronts stimulated house building through private initiative. In the fourteen years between 1864 and 1878, 2,700 buildings were built or rebuilt in Oporto, according to plans approved by the Council. Nevertheless, these 2,700 new construction were not enough to house the growth of population registered in those years - 19,000 inhabitants from 1864 to 1878. Even considering that those buildings might house 10,000 new inhabitants (which is an excessive number, since 40% of these works were extensions of existing buildings or reconstructions), there was still a surplus of 9,000 inhabitants, whose only destiny was the overcrowding of existing houses, or the 'ilhas'. The construction of 'ilhas', given that they were not subjected to Municipal approval, are not included in these numbers. On the other hand, the old and overcrowded

districts of the city registered in this period extremely low population - increases, and consequently the housing of these 9,000 inhabitants had to be found in the 'ilhas'.

The 'ilhas' began to be built in large numbers from the middle of the 1860's onwards. Between 1878 and 1890 the number of constructions in the city was about 4,700; to them corresponded the housing of 19,000 inhabitants. Since the growth of population in Oporto in this twelve year period was about 33,000 inhabitants, that means that 14,000 people were left homeless. Also in this case, this population found their housing in the 'ilhas'. Finally, between 1890 and 1900 the number of constructions municipally approved was 2,700. It is noticeable here a decrease in the rhythm of construction, owed in a large extent to the grave financial crisis that affected Portugal since 1891, with serious reflexes in the city of Oporto. To these 2,700 constructions corresponded the lodging of 11,000 people, leaving another 18 000 people without accommodation, considering that between 1890 and 1900 the population of the city grew by 29,000 inhabitants. In short, from 1864 till 1900 about 41,000 new inhabitants in the city had to find accommodation outside the houses that in this period were built with the Council approval. We believe that most of these 41,000 people found housing in the 'ilhas', the construction of which is not reported in Municipal statistics (Teixeira, 1996).

There was a sharp increase in the number of 'ilhas' after 1878. In the short 12-year period between 1878 and 1890 about half of the houses in 'ilhas' were built, whereas their construction declined after 1890. Nevertheless, the development of industry and the continuing immigration into the city, although at a slower pace, continued to ensure a strong demand for working class housing. The insufficient responses of the Municipality and the Government regarding the construction of State sponsored worker's housing, meant that, according to a new survey carried out in 1939, there were then in Oporto 1,152 'ilhas' with 13,000 houses and 45,290 inhabitants (Teixeira, 1992).

Despite the growth of industrial production from 1835 onwards, the industrialists would never become the dominant social class in the city. The merchant bourgeoisie was the dominant social and economic class in the city. It was this class of property owners who were in control of the development of the city throughout the nineteenth century. When not the owners of the land in full ownership, they were the lessees of great estates.

This landed bourgeoisie was, by the middle of the century, mostly engaged in speculative activities; besides the speculation on land, their investments were mostly in shareholding. In no way did they constitute an entrepreneurial class. Theirs was a parasitic capitalism of rent collection, usury and stock exchange speculation, mostly in government bonds and shares from public works' companies backed by the State. Their names are never found related to any industrial enterprise, and in the same way they would never assume the risk, or indeed the trouble, of building for the workers.

Despite the great increases of population in the city in the second half of the century – 81,000 inhabitants between 1864 and 1900, nearly a 100 per cent increase – and the urgent need to house such masses of people, the landed bourgeoisie who had in their hands the mechanisms of development of the city did not answer this challenge and, with very few exceptions, did not invest in building for the working classes. The reasons for this have to be found both in the characteristics of this bourgeoisie, and in the structure of the industrial sector.

The low wages paid to the workers gave them access only to the most poor kind of housing. The allocation of land and the provision of housing purposely built for the working classes would raise the rents to levels not affordable by the workers. Therefore, it was not just a question of the lack of enterprising capacity of the bourgeoisie involved in property development, but also a problem of the industrial bourgeoisie, which had in the low wages paid to the workers one of the main conditions for its survival.

Landed properties in Oporto were leased for three lives – the lessee, the spouse or the husband, and one descendant – after which the lease was renewed and a new rent established. The lessees, in turn, although subjected to conditions imposed by the original landowners, were free to divide the leased property in lots and sublease these parcels, collecting rents that taken together far exceeded the rent they paid to their lessor. The property in Oporto was thus

subdivided in a chain of successive leasings, and its ownership hierarchically organized: the direct landowners, the lessees, and the sublessees.

The lessees of individual plots of land in the city were for the most part middle-class people, merchants, traders, shopkeepers, sometimes craftsmen, who rented those lots to build their own houses. If one excepts the building of 'ilhas', most cases of building promotion were for owner occupancy. Certain locations in the city were preferred by the upper middle-classes, while in other locations the petty bourgeoisie and a certain working-class aristocracy of independent artisans could be found mixed.

The reform of the civil code in 1697, transforming the renewing leases into perpetual leases, gave rise to changes in the controlling mechanisms of this system, and the original landowners progressively lost their control over their properties and their development. Because the rents could not be increased, the depreciation of currency made old rents turn into insignificant values, and the whole system collapsed. As a result of that, the actual property of the land passed on to the tenants. This process would favour the development of 'ilhas'.

With the exception of very rare situations, no 'ilhas' were located in any of the main streets that were opened up in the city after 1865. In those areas of the city, which developed in the 1870's and the 1880's, the ownership of land was still concentrated in the hands of the land promoter, who was able to impose conditions on the use of the land and prevent the building of 'ilhas', which would have given rise to a fall in property values. Also, the prices of land in these new, fashionable streets were high, and therefore not compatible with the economics of working-class housing.

On the contrary, in the areas of the city that had been built in the first half of the century, the land had already been divided in numerous small lots and leased to different individuals. As the years went by, the control by original landowners over the development of those areas had become rather weak. Because of the changes introduced by the new civil code in 1867, that control had become virtually inexistent at the time of great demand for working-class housing. In these circumstances – property divided, with many landholders, lack of control over the use of the land on the part of direct landowners, aged areas, depreciated by industrial developments located in the vicinity, the development of new fashionable residential areas for the wealthy bourgeoisie elsewhere in the city, and great demand for working-class housing – conditions were created for the development of 'ilhas' in such older urban areas. Sometimes, these two phases – middle-class house building and working-class house building – were separated by years and decades; some other times, they were almost simultaneous, and the areas concerned were never fully developed as middle-class housing areas.

The builders of 'ilhas' were many times the original owner-occupiers of middle-class houses, who built 'ilhas' in their own back-garden. In other cases, the original occupier would move out, and the property was sold to someone else with enough capital to build an 'ilha'. Most builders and owners of 'ilhas' were simple tradesmen or craftsmen to whom the 'ilhas' represented a safe and profitable investment for their savings. The small scale of the enterprise, and the little investment they represented, made the 'ilhas' – the object of the speculative activity of a large sector of the middle-classes in nineteenth century Oporto. On the other hand, the profitability of the investment was very high; in certain 'ilhas', the annual rents collected from all the houses represented 25% of the market value of the 'ilha', that is to say, the capital invested in their construction would be fully amortized in four years' time. In most cases that period was about ten years. As a result of that, men of higher financial means, not usually involved in the construction of 'ilhas' started to promote working-class housing as well. They were successful traders, rich migrants returning from Brazil, and in some cases even a few landowners involved themselves in the construction of 'ilhas'. They would buy or lease plots of land and promote the construction of 'ilhas', some of them becoming the owners of numerous 'ilhas' in different parts of the city. In these cases, the 'ilhas' were generally bigger and had much better housing standards than the average. Because of the higher investment necessary to build such 'ilhas' their promoters resorted to bank loans for their construction. However, either because of bad management, or because the costs of building better quality working-class housing were

incompatible with the economic capacity of the workers and their ability to pay higher rents, such enterprises generally ended in failure.

Location and morphologies of 'ilhas'

Most 'ilhas' were located in the parishes of S. Ildefonso, Bonfim, Campanhã, Paranhos and Cedofeita, which surround the old nucleus of the city to the North and the East. Together, these parishes accounted for 75% of the 'ilhas' in Oporto. The parishes of Massarelos, Lordelo and Paranhos, to the West, had another 14% of the 'ilhas'. These were the parishes that registered bigger population increases between 1878 and 1890, when most 'ilhas' were built. Bonfim, Campanhã, S. Ildefonso, Cedofeita and Massarelos, alone, registered population increases in this period of about 2/3 of the total growth of the city. The four parishes in the historical centre of the city – Sé, Vitoria, S. Nicolau and Miragaia – accounted for only 7% of the 'ilhas'. The remaining 4% were located in the outermost parishes of Aldoar, Nevogilde and Foz, away from the main industrial locations.

As regards their typologies, most 'ilhas' were built inside the blocks, either isolated or in clusters. At the origin of the typologies of 'ilhas' was the general adoption in nineteenth century urban developments of urban lots with a front width of 5.5 or 6 metres. The simplest type of 'ilha' consisted of a row of small one-storey houses built side by side and all along one of these parcels, which were sometimes up to 100 metres long. All the houses opened onto a narrow corridor running all along them, with a width usually not exceeding 1.5 or 2 metres, sometimes decreasing to just one metre, the strictly necessary to give way to the inhabitants. In 60% of the cases, these passageways had less than three metres of width. In other cases, the 'ilha' was built in two lots. Here, the houses were located on both sides of the parcel, opening to a central path, common to both rows of houses. The joining of two lots allowed greater areas for access corridors, sometimes up to 4 metres wide. In either of these cases, houses had only one free frontage. Their rears were propped up against the enclosure wall of the lot or the backs of another row of houses of the 'ilha' built on the neighbouring lot. Sometimes, when the 'ilha' was built on two parcels of land, the two rows of houses were built back-to-back in the middle of the plot, leaving two lateral corridors for access.

These were the two basic typologies of 'ilhas', which were developed from the 6-metres wide urban lot. The development of these typologies, and the related housing typologies, led to their adoption to situations where those limitations of lot dimensions did not exist. They were the most rational typological solutions in terms of intensive use of the land, curtailment of construction costs, and consequently of economic efficiency. When working-class housing was built on larger pieces of land, the most usual solution was still the construction of successive rows of houses built back-to-back, using the typologies and dimensions of smaller 'ilhas'.

'Ilhas' varied a lot in their sizes. Small 'ilhas', consisting of up to twenty houses, were the majority in Oporto; sometimes they had as few as four or five houses. The biggest 'ilhas' could have 100 or more houses, and because they represented bigger enterprises and higher investments, they usually had better housing standards than most smaller 'ilhas'.

The relation between the 'ilha' and the street could take different forms. When there was a middle-class house facing the street, and occupying the whole front of the lot, the access to the 'ilha' built in the rear was made through a narrow tunnel corridor. Under this building. This house looking on to the street was usually a bourgeois multi-storey house, sometimes the dwelling of the owner of the 'ilha' himself. In other cases, the 'ilha' had a free communication with the street, through an open passageway next to the front building. This building did not occupy the whole front of the lot, leaving a narrow passage, which in most cases did not exceed one metre, for access to the 'ilha'. The existence of this open passage means that the front house and the 'ilha' were built at the same time.

The 'ilha' could also occupy a whole parcel of land, coming up to the street, without any middle-class building in front of it. The most usual solution in these cases was the construction

in two lots, with two rows of houses opening to a central path. The street frontage was made up of a simple wall, in which a door to the 'ilha' was opened. Sometimes, later on, the first house in the 'ilha' opened windows in this wall giving on to the street. In some more elaborate examples the 'ilha' itself built a façade to the street: making the first houses face the street, signaling its entry, or giving a name to the 'ilha', the last phase of its affirmation as a recognizable housing form.

As regards equipment and infrastructures, they were very poor. In most 'ilhas' there was no sewage system or water supply. According to a survey of 'ilhas' carried out in 1933, at this late date only 7% of the 'ilhas' were connected to the urban sewage system. All the others used cesspools. This situation was certainly even worse in the nineteenth century, before the construction, in 1905, of the new sewer system in the city. The lavatories were common to all inhabitants of the 'ilha'. According to that survey, there was on average one lavatory for every 5 houses or 25 inhabitants. Domiciliary supply of water, although established in the city in 1882¹, did not exist in the 'ilhas'. Water was provided by public fountains or, in some cases, by a well, but the nearby location of cesspools made the water unsuitable for consumption. Open spaces were usually very small, in most cases reduced to the narrow access corridor to the houses. Nevertheless, although rare, there were examples of 'ilhas' where there was room for a small vegetable garden.

Concerning the typologies of houses, their areas rarely exceeded sixteen square metres, decreasing in some cases to just nine square metres. In the most common type of such houses, its front was 4 metres wide, with only one door and one window. Its depth was also 4 metres. With just one storey and an area of 16 square metres, they consisted of a living room, a small sleeping-room or alcove, and a kitchen. Their dimensions were the following: the living-room 4x2.5 metres; the alcove 2.5x1.5 metres; and the kitchen, against the back wall, 1.5x1.5 metres. Houses with more than these three divisions were rare. Because the sleeping-room was very small, the living-room was also used for sleeping. In some cases, a small room was improvised in the attic, to which a narrow and steep staircase led. The ceiling of the houses was the bare framework of the roof, external walls were generally made of stone, and the internal partitions of wood. These partitions were not complete, because they did not reach the ceiling.

The houses were low, their high varying from two metres at their lowest point till 2.5 metres at the ridge. As a result of that, sometimes the total volume of the house did not reach 30 cubic metres. The situation worsened by the absence of cross ventilation. Also, the windows were very small in relation to the space they were supposed to illuminate; because every house had just one small window, in some cases illumination was increased by means of glass tiles. Construction was very poor and a few years after construction, in the damp climate of Oporto, these houses were rapidly decaying.

Some 'ilhas', and houses in 'ilhas', had much better standards. In such cases internal streets were wider, and communal spaces were provided, with tanks for washing. House areas in such cases could be as large as 90 square metres. In most cases the houses were two-storey high, with each dwelling occupying both storeys. Usually 'ilhas' with better standards were amongst the biggest 'ilhas' in Oporto, with 100 to 150 houses, and their construction had been the initiative of the owner of the land himself. However, these 'ilhas' were quite often economic failures for their promoters, unable to pay the debts contracted for their construction. Sometimes, as a means of reducing house rents and making them accessible to most workers, the two-storey houses were split up in two independent dwellings. The result was an increase of densities, and a lowering of the initially better housing standards.

Conclusion

The low initial investment, and the perspective of easy and quick profits on the part of their promoters, resulted in the construction of dwellings with extremely low housing standards, which decayed rapidly. Throughout the years the 'ilhas' were subjected to a progressive decay.

On the other hand, the same conditions that gave origin to the development of 'ilhas' outside the usual circuits of property development, and the usual social strata involved in such activities, were on the basis of the persistence of this housing form in the twentieth century. The dynamics of economic development of the city and the capitalistic mechanisms of transformation of the city were never strong enough to absorb these obsolete land use forms, which became nodules in the urban fabric, hindering its development and sometimes the application of planning directives of the Council itself. From a non-entity in the nineteenth century, the 'ilhas' were, from the early nineteenth century, regarded by the Municipality as a cancer that was necessary to eradicate. Either way, the 'ilhas' were regarded as something external to the bourgeois idea of the city.

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Agents of Change

For much of the period of its existence as an identifiable field of academic study, urban morphology has been criticised as being largely descriptive in its approach. This was particularly the case in the formative phase of the 1960s and 1970s when urban geography and social science generally were dominated by quantitative spatial analysis and political economic (mainly Marxian) approaches respectively. Although there may have been some substance to such criticisms they considerably underplay the necessary groundwork in urban morphology that was being established at this time and reflect an assumption that ‘process’ could only be uncovered through the measurement of specific social and economic mechanisms. The priorities in urban morphology were different, reflecting the need to establish a common framework for study including identifying a taxonomy for the analysis of morphological change, the recognition of the key components of urban morphology and methodologies for their examination. Building on this underpinning, urban morphology has subsequently developed strongly in several academic directions but, given the continuing societal, academic and practical interest in change in the physical form of urban areas, much emphasis has been placed on the agents of change. Initially, work focused on the roles played by the principal actors in urban change, particularly land and property owners, politicians, architects, planners and developers. In some ways, this has paralleled the interests of other urban scholars, less concerned with physical form and more with the power relations and economic influences of specific groups in determining outcomes. The ‘Agents of Change’ sessions at the Porto ISUF 2014 Conference will undoubtedly continue to explore some of these relationships, including the examination of the conflicts that inevitably arise between such actors. However, a brief survey of recent literature indicates that the term ‘agents of change’ has moved beyond the consideration of key actors, functioning as individuals and/or groups, and also encompasses the role of institutions, transport infrastructure and connectivity, demographic trends, religion, and street systems. Critics may consider the inclusion of such phenomena to constitute too wide a definition, but their role as factors and processes of urban transformation cannot be denied. The papers to be delivered in the ‘Agents of Change’ sessions promise to explore the role of many of the above in specific situations and stimulate debate on diverse aspects of their operation. Whilst listening to the detailed content of presentations however, it may be useful to reflect on the applicability of specific studies to broader themes and conceptual frameworks. Three such themes will be briefly mentioned here – scale, comparability and the morphological components being studied. The scale of study is vital in its interpretation if only because conclusions drawn at one scale may be considerably less (or possibly more) applicable at a different scale. In any search for concepts of universal applicability it is important to remember the difference that scale makes to empirical reality and theoretical interpretation. Second, comparability of experience, cultures, political systems and many other dimensions remains an important dimension of morphological study and can stimulate some of the most intriguing work. Despite the pressure of globalisation, the question of what sort of processes operate in different cultural milieu remains an extremely important one. Finally, we need to be very clear

which specific morphological components we are discussing and debating, not least because different components change at a very different rate and are themselves subject to rather different processes.

Michael Barke

Influences of housing municipal policy in slum urban form: the case of Heliopolis (São Paulo, Brazil)

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Abstract. *This article aims at understanding the possible influences of public policies on the urban form of fragile and precarious settlements in the city of São Paulo. While establishing the physical, temporal and thematic limits of this study, we chose to analyze housing policies which have been elaborated for the precarious settlement of Heliopolis from 1989 to 2012. Firstly, the paper presents theoretical studies of the housing policy management developed in the chosen period, the founding and building of the slum area, and the main interventions made by the municipal government in the area selected for analysis. Secondly, in the pursuit of comprehending how the different policy guidelines have influenced in Heliopolis, we present an analysis of the Residencial Silvio Bacarelli housing development, a hybrid space created under the influence of different city administrations with distinct guidelines.*

Key Words: *Urban morphology, housing policy management, precarious settlement, Heliopolis, analysis of architectural and urban projects*

Introduction

Scholars of Urban Morphology analyze the evolution of cities from their fundamental principles, considering their constant transformations and identifying their numerous constitutive elements. A city is the accumulation and integration of several individual and collective actions, brought about by cultural traditions and social, political and economic ties over the years. Morphological analyses focus on the tangible results of social-economic actions, by studying the consequences of ideas and intentions on the mutation of urban areas (Antonucci, 2011).

Under this point of view, the research aims at implementing a specific study on the influence of public housing policy management on architectural and urban projects for precarious settlements in the city of São Paulo.

While setting the geographical location and time period for study, the research was delimited to study the influence of different housing policy managements on architectural and urban projects developed for Heliopolis, the second biggest slum area in the city, from the end of the military dictatorship⁷⁷ to today.

Firstly, through a review of the literature, will be outlined the evolution of housing policy management in São Paulo. Considering the aforementioned time period, we will approach the following city administrations: Erundina (1989-92), Maluf (1993-96), Pitta (1997-00), Suplicy (2001-04), Serra (2005-06) and Kassab (2007-12) and present the main housing policy guidelines of each administration.

Secondly, will be outlined the history of Heliopolis. At this stage of the paper, will be recapitulated how the urban fabric of the slum area was formed and how it has changed since its foundation in 1971. Next, a short report of the main constructions proposed by each administration will be presented, complementing the historical analysis and directing it to the paper's topic.

⁷⁷ The military regime began on April 1st, 1964 and ended on March 15th, 1985.

Finally, after the literature review and interview of a São Paulo city servant, will be presented the case study of the housing development on Land H, which was designed by architect Hector Vigliecca and team and suffered influences from two quite distinct housing policies. This is why this housing development was selected for this article.

This article aims to explain how distinct, but clear and well-defined, political guidelines can interfere in different ways in the urban form of a single precarious settlement: Heliopolis.

Theoretical study

In this first part of the paper, this research will be started with the theoretical study with a review of the bibliography. Initially, there will be a brief history of housing policy management in the military government during the Brazilian dictatorship and in the different São Paulo city governments after the reestablishment of democracy. Secondly, will be presented the study on the formation of Heliopolis and the public interventions in the area.

Housing policy management

Historically, housing policy management has been redefined at every change of city administration, which leads to each policy being distinct. The city housing policy guidelines, always influenced by the political foundations which elected each specific administration, underwent transformations and prioritized different objectives, giving way to architectural projects with quite distinct urban characteristics from one another.

Below, there is a review of the housing policy which guided the actions of the military government all over the country, and the municipal policies developed in São Paulo, in the democratic period, when society reconquered the right to direct vote.

Military dictatorship (1964-1985)

From 1932 to 1964, a successful “housing policy” was developed in several states around the country by the IAP’s (*Institutos de Aposentadorias e Pensões* - Institutes for Retirement and Pensions). This phase was marked by the construction of housing developments with internationally acclaimed, high quality, modern architecture.

Between 1964 and 1985, during the Military Dictatorship, housing projects built by public organs and were financially managed by SFH (*Sistema Financeiro da Habitação* - Financial Housing System) / BNH (*Banco Nacional de Habitação* - National Housing Bank) (Antonucci, 2009). Although they were originally built for the low income population, these institutions significantly financed these homes to the middle and high class population. SFH/BNH were effective agents for raising dynamism in the national economy, especially in the housing market, leaving the goal of overcoming the housing deficit only in discourse.

This production was guided by a housing policy that valued the centralization of power, devalued the environment and cultural heritage and prioritized services to the higher income population in order to avoid so-called ‘non repayable’ investment (Bonduki, 2000). This posture gave way to the building of housing developments focused on production and capital investment and not on the quality of the units, neither serving the low income population (Bonduki, 2000). “The housing developments financed by BNH are characterized mostly by their monotonous architecture; absence of connection with the surroundings; locations far from the city center, which extend the city horizontally; their lack of concern with the quality of the projects and physical space, resulting in environmental damage; the negation of the processes of community participation [...]” (Bonduki, 2000: 21).

Sistema Financeiro da Habitação went into crisis after the end of the military dictatorship and the extinction of *Banco Nacional de Habitação* in 1986 ended the production cycle of social interest housing developments.

The Luiza Erundina Administration (1989-1992)

In 1988, with the São Paulo city elections – a few years after the end of the military regime – Luiza Erundina was elected mayor with wide support of the population and the promise to take charge of housing policy management as flagship of her government.

That administration reformed the housing policy, defining new guidelines for projects: decentralized management with emphasis in local power associated to institutions of people's participation, implementation of urban projects to revitalize decadent areas and housing projects in already urbanized areas, self-run collectives and right to land for all.

According to Bonduki (2010), the proposals of that administration were of experimental nature, therefore, they would seek a specific solution for each and every housing problem in the city. There was hope that that experiment would offer references for the formulation of future housing policy management cross-country.

Based on this ideal, they developed projects aiming at the quality of the housing unit with projected and built public space. The space was thought of in public dimensions, beyond the private sphere and with a focus on the low income population (Bonduki, 2008).

The Paulo Maluf Administration (1993-1996)/Celso Pitta Administration (1997-2000)

After the Erundina administration, there was a pause to the programs that had been created until then, and in their place, the housing project PROVER, known as '*Cingapura*', was implemented by the Paulo Maluf administration (1993-1996). This project was characterized by sporadic constructions and low architectural quality and was continued in the Celso Pitta administration (1997-2000), serving mostly for political propaganda in (Antonucci & Filocomo, 2012).

The Marta Suplicy Administration (2001-2004)

In Suplicy's first year in office, the federal Statute of the City (Law 10 257/2001) was approved in congress. In principle, this law implements the pursuit of social justice in the entire country, and, in order to reach that target, a number of urban planning tools were created to help municipal administrations in the development of urban policies.

The Suplicy administration adopted the concept of the then-recently approved federal legislation to create the first PMH (*Plano Municipal de Habitação* - Municipal Housing Plan) in the city of São Paulo, which ended in 2012, the year Kassab's administration developed the second PMH (Barda and França, 2011). The main objective of Suplicy's PMH was to create great fields of action in the city of São Paulo, which were to stimulate social and spatial inclusion of the low income population in the most valuable areas in the city (fontes, 2005:86).

The *Plano Municipal de Habitação* also established the guiding principles of the Suplicy housing policy, which were: the creation of the Municipal Housing Council (CMH) – a team of representatives of the government, civil society and members elected by citizens. They would evaluate the projects in development, the administrative modernization of the municipal organs and the search for partnerships to finance public interventions (Fontes, 2005:87).

They also developed a consistent plan of action in slum areas, squatter settlements and improvements in the housing developments built for the low income population in previous administrations. All of the projects developed by this administration strived at maintaining the families in the areas they already inhabited.

The José Serra administration (2005-2006) / Gilberto Kassab Administration (2006-2008 / 2009-2012)

According to França (2012), as a work objective, the focus of the housing policy of Serra/Kassab was to comprehend the relation between the city and precarious settlements. As a

result of this work guideline, they developed housing projects which aimed at, for example, solving urban problems which surpassed the limits of slum areas. The most successful programs were the urbanization of Cantinho do Céu, on the banks of the Billings reservoir (Antonucci and Filocomo, 2013), and the Renova SP program, which created work perimeters of approximately 4 million meters squared (Barda and França, 2011).

In addition to these large scale projects, they produced housing developments following urban guidelines, but which were developed as architectural projects. This is the case with the projects developed for the Heliopolis slum area.

Human settlement: Heliopolis

Currently, with its 41,118 people (IBGE, 2014) and 986,222 meters squared (Fontes, 2005: 53), Heliopolis is the second most populated precarious settlement in the city of São Paulo. Its foundation was quite peculiar: it was the result of an unsuccessful housing policy. Its development, similar to other cases in São Paulo, was the result of the rising search for lands by the low income citizens. In this case, it was a large plot of land near the city center, therefore well-attended by the urban infrastructure network.

History of the occupied area

The first ownership record of the area known as Heliopolis today appoints the Countess Álvares de Penteado as proprietor. In 1923, the city hall opened a protocol to subdivide and urbanize the area. This project was not implemented (Sampaio, 1991).

On April 23rd, 1942, the land was disowned by the Institute of Retirement and Pension of Industrial Workers (IAPI) in order to build housing units for its members, a common practice of the retirement and pension institutes (IAP's) of the day. 36 houses, from 141 to 697 meters squared were built (Albuquerque, 2006: 186).

In 1966, the retirement and pension institutes merged and the National Social Pension Institute (INPS) was created. As a consequence, the land became INPS property. During this period, approximately 423,000 meters squared were subdivided and sold to PERTOBRAS, the energy company of Brasil (Albuquerque, 2006:186). Nowadays, part of the area is still occupied by PETROBRAS.

Another part of the land was dismembered in 1969 by the governments in power to implement two public health units: The Heliopolis Hospital and a Basic Medical Center (PAM). The second unit has regional importance.

During the decade of 1960 and 1970, it was common for city and state governments to create temporary shelters for low income families removed from areas receiving public intervention – mostly for street and road building. In 1971, 150 families were removed from a public area, in Vila Prudente, neighborhood of São Paulo, in order to build an overpass. These families were sheltered in the Heliopolis area.

In 1978, more than 60 families were removed from Vergueiro, a neighborhood of São Paulo, for the construction of a new road for the city. A total of 210 families were relocated to temporary shelters in the INPS land (Albuquerque, 2006: 186). This area, a specific point in the land, can be seen in this aerial photograph made available by Fontes (2005).

With this new architectural intervention by the government, there was massive mobilization to occupy the remaining space in 1977. The dwellers of these shelters, workers of the Heliopolis Hospital and PAM, bought the areas from the “invaders”, who subdivided the area and sold plots illegally, forging landownership documents. This illegal activity encouraged the occupation of the area in record speed, and due to this, the temporary shelters were treated as permanent interventions.

A new subdivision of the land took place in 1978, when part of the INPS property was sold to the São Paulo state sewage company (SABESP). The land was acquired by the Company so that equipment could be installed for the structure of the Construction Program for Sewage and

Water Pollution Control of the Metropolitan Area of São Paulo (SANEGRAN) (Albuquerque, 2006: 187). This area is still occupied by the company.

It is important to mention that both PETROBRAS and SABESP had bought land from a dismembered area and built low density occupations with low urban quality in comparison with their surroundings. These areas can be considered urban barriers, thanks to the large dimensions of the properties and their lack of use.

In 1980, INPS takes legal action for a repossession suit in the occupied area, mainly due to the action of “*grileiros*” – a typical and common type of invaders land in Brazil that sell counterfeit land lots propriety for other people. The plea was granted in 1983. In 1984, the land was sold to the National Housing Bank (BNH). However, with the bankruptcy of the Housing Financing System (SFH) and the extinction of BNH, landownership was transferred to the Housing Company of São Paulo (COHAB-SP) in 1987. At this moment, the sum of the land area of Heliópolis reached approximately 950,000 meters squared (Albuquerque, 2006: 187).

Due to a series of irregularities (occupations linked to irregular subdivisions since the 1970s; consolidation of temporary shelters; population of workers of industries located on the margins of Anchieta road and Juntas Provisórias Avenue; migrations to be close to family and friends), in 1986, Heliópolis clearly shows urban characteristics which would reflect on the development of the area. Among other characteristics were irregular urban network, small lands with no regularization, small empty spaces, low quality housing units (especially in precarious brick and/or wood constructions) and the inexistence or precariousness of infrastructure (Luz, 2010: 03). These characteristics can be clearly observed in an aerial photograph from 1986 (Fontes, 2005: 75).

At that time, there were about 20,000 inhabitants organized in approximately 4,700 housing units, of which 51% were wooden and 49% precarious brick constructions (Fontes, 2005: 56). This initial precarious structuring of the area did not impede further population of the settlement, which continues to grow until today. However, from the 1980s on, urban development of the area has been mainly influenced by direct public action.

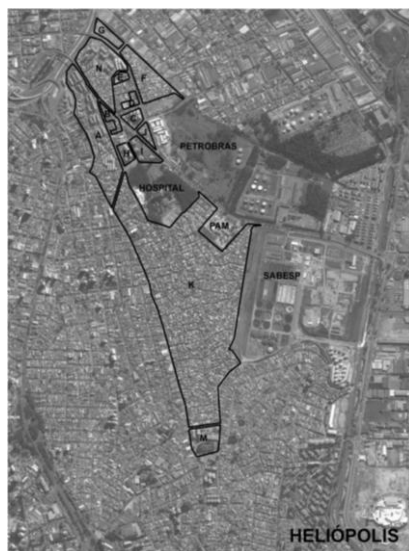


Figure 1. Heliópolis (Map by authors).

History of public policies for the area

Although this research concentrates on the study of post-dictatorship housing policy management, public policies for the Heliópolis slum area began in the Barros administration (1979-1982). Therefore, will be briefly described the public interventions from the end of the

dictatorship: Reynaldo de Barros (1979-1982), Mario Covas (1983-1985) and Janio Quadros (1986-1988). In sequence, will be listed the main public interventions of the period in question, which spans from 1989 to 2012.

During the Barros administration (1979-1982), after years of struggle, the Heliópolis residents' association were granted service from PRO-AGUA and PRO-LUZ, water and energy programs of PROMORAR, the São Paulo city housing program. These policies aimed at improving and/or implanting the public infrastructure network in slum areas. In this case, water and energy supply was taken to parts of Heliópolis and both were financed by BNH (Fontes, 2005: 68).

In Mario Covas' administration (1983-1985), there were few, inefficient public programs for the area. Amongst those were two failed attempts at creating the Housing Plan of Heliópolis and an attempt at hiring a social assistance team for the area, who were eventually removed due to alleged lack of work conditions (Fontes, 2005: 68).

Between 1986 and 1988, during the Janio Quadros administration, 276 "embryonic housing units" were built by contractors. They were basic residential units which previewed the possibility of inhabitants themselves expanding their units. The units were 24 meters squared each, located in 74 meters squared lands.

In addition, 43 vertical units were built with 16 apartments each, with a total of 688 housing units, attending the population with income above 10 minimum wages. At the end of the term, more than 1176 units started being built by collective action. However, due to litigation from the residents' association, only 318 units were delivered (Fontes, 2005: 73).

During Luiza Erundina's administration (1989-1992) in the democratic period, the first urban plan was implemented in the area: the Global Plan of Interventions in Heliópolis (*Plano Global de Intervenções em Heliópolis*). The strongest guideline of the program was to keep the families which lived in the area there during project execution. However, if a housing unit had to be removed due to precariousness, risk or infrastructure building, the families affected were relocated to another area of Heliópolis.

In that moment, 178 vertical units started to be built by contractors and 130 units were built by organized collective action. Of 308 units, only 120 were finished. Other constructions paused during the following Maluf and Pitta administrations (Fontes, 2005: 76).

During Maluf's (1993-1996) and Pitta's (1997-2000) administrations, vertical and standardized housing units known as "Singapura" were built in Heliópolis, as well as in other areas of the city. This program was called PROVER and it delivered 344 housing units in Heliópolis in 1998 (Fontes, 2005: 79).

In Suplicy's administration (2001-2004), 430 vertical housing units were built by contractors. 344 more were in construction, but had been sold before the end of the term. Her administration invested the most in the urbanization of Heliópolis, by attending 14,588 families and 75% of the total area. The urbanization project implemented water and sewage networks, paved the consolidated urban areas and created leisure and green areas (Fontes, 2005: 83).

In the Serra (2005-2006) and Kassab (2006-2008/2009-2010) administrations, Heliópolis, as well as Paraisópolis, São Francisco and Jaguaré, were considered areas of particular importance due to being the four largest precarious settlements in the city of São Paulo.

The governments sought to develop projects that enabled implementing an infrastructure network in the neighborhoods (water supply, sewage collection and public drainage networks), the removal of families from areas in risk, the construction of new housing units to attend the housing deficit of the area, street pavement and construction of public equipment (França, 2012: 35).

By the end of the term, 100% of the families living in these four slum areas had been attended with water supply and 80% with sewage collection through the official network. In addition, 15,843 families had obtained official ownership of the units they inhabited in Heliópolis and, in addition, 3,442 new units were distributed among lands A, H, K, SABESP, N, Rocinha and G (França, 2012: 34, 103). It is important to note that not all units were inaugurated during Kassab's term.

Analysis of the influence of housing policy management on the urban space

The study of the relation between society and urban space has been discussed and proven by different researchers in the area of urban morphology. We can briefly cite names, such as Manuel Castells, David Harvey and Henri Lefebvre, who have contributed to this area.

In the same manner, we can affirm that the creation of urban form is the product of human action and the process of transforming space and its results comes from the political, social, economic and cultural actions of each community (Antonucci, 2005).

However, in 2001, Whitehand criticized urban micromorphology in the sense that it “has not been widely investigated” (Chen, 2012: 135). And, based on Chen’s conclusion, we can affirm that this detailed study of the production of this urban space clearly points out the political, economic, social and cultural influences on urban space in general. The Brazilian studies which have been published lean towards this theory (Antonucci & Filocomo, 2012).

Based on this information, will be presented the case study on Heliopolis below. This phase of the research aims to identify the relations between urban policies and urban space production, represented by the construction of housing units for the low income population by the municipal government.

Selection of the analyzed project

Considering the limitations of one paper, was defined, for this publication, select only one housing development to present. Therefore, we defined a methodology which would gather the main architectural projects developed for Heliopolis during the established period.

The Angélil and Hehl’s work (2012) was choose as an initial reference for the selection because of their list with 14 finished or unfinished constructions for the precarious settlement in question. In this work it’s possible to find some of the most important projects for the area.

The production was organized by the authors as followed:

After analyzing the available material, we selected the land H housing development designed by the architect Hector Vigliecca and team, due to it being the only one to receive direct influence from completely different housing policy managements, therefore better to exemplify the possible political influences on the urban form.

Land housing development (2013)

Based on the images provided by Vigliecca and Associates’ office, made available by Arcoweb (ARCOWEB, 2014), and information from the São Paulo city hall and architect Marcelo Rebelo⁷⁸, we can recapitulate a brief history of the land H housing development area, making a morphologic analysis of the space and considering the political, social and economic influences.

The first public intervention in the area was during the Maluf and Pitta administrations, when they decided to provide social interest housing units on land H, Heliopolis. For this, they elaborated and executed the projects in the lines of PROVER (Singapura), idealized by the abovementioned administrations.

When the construction of the Singapura housing development began, there was a fire that destroyed the unfinished towers, and the work was interrupted. At the time, 5 towers had been built and were receiving finishing touches, while the foundations for the rest of the buildings

⁷⁸ Interviewed in the beginning of 2014.

were in progress. The PROVER development was not resumed. From then, there were unplanned interventions, detached from surroundings and with low architectural quality.

Table 1. List of construction

City Administration	Period	Housing Developments Built	Notes
Erundina	1989-1992	Development 113 (Land K)	
Maluf + Pitta	1993-2000	Cingapura / PROVER (Land L1) COHAB (Land L2)	
Suplicy	2001-2004	PROVER (Land A)	start: Pitta administration
Serra + Kassab	2005-2012	Development 0 (Land A) Development 1 (Land A) Development Ceratti (Land N) Pocket II (Land A) Development D and E (Land N) Development 4 and 5 (Land A) Edifício Comandante Taylor (Land K2) SABESP 1 (Land K1)	
Haddad	2013-2016	Land H Land G	start: Kassab administration start: Kassab administration

The combination of housing deficit, high expansion potential in slum areas, completely dissociated and already deteriorated urban space and available space for construction encouraged irregular occupation of the empty space left by the unfinished PROVER development (a characteristic of the housing projects from the Maluf and Pitta administrations 1993-2000).

This irregular occupation consolidated and lingered in the area for about a decade. During this time, the homes produced by the residents of the slum went from ground constructions to precarious buildings of up to six floors, built in brick.

In 2009, during Kassab's administration, there was a new project for the land H housing development, named Residencial Silvio Bacarelli, which was developed by the Vigliecca and Associates office. The project was finalized in 2012. During this process, the irregular housing units built on the land were removed and construction began.

The project developed by the architect Hector Vigliecca and team sought to preserve the almost finalized structures from the PROVER program and, in the remaining area of the land, they created buildings attached to the pre-existing 5-floor structures.

The design of the buildings, besides having more harmonious dimensions with the surroundings, created six small leisure areas, a big square – where there is a multi-sports court, lanes connecting every block and three streets accessing the development, solving drainage, water supply and sewage collection problems.

The area of the unfinished towers was recovered and finalized, completing the 200 50 meter-squared apartments.

Construction finished in 2013 and, according to the source, the project was capable of relocating all families initially removed for the Singapura project.



Figure 2. Residencial Silvio Bacarelli before last intervencion - Photo by Vigliecca e arquitetos associados.



Figure 3. Residencial Silvio Bacarelli nowadays - Photo by Vigliecca e arquitetos associados

Final thoughts

After studying the documents about the political decisions made in different historical contexts, it was clear how the preoccupations of each government were distinct as to the quality of the architecture and urbanism of the produced housing developments, as well as to their preoccupation in improving the housing deficit in the city (Antonucci and Filocomo, 2012) and implementing infrastructure in precarious areas.

The interventions in Heliópolis dating back from 1979, still in the dictatorship, denounce the distinct interests of each administration regarding housing policy management. We believe that this interpretation is made possible because the precarious settlement in question is today the second largest slum of São Paulo in population, therefore being frequently chosen by the different administrations for housing policy experiments and consolidating concepts of intervention.

In the case of the Residencial Silvio Bacarelli development, on land H, we can observe how clear guidelines can lead either to creating quality urban spaces which correspond to the area's social demands, as seen in the Vigliecca and team project, or to producing spaces with no urban relation with surroundings, such as PROVER, which was implemented in other areas of São Paulo as well.

It is clear, however, that the city's housing policy management influenced the urban form of the precarious settlements of the municipality and that is why guidelines must be created compatible with the reality of each area of the city, so that the idea of urban space production through political action in precarious areas is compatible with the aspirations, the history and the culture of the population.

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The auto representative image as an agent of legitimation and incorporation of urban settlements in the city of Rio de Janeiro

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Abstract. *Social Housing is a highly sensitive social issue in Brazil, where there is an urgent need to develop strong building policies for large conurbations. With the objective of guaranteeing more security and access to dignified housing, was established the society's engagement and the practice of new strategies that enable a bigger commitment with the elaborated proposals. In this sense, independent initiatives that intend to form photographers in slums are accomplishing a bigger visibility in Rio de Janeiro and this pedagogical work represents a new dialogue with the inhabitants of informal areas. The inhabitants can contribute in an effective way to a housing and urban proposal more suitable to their aspirations. The image decharacterization language assumes here the guiding role of the research in the inclusionary housing, contributing to help to solve housing issues, pointed with the documentary look. The research attempts to investigate how such images can contribute to the development and evaluation of inclusive practices of public policies in Social Housing and how they may benefit from the community's perception of their own environment. In the interaction between dwellers and local photographers, the community can convey their aspirations more effectively and closely related to their local realities.*

Key Words: *auto representative image, inclusionary housing, urban planning, housing planning, urban settlements.*

Introduction

This Project originated from the author's reflections after working with “*Instituto de Terras e Cartografia do Estado do Rio de Janeiro/ITERJ*” (Land and Cartography Institute of Rio de Janeiro State)⁷⁹, and during the preparation of the thesis “*Salubridade na Moradia Popular em Assentamentos Rurais no Estado do Rio de Janeiro: uma análise a partir do Mutirão Campo Alegre*” (Salubriousness of Social Housing in Rural Settlements in the State of Rio de Janeiro: Analysis of the Campo Alegre Cooperative) for a Master's degree⁸⁰.

In both latter instances, photography was a crucial instrument for recording research in the field and vital in the subsequent analysis of the buildings environment. In the case of *ITERJ*, photography was vital to evaluate the transformation of the settlement following legalization of the properties and lands where they were built. As for the thesis, photography was invaluable to evaluate the physical conditions of buildings within Campo Alegre, undertaken with methods developed by the “*Rede Brasileira de Habitação Saudável RBHSQ/Fiocruz*” (Brazilian Network of Healthy Housing).

⁷⁹ In the period 2003-2006 with the assistance of “*Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro/FAPERJ*”, the work aimed at mapping the housing and infrastructure conditions of three settlements regularized (legalized) by ITERJ in the metropolitan area of Rio de Janeiro.

⁸⁰ The focus was to investigate a cause-effect relationship between housing and health conditions as well as their influence in the development of the Campo Alegre settlement.

³The photographic materials enabled the development of a dialogue between different disciplines within the RBHS/FIOCRUZ research center.

As one evaluated the extensive photographic material from the two projects, the question arose as to whether the importance of photography should be investigated beyond its role as supporting instrument during scientific investigations. After all, the multitude of images illustrated clearly the subject matter and, more importantly, those images triggered new lines of questioning.

Local “people’s photographers” are becoming commonplace in Rio de Janeiro, where some projects in slum areas encourage locally resident photographers to create their own images to represent the interests and aspirations of their communities. This development enabled a healthy dialogue within the communities in addition to creating opportunities in the jobs market. Such documental images provide, above all, a educational and professional perspective from those who live in these places, thus representing their reality.

In any case, images also reveal conflict areas in the language used by interested parties regarding the city and social housing. Thus, the reach of Photography in the interpretation of buildings, housing and urban areas in the modern city constitute the focus of this project.

Multi-disciplinarity: photography, architecture, urbanism and visual language working together

Bearing in mind the author’s dual professional expertise – Urbanism and Photography – the intention of the current research is to focus on the dialogue between these two different disciplines. As will be seen, architecture, urbanism, photography as well as some other areas of visual anthropology will be explored together in the search for common grounds within the topic. From Morin (2010), we learned the importance of “inter- poly-trans-disciplinarity” in scientific research. The sum of human knowledge generates a global perspective - inter- and trans-disciplinary - research that releases one to trade and cooperate freely: *“intellectually, disciplines are fully justifiable, since they remain a field of view that recognizes and conceives the existence of links and solidarities. Plus, they will only be fully justifiable if not hiding global realities”* (Morin, 2010:113). In this sense, this study proposes to go beyond the boundaries limitations of any one discipline.

Expanding on the relationship between places and cartography, Seeman (2012) reminds us that the written description of places in maps is heavily influenced by whoever writes the piece. Thus, there is a dialogue between scientific and the human tradition in cartography. The winning proposal narrows the scope of the two opposing views: one that fits between the standardized tests and questionnaires, in order to give a scientifically accurate (quantitative research) and one that requires more open, flexible, or as the author calls “the most inventive” (qualitative research) .

Multi-disciplinarity, therefore, guide us down a path where photography, architecture, urbanism, and visual language work together. Thus, one would expect to reach an outcome that sums different disciplines to provide us instruments to achieve a housing and urban policy for the benefit of society.

Although the value of images still finds critics in Academia (Kossoy, 2001), its merits as a document have been recognized through the constitution of pivotal archives and in institutions dedicated to images as historical, anthropological and ethnographic sources of information.

The value of the documentary photography

Documentary photography found its place in the course of history from the time images were created. There are many examples where documented imaging demonstrates its relevance in understanding urban transformation. Even recently, there are authors from different fields of knowledge, who are keen to extol the value of Photography in documenting change.

In Architecture and Urbanism too, several authors have acknowledged the value of photography in the search for understanding the landscape and the transformation of urban spaces. John Collier, Kevin Lynch, Vilém Flusser and William Whyte and are outstanding examples that Photography is a validated historic and documentary source of scientific quality.

Emerging in the second decade of the 19th century, Photography adapted itself to the urban language from the very beginning, and was further developed in modern cities (Rouille, 2009). Product and instrument of urbanization since its creation, product of industrial society and, with the expansion of cities, Photography showed to be predominantly urban from its inception. Photography also provided visual records for scientific research, artistic creation - expressed in different languages and styles – and for social memory of societies; and almost a century after its birth, it provided a visual memory of conflicts and war events registered by photojournalism.

In 1935, the Farm Security Administration (FSA)⁸¹ of the USA represented a pioneering work and one of the most significant visual documentation of history by bringing together a team of renowned photographers (Dorothea Lange, Walker Evans, Russell Lee, Arthur Rothstein, Gordon Parks among others) to witness the life of farmers affected by the 1929 financial crash. The latter constitutes one of the largest and most important photographic North American collections from the early 20th century, consolidating the concept of photo-documentation.

Photography gradually became recognized as a documentary tool of great historical importance, acquiring social function and visual evidence in the major events taking place around the world.

In Germany, during the Weimar Republic in the early 1920s, the photographer August Sander with the Group of Progressive Artists in Cologne (Kölner Progressive), began his extensive work of cataloguing contemporary German society through a series of pictures. Sander developed the “People of the 20th Century”, essentially a cross-section of society during the Weimar Republic. The series was divided into seven sections: The Farmer, The Skilled Tradesman, Woman, Classes and Professions, The Artists, The City, and The Last People (homeless persons, veterans, etc.). The latter covered the crucial period of economic and social transformations that occurred in the country between unification (1871) and the first three decades of the last century (Rossi, 2009).

In Brazil, Pereira Passos (Mayor of Rio, 1902-1906) intended to record and show the changes of his administration through the image. Marc Ferrez (1843-1923) used photography extensively when he took part of the Geological Commission which documented the north and south of Brazil, while Augusto Malta (1864-1957), a documentary photographer working for Rio’s Municipality, recorded changes in the urban landscape of Rio in the late nineteenth century (Rouille, 2009, p.29) . During the government of Pereira Passos, Malta was responsible for documenting the transformation of the city in relation to delays of planned works as much as to the grandeur of the new features.

Sebastião Salgado, a Brazilian social documentary photographer and photojournalist, devoted many years recording the lives of socially excluded folk, such as the “*Movimento dos Trabalhadores Rurais Sem-Terra/MST*” (Landless Rural Workers Movement). Salgado contributed greatly to the development and dissemination of “photo-complaints”. Between 1986 and 1992, Salgado focused on rural workers, and between 1993 and 1999 he authored “The Children: Refugees and Migrants” (published in 2000). César Barreto, official photographer of the Municipality of Rio de Janeiro, currently documenting the changes ongoing in the city in preparation for the 2016 Olympics. Contemporarily, Boris Kossoy focuses on the value of photography to witness and document history, while Cristiano Mascaro has recorded the

⁸¹ An institution created by President Franklin Roosevelt, under the leadership of Roy Stryker with the mission of providing support to small farmers and rural communities during and after the Great Depression.

changes in São Paulo as a city and its architecture. These are a few examples of Brazilian photographers who have dedicated themselves to Photography in its documentary value.

Images initially registered chemically and now registered digitally in photographs, are thus highly effective tools for scientific research, and they had their role legitimized by enhancing our understanding of urban life and of the relationships between urban dwellers.

The participative management and the role of the Photography in a social housing planning

The value of images as vital elements in the pursuit for understanding the landscape and the transformation of the urban areas - within Architecture and Urbanism - has been investigated before. Researchers also used de-characterization of images as a means to understanding cities under construction and the relationship of the dwellers of a given space⁸². In Architecture and Urbanism, renowned authors have already spoken about the value of the image as a vital element on the pursuit for the understanding of the landscape and the transformation of the urban areas. Many researchers also used the image decharacterization discourse as the main way to a better understanding of the city under construction and the relationship of the inhabitant with the space.⁸³

The news here, therefore, is in the fact that the research proposes to Photography a new role in the popular areas investigation. Starting from the original experience of the programme “*Imagens do Povo*”, this project intends to demonstrate that it is possible to attain a satisfactory result in social housing policies through participatory management, whereby photographic material helps focusing social realities and aspirations of slum-dwellers⁸⁴. In short, Photography can play a pivotal role in generating and implementing social housing policies.

In the modern word, cities have suffered significant transformations. With the vertiginous urban growth and the disordered occupancy of the land, the current tendency is that appear more precarious areas, aggravating the vulnerability risk context. As a result, features like the housing deficit and inadequacy became the main issues to be solved in housing programs.⁸⁵

In Rio de Janeiro State, the lack of housing and basic sanitation policies have resulted in tragedy over the last two years. Rain devastated large areas of the cities of *Nova Friburgo* and *Teresópolis*, due in part to the intense building in areas bordering rivers, which are forbidden by law to be built on (“*non aedificandi*” areas)⁸⁶. In Niterói, the second largest city in the state, houses built illegally on landfill sites were destroyed by the rains. Yet, in several neighbourhoods of Rio de Janeiro houses are still being illegally built on hillsides that are unstable and without services (electricity, sanitation), with great risks to health and life, notwithstanding the environmental damage of such occupation. In the aftermath of these

⁸² Lynch, White, Collier, Kossoy and Mascaro are examples of authors referred to in this research (see “Bibliography”).

⁸³ Lynch, White, Collier, Kossoy and Mascaro are some examples of authors to which this research will refer (see “Bibliography”).

⁸⁴ Related to agricultural policy, the Ministry for Cities created in 2005 and the Participatory Directing Plan Campaign aimed “to create the means to generate resources for investment in housing and urban infrastructure.” (Bonduki, N.; Rossetto R.; Guilardi, F. H., 2009).

⁸⁵ Anna Tibaijuka, ONU’s subsecretary and executive director of the Programa das Nações Unidas para os Assentamentos Humanos (Un-habitat) (United Nations Program to Human Settlements), in interview to the IPEA’s website (2010): “(...) the continuous growth of the cities demands new solutions and public policies that can join suitable housing with access to goods and services, and to promote income generation to a population contingent that are still migrating from rural areas to the cities, looking for better opportunities and life-quality” (Website: IPEA, 2010). IPEA. Available at <http://desafios.ipea.gov.br/index.php?option=com_content&view=article&id=1369:entrevistas-materias&Itemid=41>. Access on: 03/03/2012.

⁸⁶ Areas considered as high-risk of flooding and, hence, forbidden to be built on.

disasters, the local population demanded new strategies to deal with building safety and access to decent housing⁸⁷.

One of the issues debated in the “participative management” of the last decade is whether democratic participation - proposed in the National Housing Policy – actually encourages society’s engagement in public policy. Participative management is predicated in all interested parties actively participating in the planning process. However, there is no effective space or forum for dialogue and reflection between the body politic and the communities. In this regard, the training of locally (slum) resident photographers represents one such line of dialogue with the inhabitants of these areas. Other than “Imagens do Povo”, the “*Núcleo de Antropologia e Imagem*” (Nucleus of Images and Anthropology)⁸⁸ and other research work such as “*Iconografia das Favelas Cariocas*” (Iconography of Rio Slums)⁸⁹ are examples of institutional projects aiming at greater interaction with communities and social movements, in order to promote debate about living, working and housing conditions of society’s poor.

Housing – a major issue: how can the auto-representative image be a contribution?

Cities undergo transformations along their history, the pace of which has increased in recent times. With rapid urban growth and disorderly occupation of the land, the current trend is the occupation of areas that in varying degrees may be unsuitable for inhabitation, which brings a concomitant increase in occupation-associated risks. Thus, housing deficit and inadequate housing became major issues to be addressed by housing programmes.

In order to ensure access to suitable housing, participatory management is paramount, whereby involvement of the local communities allows a greater commitment by these communities to the proposals set out in housing policy plans. The concept of democratic participation published in the “*Política Nacional de Habitação/PNH*” (National Housing Policy, approved by the Council of Cities, 2004) establishes that all interested parties should participate in the planning process. However, the political elites responsible for housing and urban development have not yet established effective forums for dialogue with the communities in Brazil.

A new way of evaluating the different spaces within cities is through Photography, which became common practice among low-income neighbourhoods in Rio de Janeiro city. In this regard, training popular photographers within the slums represents a new opportunity for dialogue with the residents of informal areas of the city. Through the visual records of their own reality, the locals are starting to contribute effectively to housing and urban proposals in a manner that is more in line with their aspirations, while providing a vision that is more closely linked to the reality of their living space than the vision of whose is observing from ‘outside’. As a bonus, photographing gives to the economically disadvantaged a possibility to changing from being “objects of representation” to being “authors of their own representation” (Gama, 2012).

The agency of images “*Imagens do Povo*” (People’s Images) started in the 1990s, made a new proposal, namely to foster a new image of the “*favela*” (slum) and to increase the self-esteem of the youth of Rio’s *favelas*, by including them in the jobs market. More importantly, they proposed to give the local youth the chance of portraying the spaces they inhabited through

87 According to this document (Ministério das Cidades: 2004: 29), the NHP is in line with the Constitution that considers housing a citizen’s right, which together with the Cities Statute, establish the social role of property, among other civil rights”. (Bonduki, N.; Rossetto R.; Guilardi, Flávio Henrique, 2009).

88 The Universidade do Estado do Rio de Janeiro created the nucleus. Website: NAI, 2012. Available at <<http://naiuerj.blogspot.com.br/>>. Access on: 03/03/2012.

89 “A story of omission and recovery”. Research work developed at Universidade Federal Fluminense together with the Post-graduate Programmed of Architecture and Urbanism College (PPGAU/EAU/UFF).

their own perceptive. We refer to the above-mentioned images agency People's Images⁹⁰ (created under the auspices of "*Observatório de Favelas*" – Slums Observatory⁹¹) as the germ of the ideas for the current work. The main aim of this project is to analyse how locally generated photographic images (of slum areas) can contribute to housing and urban development. The project also investigates images as a *critique* of public programmes and how images may help planning of social housing with citizen inclusion. Such documental representation is the guiding light to this research in investigative analysis of social housing, cities, and their urban context.

By means of the generated records of their own reality, slum dwellers start to contribute effectively to housing and urban proposals that are more suitable to their aspirations and living space. The language of image de-characterisation takes in this case, effectively, a guiding role in the investigative analysis of social housing in the city, contributing to solving housing issues highlighted by the documentary materials.

The results of the current research may contribute towards the development of public policies directed towards urban housing programmes to identify and offer more urban territories with infrastructure.

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⁹⁰ The programme *Imagens do Povo* aims to train and place local photographers in the jobs market. Ex-pupils of People's Photographers School form the crew of photographers of the Agência Escola (School Agency). The agency sends images to the Program's Image Data Bank (<http://www.imagensdopovo.org.br/apresentacao>).

⁹¹ Social organization for research, consultation and public action related to slums (<http://observatoriodefavelas.org.br/apresentacao/>)

The origins and pathways of urban (in)formality: towards an understanding of local dynamics and agents of change within a favela in Rio de Janeiro

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Abstract. *“The fact is that the segregated social space that characterizes Rio de Janeiro today had the public power as one of its director agents”. (Redes de Desenvolvimento da Maré, 2013) p.24*

Subnormal settlements, informal settlements, favelas, slums - the words remind us of places of non-planning, the opposite of the formal city, lack of infrastructure and services, poverty and segregation. In Rio de Janeiro around 22% of the population lives in informal settlements. These territories have structural characteristics that diverse them from the rest of the city, but that also diverse them from each other. Although they have been historically understood as the informal place, segregated and separated from the rest of the city, they are in fact territories that result from the formal city, dialogue with it and build its own dynamics as an autonomous and specific urban place. This research looks for the historical background that built up the favela of Maré, in the North region of Rio de Janeiro, with approximately 130.000 dwellers. This territory may be considered as a paradigmatic example on how different agents of change build the morphology of our territories. It is a complex of 16 favelas, each with its own background and particular form, built upon a landfill ("maré" is the portuguese word for "tide"), delimited by 3 of the most important traffic ways of the city. The aim of this research is to understand the agents and context of construction of this territory and its inner variations by questioning the dialogues and dichotomies that determine its urban morphology. It tries to look at the urban form as a complex result of human, social, political, geographical and infrastructural dialogues, and brings ideas for a new perspective over these places, focused more on their inner processes rather than on their products, as places of adaptation: adapted and adaptable.

Key Words: informality, favela, urban dynamics, adaptation, Maré

Overview

Maré is formed by 16 different communities. Each of them have their own story, their own traumas, challenges and inventions. The physical result of the planning processes (even though when those processes were not called as being a planning strategy but a temporary solution for other urban objectives) were in the end, just the first tip for the development that followed. Being mainly a mangrove area, with only one hill, and having historically passed through different political moments and political understandings and initiatives towards the favela, one may say that urban growth and planning bind together as a response to its own urban context – physical, social, political.

The aim is not only to define the agents of change, the objective causes of morphological conceptions, but to make a proposal for an understanding of urban dynamics where the form follows and is followed up by local inventions, wishes and dreams. But coming from the

⁹² This paper and its conceptual interest come from a direct contact I had with Maré, while collaborating with the NGO Observatório de Favelas, and was done supported by the Royal Institute of Art - Stockholm.

Some impressions presented here come from the empirical experience and local informal observations, that opened up reflections and interests about the urban structure of these multiple territories inside Maré. Therefore, some impressions here are mostly founded on a daily basis perception and further reflexion, that are still on the working process of finding the most possible complete theoretical support.

research question, we shall understand what is that about informality in Maré? Can we really talk about an informal settlement and by doing that, consider that it is a result of not planned processes? As we will see now, Maré is a very clear example of how public decisions and understandings of the “favela as a problem” turned out to be the planning process in itself.

By getting closer to its own stories and history, the main questioning that is pushed up here is if territories like favelas, and specifically Maré, can still be understood and classified as being informal, slums, or any other classification that detaches them for the rest of the “formal”, “legal” or “beautiful” city, or if this paradigm shall be urgently shifted in order to build a more coherent understanding of these territories as deeply related to the city as a whole, dependant from political, economic and social moments, as contemporary territories of urban development. By shifting this paradigm, one may also question the role of planners as agents of change, and the necessary political positioning upon these places in order to achieve an integrated and democratic city.

Classification and conceptualization: regional approach always as a comparative model?

For a theoretical approach of place: applying the anthropological concepts of Michel Agier

In anthropology of the city (2011), Michel Agier, when talking about the urban knowledge of anthropology, speaks about three categories of approaching the urban themes in anthropological research. He considers that all the knowledge taken from the city is always a partial knowledge, based on metaphor, comparison, dialogue, and other inductive perspectives of research. He is interested in the process between the observation and the construction of urban knowledge, the way to get to urban theorization from empirical experience.

He says that there are regional, situational and reticular approaches to the urban anthropological questions, and remembers us that urban investigation has its starting point within the context of Chicago as a fast growing city with emergent new issues.

From the research question of this paper, I find it interesting to take a departure from Agier's position, once that what is proposed here is an understanding of the partial perspective that is being taken upon the understanding of the favela as the “other” territory that is informal, segregated, poor, and resulting from the absence of the state. What is proposed here is a more objective perspective of the evolution of the territory of Maré as an interdependent and integrated part of the city of Rio, and a fundamental testimonial of the history of the city.

“Space has been, through time, designated to answer to specific functions that vary according to the needs of the social organizations of each time. From this perspective, the city results, unfinished and in transformation, from interventions that are regulated by different systems of social and economical values.” (Resende, 1982) p.19

The regional perspective is, according to Agier, where the social control is built. The socio-spatial classifications organize the affirmation of relative differences, and never of absolute identities. He supports that there are natural areas of segregation, related to the origins of the population, reaction, age, or one may add, related to economical situations of a given population. However, the territories where natural segregation may occur, then level up into moral regions, reconstructed in the imaginaries of the whole population – the building of the imaginary city, the imaginary cartographies. In the individual perspective, it would be considered when the individual becomes a person, as the social status is defined, together with social distances. As I try to bring the theory to an urban morphological perspective, it would be when the territory becomes the place. The definition of place is done by all urban actors, from decision makers, to planners, to the population, and the definition of the place needs to have the whole city as a referee.

This process supports the building up of social distances above spatial distances, the creation of relative identities and the possible understanding of the city as a patchwork of different and well defined places that somehow close in themselves.

These classifications open the door to potential duplications, or definitions by opposition of two different classifications. According to Agier, defining a place with bad reputation and building a stigma around that specific area can be a way to classify other areas as being areas of social success, by opposition.

This regional approach of urban reality can be easily understood in the evolution of the definition of the favela – and specifically of Maré – as a place: the favela vs the city, informal settlement vs formal city, ghetto vs legal city, slum / shantytown vs structured city, periphery vs center, zona norte vs zona sul (North zone vs South zone), and lately the understanding of it as a neighborhood, but one that needs to be integrated to the rest of the city (considering it is a different neighborhood, and shall be integrated through “pacification”).

“Taking advantage from that uncertainty of boundaries, the “regional” point of view would win, I think, in being applied to any space, independent from its limits or its scale. By doing so, it could be registered the way how a place is defined by the urban actors, whomever they are (from the urban planner to the inhabitant of an alley). This sense of place undertakes the whole city as a referee context.” (Agier, 2011) p.67

Besides the regional approach, Agier describes what is the situational and networking approaches. Both approaches build the understanding that the urban relations and interactions are not determined only by the place where they occurred, from what they can be at least, influenced. The specific situations of interaction vary among the same space in different periods of time, and can give to these spaces different identities and classifications. Also the networks built upon specific urban areas are fundamental to understand the dynamics and to build on knowledge about a specific place.

So, one may say that the regional classification is always relative to a specific context, and that urban interactions exist upon and further from the its regional condition or categorization.

Foreplay and the foundation of maré – could have it been some other way?

Where does the Favela come from?

Let's start the story in 1893, even though we could go even more backwards and find possible bridges between the favela and its stigma, its creation in the end of the nineteen century and the slavery history of Brazil. But let's start it from 1893, that was the time when the very first house occupied the “Morro da Favella”.

“The episode of the destruction of Cabeça de Porco became one of the initial marking points of a whole way of understanding the management of social differences within the city. Let's locate the two fundamental points of that way of dealing with urban diversity. The first one is the construction of the idea that “poor classes” and “dangerous classes” - to use the terms of the XIX century – are two expressions that talk about, that basically describe the same reality. The second one refers to the appearing of the idea that a city can only be “administrated”, which means, managed according to technical criteria alone.” (Chalhoub, 1996)p.19/20

The cortiço of Cabeça de Porco was the first known episode of destruction of these tenements of the urban poor, but the story repeated in many other areas of the city. The cortiços were seen as dirty and immoral areas, and through hygienist arguments, they were removed. The inhabitants, needing to find places to settle, started to go to the hills of the city and build their own houses. The city was living a moment of great immigration, and also of fast development and the poor ones could not afford living in more privileged areas of the city.

It is in the end of the century, specifically in 1897 that the Morro da Favella is occupied. It is important to understand that the issue of housing in the city and the incapacity to deal with the urban poor dated backwards, before the word “Favella” was even used for the first time Key Words: Saverio Muratori, Ludovico Quaroni, morphology, typology, Rome School of Architecture.

The Morro da Favela has a very well known story: it was the place where the soldiers

coming from the battle in Canudos in Bahia settled when they arrived in Rio and did not have housing provisions as promised by the government. Favella is the name of a plant that is very popular in the region of Canudos, and because of the soldiers occupation, the area was known with that name.

So, the first generalist identification and classification of these territories is, in fact, the name of a plant, and is a word that does not carry in itself any morphological considerations or any pre-conceptualizations of informality or marginality.

In the beginning of the XX century, Pereira Passos, the “tropical Haussmann” (Valladares, 2005) started great urban works in Rio, and defined a very clear urban positioning. It was known as the period of the “bota abaixo” (“throw it down”): with the construction new big infrastructures in the city centre and the beginning of the demolition of Morro do Castello, demolishing one of the biggest cortiços in the city. Already in this early moments, Morro da Favella was already seen as a place of great violence, lack of basic infrastructures, sickness and immorality. This is just the beginning of a big story that repeats all over the time, and in Maré (occupied only in the 40's) it has its specific urban impacts.

Where does *Maré* come from?



Figure. 1. Maré – the area in 1929 (Guia Brigueiet map) and in 2009 (google maps). Down, the Ilha do Fundão, where is the university of Rio (UFRJ) and in the center (between the big yellow line that is Avenida Brasil and the shore) Maré. Sobrepositon work by Êisdur and published at Êisdur (2013).

With the revolution that happened in Brasil in the 30's, the industrial bourgeois ascends in social class and capitalism is expanded in Brasil. It is the end of oligarquies, and the beginning of an economy based on industries. With the world crises of 29, Brasil focuses on its internal market until the second world war, when there is a new phase of economical growth: great exportations, fewer importations and greater demands on its internal market. In 1937 starts the “New State”, with the main figure of Getúlio Vargas in the power. He starts an extremely populist government, that in fact supports the industrial bourgeois against the working class. When WW2 ends, Vargas tries to recover his relation with the popular classes, but the institutionalized powers of the bourgeois and the old imperialists do not allow it to happen. In 1945 Vargas is taken out of the government and Dutra takes power until 1950, supporting a new imperialist moment in the country. In 50 Vargas is elected, and in 54 he suicides and it is when Jucelino Kubitscheck becomes president, supporting the principles of development, on a progressist policies towards the greates capitalization of the countrys opening it to foreign investments and implementing industries in the country for durable products (it is a moment of great exoansion of the automobile industries in Brazil). Kubitscheck is also the president responsible for the construction of Brasília and moving the main city from Rio de Janeiro to

there, in 1960. In 1964 starts the military regime in Brazil, a dictatorship that will last until the 80's.

In this context, Rio faced a great amount of migrants from the 30's on, when the country faced great growth inequalities between different regions, and reinforced Rio and São Paulo as the main investment areas. People from all over the country were migrating to both cities, looking for working opportunities. Only on the 50/60's Rio starts to have fewer migrations than São Paulo, being until then the main destination of thousands of people, and in the 60's the city becomes the State of Guanabara, after the inauguration of Brasília as the main city. All these years of migrations to Rio had strong impacts in the city, that was not prepared to receive this amount of people.

“The consequent flow of migrations in direction to these points (Rio / São Paulo) brings as a consequence the growth of the population of favelas, that grows on a rate of 7% against 3,3% that refer to the population growth of the whole city. In 1960, the population of favelas reaches 11% of the total of the city, that is of 3,8 million inhabitants” (Resende, 1982)p. 50

It is in this context that the city of Rio is strategically planned to grow towards north, with great investments in industries. In 1946 Avenida Brasil is built and opens to traffic, and along its way several industries are built and start working. Years later, the university of Rio de Janeiro builds its new campus in Ilha do Fundão, nearby Avenida Brasil. In this period, the city had no housing provision for the new residents coming, and the areas available were of high prices in a city that was developing increasingly towards a capitalist and private strategy of the richest ones. The working class, mainly migrants getting to the city, needed to find housing solutions for themselves. One of the priorities was to be closer to their working places, in a period where transportation was already a growing problem. There was a continuous growth on the number of favelas of the city, on faster rates than the growth of the city of Rio itself. (Perlman, 2010)

A part of Avenida Brasil was built close to a mangrove area, that was vacant because it was not a desirable place for real estate investments. In this area worked, on the XVI century, the port of Inhaúma that was on that moment a very important port for the transportations between the centre of the city and its north area. Also, this area was exactly between the new avenida Brasil being build and the future University at Ilha do Fundão.

This area of no interest for the wealthiest, was a very strategic place for the working class. (Vaz & Jacques, 2004) On the early 40's, Mrs Orozina decides to settle on the only elevated area within the mangrove, and for decades, the place was enbanked, occupied, developed, structured, transformed and adapted. Being built upon the water, it was named Maré (tide). And so the story goes from here.

A morphological trip: addressing processes of urban development in the 16 favelas of Maré

This section will focus on the history of the favelas of Maré. The work of Lilian Vaz (Vaz, 1994) was the main source of this data, together with the maps guide of Maré (Redes da Maré; Observatório de Favelas, 2012) and the publications of Redes da Maré (Redes de Desenvolvimento da Maré, 2010 and 2013) All the chapter has reference on those works.

Avoiding the classical classification of “formality” vs “informality”, that we aim to dissolve in this paper, the communities of Maré will be introduced and its history presented based on its *form*. We consider that informality can never be the absence of form, but the lack of understanding of different logics of space structuring. This comes from the understanding that both time and space are social inventions, built by specific logics of society (Damatta, 1997).

So, based on form, communities are presented according with two different criteria: regularity vs irregularity, and within each group, they are presented chronologically.



Figure 2. The evolution of Maré in a period of 50 years (source: Jacques 2002, design by Pedro Seiblitiz, taken from (Vaz & Jacques, 2004).

The irregular places

Morro do Timbau, Baixa do Sapateiro, Parque Maré, Roquete Pinto, Marcílio Dias

The irregular territories within Maré have a common basic story. They all result from spontaneous occupations, are usually the oldest areas occupied in Maré and have stories of struggle against evictions. In these areas it is very clear the inventive capacity of the populations to find strategies in order to fix themselves and build their own urban environment out of the different challenges that they need to face. These places are a great collection of memories from the occupation and the removal attempts, as well as from the opportunist episodes when public forces tried to take advantage of the weak political conditions of the urban poor. In these territories we may also find great lessons of other ways of thinking urban priorities, difficulties and solutions for very concrete and specific problems. In Maré history tells us that people didn't occupy the land, but they built their own land to fix their presence and rights within the city. It is a construction of identity, built from almost nothing but the need to stay, or what one could understand as the capacity to organize urban structures around the need for urban life.

40's and 50's

Timbau and Baixa do Sapateiro (located side by side) are contemporary considering their occupation, but it is usually said that Timbau was probably the first territory being occupied⁹³. The area known as Praia de Inhaúma was already place for some fisherman communities, on the fringe between the hill and the water, but it was on the 40's when people started occupying the hill and giving it the shape we see today. Timbau, Baixa do Sapateiro and Praia de Inhauma were, one may say, the origins of Maré, and neighbors of each other in a continuity of development – this continuity is very clear when observing the map of the areas

⁹³ The population argues that Timbau was the first area occupied, but some official sources (SAGMACS) say that the area where is Baixa do Sapateiro is occupied since the 20's. (Vaz, 1994)

Being the only elevated area of Maré and this was a fundamental condition for the first occupations, since it was the only solid area to start occupation – Maré was a huge mangrove area in that period. Baixa do Sapateiro itself first started to be occupied in its hill area, the borders between Timbau and Baixa were blurred, and only later people started to go to the mangrove land and build there. This topographical condition supported the definition of the first occupied area, and its morphological organization is very related with the fact of it being a hill, with similar territorial distributions than in other hill favelas of Rio. The first inhabitant of Timbau, Mrs. Orozina, assumed that she knew from the first moment she was occupying land without allowance, and her family self built their first wood house there. In the next years more people came and settled in the area, and in the 50's, Timbau was already becoming a more dense area. (Vaz, 1994)

This has directly relationship with the construction of Av. Brasil in 1946 and the University of Rio in Ilha do Fundão, in 1950. It was the period of great industrial investments in the city, a planned development towards north based on industrial development, the area of Maré was located exactly between the two projects and these infrastructures demanded a great number of workers. In Rio, in this time, there was a great movement of migration towards the city, from other areas of Brazil, mainly from the country side of the northeast, where people were suffering from droughts. It had impacts on the increasing of favelas and its population: the favela population grew in that period 7%, while the city's total population grew 3,3%. In 1960 11% of the city inhabitants were living in favelas. (Burgos, 2006)

The population was occupying the area at first according to their individual needs, and the houses were first built with wood. Because the area was structured, as time passed, the inhabitants of Timbau started to build better infrastructure systems – while in the other areas people were struggling to live on stilt houses, and investing on embankment works. Also from the 40's is the occupation of Marcílio Dias (first called as Praia da Moreninha), an area quite far away from the rest of Maré⁹⁴, where fishermen already lived in stilt houses. (Redes da Maré; Observatório de Favelas, 2012)

It might seem weird, but in the 40's Rio was living a moment of strong favela removals. The código de obras (code of construction works), created in 1937, proposed the elimination of the favelas and ignored them from the maps. It was then forbidden to improve the houses in favelas and to build any new house. As a solution, the mayor Henrique Dudsworth starts the projects of proletarian parks to re-locate people living in favelas. (Leeds & Leeds, 1978) In these proletarian parks the daily life was strongly regulated, with great vigilance, considering that the people from the favelas needed to be civilized. These proletarian parks were supposed to be temporary but ended up in being permanent and people stayed until they were evicted from there. From 41 to 43 there were 3 proletarian parks built in the city, on a clear statement of the authoritarian populism of Getúlio Vargas government – deeply care about the proletarians, with great control over the urban poor, in exchange of populist measures.⁹⁵

It was in this context that one can understand the fundamental role of the military for the history of Timbau and its present condition: in the 40's, the army settles in an area nearby Timbau and they start to control the development of the area. They argue that the area of Timbau is their property and started to ask for payments from the population. The inhabitants

⁹⁴ There is a military area separating physically Marcílio Dias from the other parts of Maré.

⁹⁵ It is important to remember that in 1937 the country faced a *coupe d'etat* that initiated the Estado Novo (the new State) regime, a dictatorial period, centered in the image of Getúlio Vargas. The Estado Novo lasted until 1945, and it appeared within the context of the growing of an industrial bourgeois. It was a populist government, and ended up in being the opposition of the industrial bourgeois and the organized and “official” working class, against the informal poor workers. When Vargas tries to focus on its popular basis, the imperialism and its actors don't allow it and he is taken out of power in 1945. Vargas returns, elected, in 1950, after 5 years of an imperialist government of Dutra. In 1954 Vargas suicides, and Juscelino Kubitschek becomes president, starting a progressive government opened to international investments.

needed to have a strong relation with the army, considering the threat of removal that was present in this period in favelas all over the city. In 1947 the municipality orders the removal of the houses of Baixa do Sapateiro, when there were already some embankments done and stilt houses in the mangrove area.⁹⁶ In 1947 the mayor Mendes de Moraes created a commission for the extinction of Favelas, but the commission has as its only effective final product the construction of a Census of Favelas. However, it was a moment when Favelas were seen as an issue to face – in 1947 is created the Foundation Luis XIII, attached to the church but with support from the government, whose main role was to recover the favelados and “save” them from the communist threat within a politics of high control. Also in 1948 Carlos Lacerda⁹⁷, that in that time was a journalist, starts up what he calls “The Battle of Rio”, understanding favelas as a national problem, rather than only a municipal one. (Leeds & Leeds, 1978)

Although favelas development were strictly controlled, in the 50's the area of Parque Maré (located between Nova Holanda and Baixa do Sapateiro) starts to be occupied (it is Maré's 3rd favela) as a consequence of the population growth, mainly resultant from the existence of new industries along Avenida Brasil. Parque Maré has also an spontaneous occupation and its irregular streets together with great number of full of alleyways that come from main streets, are mainly resultant from the processes of embankment done by the population in the 50's (similarly to Baixa do Sapateiro). The area was occupied first close to Av. Brasil, in what is today Rua Teixeira Ribeiro, and differently from Baixa or Timbau, the area of Parque Maré was completely mangrove land, and the first occupied areas were the ones where there were already some small entrances of land. Its morphological structure has its origins in the fact that the bridges built above the mangrove were the origins of the embankments done, defining the streets of the area: Rua Flávia Farnesi was the first resultant from the embankments, but many other streets were built upon the mangrove. (Vaz, 1994)

In 1955 Roquete Pinto is occupied. It is a landfill area, with constructions first built out of wood, later replaced by brick buildings, in the process of consolidation of the community. It is located north, separated from the rest of Maré, and close to Praia de Ramos, also an occupation from the 50's, when fisherman and some fish marketers lived in the area – known, at that time, as Maranguirú (mangrove, in TUPI language). There was there a beach and a small port. There, residents started to build embankments and wood houses, replacing the stilt houses. These two areas are located in flat areas and were both occupied in an spontaneous way. (Redes da Maré; Observatório de Favelas, 2012)

So one may understand that even if from 37 until the 50's favelas were being highly debated and its population controlled - the population needed to ask for allowance to do any improvement or construction in the area, until the 50's when building new houses was totally forbidden, it was one moment of great development in Maré. It was a development done with great struggling, persistency and patient, with the population rebuilding and re-inventing ways of staying in the area against all odds of the current time politics. This controlling and restrictive moment of the history of favelas in Rio is also a key to understand why Timbau is the community of Maré with the lowest density rates, related with several control from the army against new construction or development of the area. At the same time, from that relationship with the army, the residents started to organize themselves in order to fight for their need of improving the area and for achieving their property rights: Timbau has the oldest Residents Association of all Maré – started in 1954. (Vaz, 1994)

Baixa do Sapateiro ended up in not being demolished, and people kept on building their own houses in the night, and paid to the policeman that supervised the area for him to let them build. Houses were made out of leftover materials (construction materials, wood and metal) and the stilts were done 2 meters above land, with bridges connecting the houses. Later, as people were embanking the area, these connections turned out to be the streets.

⁹⁶ Maré had, in the end of the 40's, around 3500 inhabitants.

⁹⁷ In the 60's Carlos Lacerda becomes the first governor of the Guanabara State, after Brasília became the main city and Rio turned into a state, and developed a series of politics for controlling favelas.

When the police used to come and demolish some of the houses, the strategy of the inhabitants was, besides building them in the night, to have them occupied with children in the day, hoping the policeman would be sensitive to that and not take the houses away with children inside.

In 1957 the residents association of Baixa do Sapateiro is created with the purpose to build water provision and sewage networks, which happened in the 60's. Until the 60's the inhabitants improvised ways of getting water and sewage systems done by themselves. (Vaz, 1994)

It is important to locate historically the resistance of the population that, in a moment of great control and even forbiddance of building, kept on coming to Maré and struggling to fix themselves and develop the area. within this dual relationship of government with the favela, and maybe try to take from it some understanding of the processes that happened: the industrial investments and infrastructural construction of the city asked for great number of workers to be in the city, but the municipality didn't have the capacity to answer with proper housing provision. So, if in one hand the wish to clean the city from the favelas is politically present and represented through governmental actions, in the other hand the constant demand of workers supports the process of development of favelas in the city. Maré has both facts within itself: growing while struggling not to be taken away. This process of development led directly to its current form: intuitive, completely context-related (both topographical, geographical, political and sociological) with great priority in building individual housing, before planning or building common infrastructure.

The 60's

In the 60's, the policies relative to the favela, besides being pointed with external variations on its shape, is essentially the continuation of a policy of control, that goes back at least to the 30's. Sometimes that control is lined up of more populist adornments – for example, on the way of “urbanizing” in loco of favelas, but in some other moments it appears under a more repressive shape, as, for example, the total removal of favelas and the rigorous administrative supervision of the governmental housing units of emergency, called as proletarian parks" (Leeds & Leeds, 1978).

From 1968 to 1973 more than 175000 inhabitants of 62 favelas were removed and transferred to one of the 35517 new housing units built mainly on the north and west side of the city (Brum, 2012). This was done through CHISAM⁹⁸, an institution from the federal government, supported by the state government of Rio. On the 11th of May of 1969, the favela of Praia do Pinto, located in Leblon (one of the wealthiest neighborhoods in the south zone of Rio) burned and its population was removed to different housing units along the city. Since the 23rd of March that the residents were being removed, but the ones resisting the eviction were staying in Praia do Pinto, within the debris left of the houses already demolished. There was a great real estate interest in the area, and the politics of the government was once again, seeing the favela as a problem to correct by removing it and building low income houses in places far away from the city centre and the south zone. It is still not confirmed the origins of the fire in Praia do Pinto, but it is consensual among the residents that it was an initiative from the government to definitely clean up the area. One of the main arguments from CHISAM to

⁹⁸ CHISAM – Coordenação de Habitação de Interesse Social da Área Metropolitana (*Coordination of Housing with Social Interest of the Metropolitan Area*) was created in 1968, as an initiative from the federal government. IT had a single perspective over the favelas, understood as a problem to be eradicated, through the extermination of favelas in Rio. It subordinated COHAB to build housing complexes for residents of favelas. In that period FAFEG (Federation of Favelas of the Guanabara State), a strong association, was also transformed and started to support the state government, with some residents associations working in representation of the State (Brum, 2012). According to the sources consulted, this didn't happen with the residents associations in Maré, that kept on fighting for urban improvements and against removals.

remove favelas was that they were “urban abnormalities that act against the more primary principles of civilization”, so the urban argument was used to justify the removals. In the case of Praia do Pinto, the houses were all made out of wood and it lacked urban infrastructure, and this territorial fragility was used sometimes as a government argument, even though it was then clear that the main objective was to sell that land to private companies and build high valued housing blocks. (Brum, 2012) The episode of Praia do Pinto became a paradigm of the governmental action towards the urban territories of the favelas in this historical period, and a possible trauma for the residents of favelas, being understood and so dramatically treated as undesired in their city.⁹⁹

In this context, one of the objectives of the residents associations in Maré was to resist the attempts of removal that happened in the 60's by urbanizing and building stronger houses, and getting structured so they would have arguments for not being removed. Many brick houses were built in this period. Once it started being forbidden to build in bricks (by SERFHA and SMDS), people find strategies to overpass the rule and Baixa was consolidated in this period. (Vaz, 1994)

In 1957 there was a big fire in the whole community of Praia de Ramos that destroyed it completely. The area was rebuilt by the residents and in 1962 it was already a consolidated place. (Redes da Maré; Observatório de Favelas, 2012)

In the 60's some residents from Baixa moved to Parque União, a new area occupied and structured by Margarino Torres, an influent man that planned the occupation of that space. He took inhabitants from Baixa to start fixing the area in Parque União, and people could find better physical conditions there, where the embankment was already done. If on one hand Baixa and Timbau were already becoming structured and greatly occupied territories, Parque Maré greatest expansion was during the 60's, when the embankments started being built in the area, and people were already building brick houses and expanding towards the bay, on stilt houses. (Vaz, 1994)

Its morphology is directed related with the housing building processes, and the strategies of the house owners to ensure bigger land properties for their own: the houses were built quite far away from the toilets, built outside. As it was a mangrove area at first, the houses and the toilets were connected through a bridge, and by doing so the owner would mark on its occupation that the area between his house and toilet belonged to himself. Later on, the owner could think on selling portions of the area or renting them and having economic benefits from it. This is a very interesting strategy, that shows clearly how the residents did not only struggle to stay at that place and fix in the area even though they needed to make great efforts not to be taken away and to do great embankments, but that they also planned their occupation considering a long term evolution of the area, a consolidation and having future economic benefits out of that planning. In this case, it is extremely wrong to consider that these areas are informal and not planned, when the logics within their occupation are totally based on a very coherent and strategic planning thinking. The residents fixed in their formal territory their determination to stay and struggle (physical and politically) and also to develop further and consistently. It was then, one may say, a common interest of all the inhabitants to improve their territories, both for common benefits of having better urban infrastructure, for individual needs of having provision of services and the specific plans to improve their lives. One may then understand also that, by building their own houses and organizing their thinking, they planned to stay on the area with long-term perspectives, and improve their lives taking advantage of their own planning decisions.

Because of this organizational methodology, Parque Maré has its specific morphological asset. Some people coming to Parque Maré didn't have enough budgeting to build their houses and toilets outside, so sometimes they would build their houses side by side with a neighbor and

⁹⁹ Some residents testimonials of the fire tell that they were transported to their new housing units in garbage trucks, and many didn't even know where they were when they arrived in the new houses. (Brum, 2012)

use his toilet, through his bridge. In other cases, if both would have the opportunity, two toilets could be build side by side, with both bridges side by side. Once the embankments were done and the urban structure better defined, the bridges that before connected the houses with the toilets became the streets of Parque Maré: the single bridges may have turn out into small alleys, as doubled bridges became bigger roads.

So one may say that in Parque Maré we have a great example of how irregularity can result from planning if planning itself is focused on something else rather than in pre-determined forms and shapes. In parque maré there were no issues of alignment, spatial proportion or morphological pre-conceptions; people built as they perceived their best opportunities and priorities. The same way that happened with Baixa do Sapateiro, the houses were build and rebuilt, with the police coming and demolishing the built houses, and people putting them up once again.

As in whole Maré the houses were built without water infrastructure being the basic infrastructure done later on, after the area was occupied and establishing, usually with support from residents associations and among the community. The first sewage infrastructure was done connecting with the sewage network built in Nova Holanda in Lacerda's government – some inhabitants worked in building that infrastructure, so they knew how to do it to build it connected with Parque Maré. (Vaz, 1994)

The embankments were also done collectively, in a “mutirão” system, street after street. They were first done with coal, and later the inhabitants were informally settled with the truck drivers for them to throw material like construction debris and earth from demolition of hills. The water was coming from far away, stored inside barrels. These barrels were put inside tires, and rolled all the way to the favela. The electricity was illegally taken from the public system. (Vaz, 1994)

The 70's and 80's

On 1975 the removal moment ends, and 52 favelas stay in middle and high class neighborhoods. Even though there were great removals during almost a decade, the number of residents in favelas didn't change – people would sometimes sell their new houses and go back to favelas. After 75 there was once again a clientelist period, the same politics lived in the populist governments at Vargas period, with small favors done in exchange of votes, within a authoritarian context (Brazil was still living in a dictatorship period). The political disarticulation of the residents led to a relationship among them and the public authorities based on lack of trust and on a distant perspective, and this supported the clientelist interests of the governments. (Burgos, 2006) In Maré, it was a moment of continuation of the work being done, structuring more the areas, but it was only in the end of the 70's, beginning of the 80's that the whole area saw once again a moment of great transformations. There was a lot to be done in these territories: in 1980 only 1% of the favelas had a completed sewage system; 6% had a complete system of water provision and only 17% had a satisfactory garbage collection. From 83 to 85 the municipal company of water (CEDAE) builds a program to bring water and sewage systems to 60 favelas, the garbage company buys micro trucks to access some areas in communities and there is also a program of public lightning in 85. If in one hand these initiatives represent a different approach to these territories, on the other hand its representation and identification as the area of poverty, immorality and crime¹⁰⁰ does not help in the overcoming of the stigma of

¹⁰⁰ In the 80's the organized crime groups in favelas grow, particularly the drug dealers. There is a strong relationship between this phenomena of violence and the clientelist moments that disturbed the processes of political organization of the inhabitants of these areas: “The coincidence between the democratic transition and the privatization of the favelas by these parallel powers is particularly dramatic because it establishes a continuity with the tragedy lived during the military regime. The embarrassments that these parallel powers impose to the local political organizations, inclusive with the murderer of many of their leaderships, follow up the terror that was before imposed by the state.” (Burgos, 2006) p.44.

these territories and its segregated condition.

In 1979 the military government had their last program executed, focused on urbanization. It was called PROMORAR and the first project of PROMORAR was Projeto Rio. The whole program started in 1979 and was financed by BNH (National Housing Bank), the same bank that financed the construction of the new housing units in the removals time of Lacerda's government in the 60's. In the debate of PROMORAR the discussion is not, for the first time, between urbanizing or removing the favelas but how to integrate these areas in the city, and it means a great advance from the previous programs and projects. Projeto Rio was to be implemented in areas where people were living in precarious conditions, in watered areas, and since it was the case for many houses in Maré, there was a seen risk of eviction and its main objectives of Projeto Rio is to improve basic infrastructure (sewage mainly), to eliminate the existing stilt houses and to give property entitlements to the residents.

To recover flooded stripes inhabited, pretending, with the valorization of the areas that are then conquered, to recover the investments done (...) the Projeto Rio would be developed in areas close to the international airport, reaching six favelas in Maré: Parque União, Rubens Vaz, Nova Holanda, Baixa do Sapateiro, Timbau and Maré. (Burgos, 2006)

The residents of Maré, when first told about the program, were afraid of being evicted from the area. The residents associations mobilized and actually Projeto Rio ended in having positive effects in the whole territory, with no attempts to remove the population from the area. People living in stilt houses were moved to new popular houses built in Maré, in other vacant areas. The inhabitants of Timbau and of some other areas, had their property entitlements rights given (1057 in whole Maré) in this period and the territory actually became more consolidated with the construction of new areas, with the government planning for the residents to stay in the area, together with people that came evicted from risk prone areas of other favelas of the city. (Burgos, 2006)

In 1979 Baixa do Sapateiro had around 20 000 inhabitants, and still had a great number of stilt houses, where people lived in very bad conditions. Some houses were built on top of an open air sewage, and when the tide increased, people had black sewage water in their houses. These houses were taken during the implementation of Projeto Rio and the population moved to the new housing units (1534 units) built in 1982 in Vila do João. The project was extremely important for the community of Baixa do Sapateiro, that became free from the stilt houses challenge and its property rights given, and since that at that time almost all basic infrastructure was built in the community, and the houses were already made out of bricks, it was turning out to be a even more consolidated and structured area.

The government also paved some of the streets of Parque Maré and the area had many improvements, with official water provision systems and electricity.

Even though it was a period of greater consolidation¹⁰¹ that extension of the occupations, Timbau's occupation kept on growing and in the 80's, in the area where previously was the beach of Inhaúma, were built low income apartment houses.

The existence of basic infrastructure has strong relation with the early creation of a residents association and its historical active projects and also from the fact that by being a hill, people didn't have to care about creating their own land, and spent greater investments in improving their infrastructures.

The 90's

Projeto Rio was just finished in all the favelas in 1992, after strong protests from residents associations, asking for its ending. For instance, in Baixa do Sapateiro there were promised sewage infrastructure and urban improvements that were not built or finished in the early 80's. In 1985 these construction re-started and stop once again, but only in 1990 almost all sewage and water provision were completed.

¹⁰¹ In 1987 for example, 92% of the houses in Timbau were brick houses. (Vaz, 1994)

The Linha Vermelha (Red Line) was built in 1992 and in that time the population of Maré decided with the planners what to do with the area between the communities and the highway. There was built Vila Olímpica, a big area dedicated to sports and leisure activities, managed by the municipality until today. It is a semi-closed space, where people can have access, but it is a fenced area.

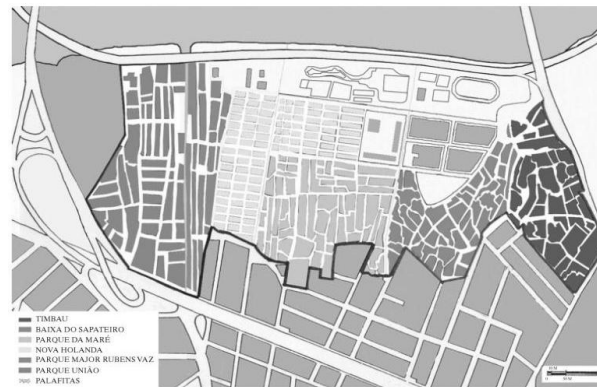


Figure 3. Part of the area of Maré in the 90's, after Projeto Rio (source: Projeto Rio, design by Leandro C. Rodrigues, taken from Vaz & Jacques (2004)).

Since then

All these irregular places are today consolidated and dense urban areas. They have great provision of economic activities and social connections between the residents. It is very usual in these areas, as well as in the greatest part of Maré, that people keep on growing their houses as family grows, or improve their living conditions as their economic life evolves. There are no more wood or stilt houses in Maré, with the exception of a small area, commonly known as Favela Mac Laren, where people do live in extremely poor conditions, without basic infrastructure provided. However this favela dates from round 10 years ago, and being located between Morro do Timbau and Vila do Pinheiro, it does not belong directly to any of these residents association areas of intervention. It is a case of exception within Maré, where today more than 130 000 people live with, at least, basic housing and urban conditions.

Morro do Timbau, together with Parque União, are the areas in Maré with higher housing prices, known in Maré, between their residents as the “south zone” of Maré.¹⁰²

Parque Maré is a completely consolidated area, with all the houses built in bricks and with no urgent problems related to basic infrastructure. Rua Teixeira Ribeiro, in Parque Maré, is one of the most known streets in all Maré, with a great economical dynamic and one of the most famous street markets of the whole favela. In the project for a new BRT (Bus Rapid Transit) line passing in Avenida Brasil (called Transbrasil) it is included a BRT transit stop nearby Parque Maré, which will improve the access and direct connection between this area and the rest of the city.

The places with regular guidelines

Nova Holanda, Rubenz Vaz, Parque União, Conjunto Pinheiros, Vila do Pinheiro, Salsa e

¹⁰² The South Zone refers directly to the identity of a richest area. In Rio, the south zone of the city is the wealthiest part of the whole urban area, where the neighborhoods of Copacabana, Ipanema, or Leblon (to name few) are located. To live in the “South Zone” is then directly related with wealth. Timbau and Parque União are in Maré the “South Zone” areas.

Merengue, Vila do João, Bento Ribeiro Dantas, Nova Maré, Conjunto Esperança

The places in Maré with regular layouts have two main different backgrounds. There are the cases where the regularity was determined locally, mainly with the intervention of Mr. Margarino Torres in Maré. These places date from earlier moments and are a local attempt to organize and structure the areas based on predetermined physical strategies. These places are not as regular and orthogonal as the other ones, where the public government implemented projects of low income housing for the residents. In both cases the main common fact is that it is not about spontaneous occupation, but rather planned and organized processes of urban development. Both these areas, because of its planning processes and final regularity are the closest ones to the planning logics of the ordered city, and can easily be understood as being anything but informal areas.

1950's

Parque União is the most consolidated area of Maré, with a very well defined urban structure and a high housing prices. It has large streets, some well defined sidewalks and very few alleys. It started to be occupied in the middle of the 50's, on a spread occupation in the parts that are nearest to the Avenida Brasil. Threatened of removal by the government, in the end of the decade Margarino Torres, a communist lawyer, is called to support started planning and coordinating the occupation of the area, managing the land distribution and selecting the residents to come to the area (for example, only people with permanent work could settle in). His plan of organized occupation was followed until 1969.

The portions of land were sold¹⁰³ to the new residents that needed to follow the rules of the space – it was forbidden to have illegal activities within the area, like prostitution, if someone would build a house without permission he would set the fire on the house and each inhabitant could only owe one piece of land. (Vaz, 1994) Margarino controlled morally and judicially the occupation, and prevented the residents from potential actions from the police, acting judicially towards the police initiatives: the policemen needed to be identified in order to get into the area. On the other hand, Margarino started to be accused of charging for fees and not improving the area, and his story in Maré ends with an episode of a murdering of a local resident.¹⁰⁴ This second phase of occupation happened in a fringe of land close to the water channel (bordering Rubens Vaz) that was left that was an embankment done by a private company that then left it without occupying.

The planning of the area took into consideration issues of housing and mobility, with plots with an area around 70 sq.mt and a well defined layout of streets. The occupation of the whole

¹⁰³ “When rumors of a SERFHA-led expulsion began to circulate, one of the residents decided to call on Magarinos Torres, based on his reputation as a powerful friend of threatened favelas. Magarinos Torres accepted the charge, setting up a neighborhood organization, re-naming the area the “Bairro Operário Desembargador Magarinos Torres (after his father), and collecting money that he said would cover court fees and neighborhood improvements.” (Fischer, 2013)

¹⁰⁴ “In Alexandrino’s retelling he had initially paid and collected the fees without question, trusting that Magarinos Torres was using the funds to defend local land claims and “urbanize” a favela initially entirely destitute of water, drainage, electricity, schools, or roads. As the months went by, however, Magarinos Torres raised the fees, charging as much as 40,000 cruzeiros as an entry fee, in addition to a monthly charge of CR\$1000. The promised improvements never materialized. Magarinos began to demand that new residents be registered voters, and that they go along with his “political activities,” imposing increasingly violent penalties – expulsions, shack burnings, beatings – on those who violated his terms. When João Alexandrino began to question those activities – leaving the local association, seeking a personal audience with Governor Carlos Lacerda to report the “crimes” and circulating a petition against Magarinos Torres that would eventually become the foundation for the police land-grabbing inquiry – Magarinos Torres began a series of steadily escalating threats against Alexandrino and his family, which culminated in his cousin’s assassination.” (Fischer, 2013).

area followed 5 different phases, moving towards north and east, and the development management included the payment of fees from the population that were then applied in urban improvements and to pay the services done by Mr. Margarino. (Vaz, 1994)

Rubens Vaz is the favela with the smallest ground level area within Maré. Located in a small fringe between Nova Holanda and Parque União, started to be occupied in 1951 on a sand area that was left from the canalization of the water channel of portuária. João Araújo, that was an inhabitant, started to organize the area and define the streets layout. Being occupied in the 50's, all the houses were first made out of leftovers of wood, since it was strictly forbidden to build houses with bricks in favelas on that moment of strong removal policies. It was then a place where people lived in very hard conditions, living in a very flood prone area and without allowance to build with more permanent materials. The area hadn't basic infrastructure, and in 1954 the population itself found a way of divert water from the pipes that passed under Avenida Brasil and have a water source within the community. Before that, the residents of other communities needed to bring water from Bom Sucesso, in the other side of Av. Brasil, crossing the high traffic carrying the drinking water (many people died hit by cars in this period). Afterwards, the whole area was able to have their own water provision individually at each home. (Vaz, 1994)

The embankments were done by the residents, with chalk (thrown out in the area by the state gas company) and construction debris that truck drivers would leave in the area in exchange of payments. The residents build their structured land and the occupation kept on developing and growing. The authorities paid attention to it and decided to act in order to stop the development of the area and this is when Margarino Torres steps in and fights for the permanence of the population in that place. He becomes a strong community leader and this part of Maré, first named as “areal” (in connection with the sand that existed there), is called “Margarino Torres” until 1965. (Vaz, 1994)

Its morphology is both determined by the layout defined when it was occupied, the area that was available with sand from the channel works and from the channel itself: Rubens Vaz is located between the “valão” (the current name for the channel, since it became a open air sewage and garbage deposit) and Nova Holanda.

1960's

A refavela

Revela o salto

Que o preto pobre tenta dar

Quando se arranca

Do seu barraco

Prum bloco do BNH

Refavela – Gilberto Gil. 1977

In 1960 the federal district moves from Rio de Janeiro to the new built Brasília. It is a very important time, when Rio goes from the main city of the country to being the State of Guanabara. Carlos Lacerda, a famous journalist, is the first governor of the new state and him, that was in the past a communist, starts one of the most hard decades for the favelas of Rio. The 60's is the decade of great urban and social traumas, with great removals and tragedies, and the institutionalization and re-enforcement of the favela seen as a problem and a issue to be controlled and, if possible, eliminated. It is known as the period of the big removals, both from the favelas and from the proletarian parks that were built in the 40's. It was created the National Housing Bank (BNH) that supported the construction of new settlements with popular housing far away from the south zone and the city centre of Rio, to where the population of favelas (mainly the ones located in areas of high real estate interest) were sent. The construction of Cidade de Deus (City of God) and Vila Kennedy date from this period. It was also a moment of

great investments and financial support in Brazil from the U.S. (through USAID) (Burgos, 2006).

For the re-location of the ones living in the favelas that were removed it was created low income permanent housing projects (like City of God or Vila Kennedy), far away from the city centre and the South Zone, in suburban areas, and also temporary housing projects. These ones were designated to the poorest ones within the poor, considered to be un-civilized, immoral and dirty. The idea was that these people would stay at the temporary housing projects for some time, get educated with moral values and hygienic principles in a extremely high controlled environment and afterwards, they would be sent to more permanent housing, when they would be ready to live within a more civilized world. This segregationist approach, together with the great removals, was responsible for the construction of a great trauma among the urban poor, detached from their territories and divided, separated from their closer ones and from their urban contexts. Many of these people, living in favelas in the south zone, worked in the same area but after the removals they faced difficulties on finding work opportunities and building their new social context.

The foundation Leão XIII, created in the 40's by the church is revitalized, becoming part of the municipal secretary of social services in 1962. This foundation will be one of the main responsible for the management of the removal processes and the control of the new settlements, the administration of the temporary housing centers, registration of people and definition of the centre of destiny for them. (Burgos, 2006)

This is a political moment towards the favelas that somehow reinforces and evolves from the politics that were taken 20 years earlier, with the Code of Constructions from 37 (Código de Obras) and the building of the proletarian parks, when favelas are understood as being undesired territories and its population being represented as the responsible for urban problems. Once again, the same story repeating, in an attempt to organize and control the urban land, segregating the poor areas far away from the wealthiest and high real estate valued places.

“With the increase in planned slum shifting, and the rising proportions of “relocated” people in new projects, these new projects are sometimes starting off today with the sullenness and discouragement typical of old projects or of old perpetual unplanned slums – as if they had already, in their youth, been subjected to the vicissitudes of many disruptions and disintegrations. This is probably because so many of their residents have already lived with such experiences, and of course take them along as emotional baggage.” (Jacobs, 1961)p. 278.

The story, once again, influences and reflects directly on the urban morphology of Maré: in 1962 the first inhabitants of Nova Holanda arrive in the area. Nova Holanda was one of the 3 temporary housing centers built with financial support from the USAID that created COHAB-GB. On these 3 centers and the 3 new permanent areas built in the city were relocated people from the 12 favelas that were removed. This means that, in the case of Nova Holanda, people from the old favela of Esqueleto, Praia do Pinto, Faria-Timbó and Querosene were settled together in the centre. These people had no relationships among them, and it ended up in being an area with inner segregations. When it was occupied its construction wasn't completely finished, with some houses to be concluded. (Redes de Desenvolvimento da Maré, 2010)

Morphologically, it is a very interesting area of Maré. Nova Holanda was built upon a new huge embankment done between Rubens Vaz and Parque Maré, that in that period were already occupied. It had provision of basic infrastructure and the houses were built with wood, brick or both. There were two different housing layouts: single and duplex houses, and each house was for a single family.

The construction was done in two phases (first on the northern area until Rua Sargento Silva Nunes, and then the southern area, until the limits of Parque Maré). It has a completely orthogonal layout, with very well defined structure, without alleys or cul-de-sac, in a totally flat and regular area. (Vaz, 1994)

It was not an occupied area, it was not illegal occupation, it was not informal or spontaneous, it was not abandoned or chosen by the population, it was not supposed to last for a long time and even though, it became a favela. The case of Nova Holanda should be itself a paradigm to

understand what is it about processes of “favelization”, and to which extent can the public authorities be part of that process, but that is not the objective of this paper. However, considering the urban strategy of this area and its occupation process one may address what possibly creates the perception and identification of informality that has nothing to deal with urban form itself.

Because it was planned to be a temporary housing centre, the houses were built with fragile materials and the basic infrastructure was not planned to support long term usages. Also, the population was completely forbidden of making any improvements in their houses or in the area, in risk of transforming this houses into more permanent units. Also, coming from different areas of the city, there were conflicts installed among the residents, which fumbled possible social organizations (the residents association was only formed in the 80's) and mobilization for urban improvements.

It ended up in being a permanent settlement, and the population did not leave the centre to be relocated in any other popular housing units, and as time passed, the houses started to get destroyed – and not improved – and the basic infrastructural services were not attending properly the growing population without any maintenance procedures. Since there was no consideration related to time resistance and adaptation, the area started to have some of the worst living conditions of whole Maré, becoming a place of shanties. (Vaz, 1994)

So, one may say that the political understanding of the favela as places to avoid, the cleaning of the city, marked the whole history of Nova Holanda. Its morphology and further processes of “favelization” are deeply connected – and dependant – on the strategies for social control: the fact that it was planned to be a temporary housing center, and that it was controlled to stay like that for many years, together with the difficulties of self organization and mobilization has its origins also in the planned initiative and the authoritarianism of Leão XIII, representing of the oppressor government.

If Nova Holanda is a great testimonial of the politics of favela removals that happened in the 60's, it is curious to understand that in this period some of the areas of Maré had their biggest improvements. The population kept on growing in the whole favela, and in some places the residents themselves improved their urban infrastructures, embanked new areas, and kept on occupying land. Margarino Torres was a very important character in this period, since he supported the development of two favelas (Rubens Vaz and Parque União), organizing it and giving a judicial support to the residents of these areas. It is a fact that both favelas had great improvements in the 60's, becoming structured places densely occupied. Once the area of Maré was at that time still a non-valued area for the real-estate market – the city was still having big investments in the centre and south zone, and moving towards west (Cidade de Deus and Rio das Pedras were built so that the people moved to there would be probably working on the building of Barra da Tijuca, the new area of the city in great development), and also with Avenida Brasil having its industries working all along it and being already the most congested way of Rio, Maré was then a very strategic place for workers to locate and at the same time it did not threatened the urban logics of development of Rio. There are stories of corruption within Maré's development, with the police and Fundação Leão XIII selling houses in Nova Holanda, and it may have happened in other areas of Maré. No matter what, it is important to understand that in Maré there were no stories of removal, but stories of population increase during the decade. In fact, Maré kept on growing and increasing its population until today, and that is also why it is such a rich and valuable case-study to understand the evolution and patterns of organization of favelas in different contexts and historical periods.

In 1961, the east area of Rubens Vaz was embanked, at the same time as the government was doing the landfill in Nova Holanda. The area had urban improvements on basic infrastructural services that were either given officially by the government (electricity and better water pipes) or constructed by the population (the sewage system is then directly sent to the water channel). In the same year, Margarino Margarino Torres leaves the management of Parque União with its residents associations elected (in 1961) and they keeps on following almost the same guidelines, continuing the development of that part of Maré. In 1965 the residents association of Rubens

Vaz is registered, and has a politics of controlling and organizing the allowance and distribution of residents in the area, selecting whom could live there and charging fees to the residents. (Vaz, 1994)

In Parque União, the houses were made out of wood, since it was forbidden to build in bricks in favelas, but the population started to build brick walls behind the wood, and once the house was finished, the wood panels could be removed. It was also the time of the 5th phase of occupation of Parque União and if in the first 4 phases the inhabitants had their property entitlements immediately, in the last phase it took more than 20 years to have the entitlements. In this period, the inhabitants needed to embank some areas, even though there was a preexistent embankment done, it was not enough to settle everyone. It was also the period of greater urban improvements: first, the population (similarly to what they did in Rubens Vaz) found a way of connecting the water provision infrastructure with the pipe passing under Avenida Brasil, but once it is found by the municipality it is determined to be destroyed. However, the residents mobilize and the public authorities decide to make an official connection replacing the informal one. However, ironically, the official connection has pressure problems and the populations finds it better to re-make the informal one they had before, increasing and improving it. Also in 1963 is installed the first electricity network, Also in 61 some streets have already sewage pipes built, conducting the sewage to the channel that divided Pq. Uniao with Rubens Vaz, to the bay, and to other channel that passes under R. São Sebastião. In 1962 the streets are paved for the first time. (Vaz, 1994)

In 1964, when the municipality decides to build a new freeway passing side by side with Avenida Brasil, a new embankment is done to re-locate the inhabitants living on the fringe close to the avenue. However, this freeway is not built (it will be build only in 1992 and in a completely different layout) and the population start occupying the landfill left by the municipality. This was also the phase when all the embankments were done in the full area (and after the houses were built, usually another embankment was done to reinforce the streets) that today is Parque União, completing the construction of its own land by its population and as soon as land was conquered to the water, it was immediately occupied by new residents coming to Maré. This last occupations were more irregular than the ones done while Mr. Margarino Torres was managing the area, and it is very clearly to see two main different street layouts in Parque União. The streets start having smaller widths and stop following the more orthogonal matrix done while at Margarino's period. (Vaz, 1994)

The 70's

“The environment is, with no doubt unfavorable. (...) It is hard, if not extremely impossible, to recover men, women and children in an environment like the one in favelas. Because oh what we decided for the arduous, but fruitful, work of eradication” (CHISAM, 1971: 31).
cited in (Brum, 2012)

With its territory completely occupied, and with almost one decade of existence, Nova Holanda becomes overpopulate and its basic infrastructure systems collapse. People went back to carry the water from far away, as in the old times in other favelas of Maré, and the area is already becoming unable to support the permanent and growing occupation without any urban improvement. (Vaz, 1994)

The social conflicts within the center kept on growing with clear segregation and separation accordingly to the favelas where the inhabitants were coming from (remembering the fire on Praia do Pinto was in 69, so this population was relocated to Maré in this period and facing issues of integration and relation with the other residents). This processes designed new identifications and conceptualizations within the area, subdividing the territory and breaking its perception as a unit: the duplex area, where people from Praia do Pinto were located, was known as the Vietnam, because it was considered a very dangerous area. (Vaz, 1994) Morphologically these differences were also easy to understand, since the duplex units built were the place for the ones coming from Praia do Pinto, having then a physical differentiation

from the other ones already living in Nova Holanda.

This segregation was supported by the foundation Leão XIII, probably within a strategy of segregation in order to avoid mobilization and organization among the residents that could put in risk the authority of the institution and the urban project that was implemented there.

In the government of Moreira Franco, the streets of Rubens Vaz are paved, the streets of Parque União are re-paved and the basic infrastructural systems are improved. The pavements are done on a basis of a “street commission”, where people would collect money and take decisions about the material to pave their streets. It was a self organized process. (Vaz, 1994)

The 80's

In 1982 Brizola is elected in Rio with a political agenda strongly focused on social priorities, focused on improving favelas and its infrastructure. He represents in that period the alternative way against the authoritarian clientelism that for so many moments controlled the relationships between politicians and the city, mainly the favelas.

It is a very different moment that is being lived now, with a different approach towards the favela, but since the residents were so used to be threatened of removal, they were at first afraid of being taken from Maré once that the stilt houses would be demolished. They mobilized and somehow opened the dialogue with the authorities and in fact, everyone that was previously living in stilts were re-located inside Maré to one of the different projects that Projeto Rio built there.

Some of these projects were made out of single houses, while others were apartment blocks, but all within the limits of what is Maré today. This is a moment where all development in Maré is done on a regular morphological perspective, and the experiences had already shown that if the projects are not flexible and able to be adapted accordingly to the residents needs they don't succeed as expected. There is no need to make a deeper analysis of the morphological definitions, since they are, at this point, mainly resultant from the housing layout decisions and issues of design priorities. It would be necessary to get into architectural and urban design paradigms of the moments, and that is not the aim of this work. All the projects have, however, a very strong regular plan, with modular repetitions, either in apartment blocks or when single houses are built. The basic layout and structure remains until today, with individual adaptations in houses. However, one may say that when houses are built individually they are more able to be adapted and give better flexibility to the residents to evolve or modify their layouts according to their own needs. Apartment blocks may give a more rigid morphology, and unable some intuitive transformations of its residents. In both cases, there is a strong modernist perspective upon the plans and their distribution, based on functionalistic logics and normative, orthogonal form.

The most important is to reinforce that this was a moment of structuring and development of the whole area, with a greater definition of its favelas, stabilizing more the occupation and morphological distribution. Once you have the public authorities and the government building and planning in Maré for permanent assets, it means the achievement of the urban recognition of this territory's part of public strategies for urban development of the whole city. However, this is focused mainly in housing issues at this time, with the communities lacking public services until today. For this research it is extremely important to see how urban morphology radically changes when a new logic is placed. This is fundamental to understand the diversity that exists within Maré, and to acknowledge that in fact this is not the first moment that public policies influence Maré's development – it has always happened, the main difference is that now this action had immediate and direct impacts on the urban form.

In 1982 the sewage system of Rubens Vaz is improved, built by the government. During projeto Rio, the last embankment of the area is done. (Vaz, 1994)

The first election for residents association in Nova Holanda happened only in 1984, and was planned since 79, with the threat of Projeto Rio to remove the favelas in Maré. Women and young people are the main responsible for the achievement of a collective thinking, and an

organization of the community in order to allow the existence of the residents association in an area that was initially full of conflicts. The elections were won against the Foundation Leão XIII, through a remarkable community empowering process. (Redes de Desenvolvimento da Maré, 2010)

In Projeto Rio, the people living on stilt houses were re-located to new housing units within Maré and some of the areas where the stilt houses were located, were then embanked by the project. It is in this context that Conjunto Esperança, Vila do João, Conjunto Pinheiro and Vila do Pinheiro are built:

Conjunto Esperança is the southern area of Maré. It is a completely planned area, with blocks of apartments. It does not have direct access via Avenida Brasil, because it is located behind the main building of the FIOCRUZ foundation (a health foundation). When it was built, there were no business or commercial activities proposed for the area, and the residents did not accept the project so well in the beginning because they felt the lack of services and urban dynamics there. However, with time the area consolidated, adapted and the population became more familiar with their new context. (Redes da Maré; Observatório de Favelas, 2012)

Vila do João is located North from Conjunto Esperança and faces Avenida Brasil. It was built in the same context and also for the relocation of people in stilt houses in Maré, but it has a single housing layout proposal. The residents of Vila do João were given property entitlements in the moment of relocation, and because of that it is the area of Maré where almost everyone has their property rights ensured. It is interesting to understand that Vila do João area was an airport and a flight training center from the 30's to the 70's, that was demolished because it started to be seen as an unsafe place to do trainings – there was an accident between one plane that was training with a commercial flight coming from the international airport. (O GLOBO, 2014) It was then an area already defined, completely flat and with a very specific previous occupation. There are no infrastructural buildings left from that period.

In Conjunto Pinheiro, located east from Vila do João, were built the last apartment blocks (34 units) of Projecto Rio, in 1989. Without maintenance, in 1999, the residents protested for urban improvements of the area, that were then implemented by the state housing company (CEHAB). (Redes da Maré; Observatório de Favelas, 2012)

Vila do Pinheiro was built in the context of the second phase of Projecto Rio. It is an area of small houses built upon embankments done in order to connect the Island of Pinheiros with land. This island had an elevated area, that became the first (and only one) ecological park in a favela in Rio – Parque ecológico pinheiros.

Projecto Rio left Maré in 1985, and was publicly announced that all the construction and improvements were done in Maré, but after popular mobilization the project returns to finish works that were still undone.

The 90's

In 1990 around 90% of the infrastructure was done in Maré, and the houses of Nova Holanda were already connected to the electricity network. Rubens Vaz had 98% of the houses with electricity, 86,04% connected to the sewage system, 96,63% with water provision, and 88,55% of houses were made out of brick.

From that moment, there were attempts to plan collectively the improvement and construction of houses in Nova Holanda. The creation of COOPMANH by the residents association, had the purpose to collectively manage building materials in order to give access to everyone to improve their houses. It didn't work out as it was planned and then it was created a factory of concrete bricks with support from the government, that sold those bricks 20% cheaper (in 1990). In 1992 were reconstructed 46 houses from the duplex area. Today, there are no more wood houses in Nova Holanda. Nova Holanda has one of the most impressive stories of self organization after 22 years of authoritarianism and segregation among residents, and achieved amazing results in urban development and consolidation. (Redes de Desenvolvimento da Maré, 2010).

The streets morphology of Rubens Vaz changed among the years. It was first organized as two main streets connected through alleys on a very longitudinal distribution but as time passed, these alleys were closed by the populations, occupied by houses. There is also the argument that the alleys were closed because they were crime prone areas. (Redes da Maré; Observatório de Favelas, 2012)

In the 90's there were also other areas being built with initiatives from the public government.

In 1990 Bento Ribeiro Dantas was built to locate people that came from other favelas and areas in Rio considered to be risk prone areas. Bento Ribeiro Dantas is located where was in the past the Inhaúma port, an important infrastructure for the city before the train system was installed. In 1995 the community had its residents association. (Redes da Maré; Observatório de Favelas, 2012)

In 1991 the red line is built and it brings transformations for the area. A big embankment is done in Conjunto Esperança in order to allow to build the freeway, on the area that before bordered Maré with the water in the south. Contemporary to the red line, the municipality built Vila Olímpica, a recreational area focused on sports activities located on a big area, on the east side of Maré. Also after the construction of the red line, it was built a wall all the way that borders the freeway with Maré, justified by the municipality as a way of reducing noise from the cars in the community. There are some different positions about that, considering that it was a strategy to cover Maré from the view of tourists that come all the way from the airport to the city centre through the red line.

In the 90's starts the Favela-Bairro project in Rio. The main objective of it was to improve areas of favelas, with great focus in public spaces. It was a moment where "urbanizing" was the main word for these territories, and the issues of removals were not considered anymore. The project appeared in a time where there were still infrastructural issues to solve in favelas. It was implemented during the government of the mayor Marcelo Alencar, on the foreword of the definition of the city's masterplan in 1992.¹⁰⁵ The program is created in 1993 by the governor César Maia, being one of 6 different programs proposed by GEAP (Executive Group of Popular Settlements), and has as priority to do the minimum relocations, recover public areas without being too invasive, and to have interventions mainly in smaller favelas (with 2 to 10 thousand inhabitants). In 1994 the execution of the program is prepared, and the architectural offices that win the public competition have the autonomy to define the projects. In 1995 the International Development Bank injects more money in the project (through another program of popular settlements urbanization- PROAP), and Favela Bairro extends to around 60 favelas more. There was the idea of taking Favela Bairro to all the favelas of Rio, and it was already being taken as an opportunity to build dialogues between the inhabitants and the public authorities, however, with the new governor being elected, the program was stopped. (Burgos, 2006) The implementation of Favela Bairro is contemporary to the definition of Maré as a neighborhood, and José Moraes, the one proposing the change on the areas official denomination argued that with this new identification it could be possible for the residents of Maré to have more resources to fight for their fundamental civil rights. (Silva, 2006)

Nova Maré was built within the Favela Bairro process, in the 1996. It was the place for the resettlement of people that lived in risk prone areas in the city, together with residents from Maré that were removed from their stilt houses, in favela Roquete Pinto (Redes da Maré; Observatório de Favelas, 2012). It is interesting to analyze the project on the context of Favela Bairro, because the focus of the program was the construction of public services, urban infrastructure and revitalization of public spaces, and Nova Maré is an example of a housing project within an already structured territory.

¹⁰⁵ In the city's masterplan the favelas are first identified as Popular Neighborhoods (Bairros Populares), and there is an attempt to integrate these areas in the city. It considers the construction of new popular housing and the urbanization of favelas, with a definition of these territories that do not include any moral or cultural characteristics but only infrastructural and spatial.

It is a post-modernist project, south from parque Maré and east from Baixa do Sapateiro, built with concrete and brick with no finishing, differing aesthetically from the other public housing projects that exist in Maré, that had a more modernist approach. It proposes an organization of the houses in groups, with common public areas organizing the space. The houses are structurally made so that they won't support a vertical increase, and the roofs are pitched. The circulation within the area is done so that it connects the small public spaces, with the main streets bordering the area.

Today, Nova Maré is the poorest area of all Maré and also the one with greater conflicts. It is told among the residents that a big part of the drug dealers in Maré do live in this area, and that because of that the door numbers of the houses were removed, so that it would be more difficult to identify the houses. It is also the only favela of Maré that does not have a mail service door to door, also in relation with that.

The small open spaces proposed by the project are being occupied by new houses, and the houses are being transformed in all the favela. Some public amenities are sometimes removed, as the population does not feel they want or need it. It is probably the area of Maré that today is passing through a faster transformation and adaptation process. It is common sense in Maré that Nova Maré was an unsuccessful project and its residents are not satisfied with it. Its morphological definitions and restrictions limited the adaptation capacity of the area, and the decisions within the project do not supply the social and individual needs of its inhabitants. This is a paradigmatic case within Maré where the regularity and rationality led to the dilapidation of the area because it didn't consider the adaptative processes of its residents, and tried to fix a pre-concept of housing and use of space (the fact that the houses have apparent bricks, looking unfinished and there is no allowance to finish them with paintings, for example, brings back the stigma of the favela as the place of informality and permanently unfinished).

Salsa e Merengue is the newest area of Maré. It was built in 2000, and is composed of small houses. It was built for the relocation of families from other favelas of Rio that suffered from floods and landslides. Its original name, Novo Pinheiro, makes reference to Vila do Pinheiro, the community aside, but because the houses were painted in a very colorful way, it started to be called as the Salsa and Merengue community, making reference to a soap opera that was famous in that period. (Redes da Maré; Observatório de Favelas, 2012).

Public spaces

In the 7 World Urban Forum, the Future of Places initiative hold a conference series which included the event Public Spaces in Favelas and Slums. In this event, key stakeholders agreed on the “the potential of participatory urban planning, utilizing public space as an instrument to promote equality and poverty reduction; specifically regarding marginalized communities.” as well as on the need to understand “the importance of understanding the dignity behind public space and its essential role in favelas and slums.” (Future Of Places, 2014)

In Maré, as well as in other favelas, the public space is not necessarily regularly defined, but extends to the public areas that exist within. The streets are often an extension of the houses, and become multifunctional areas. In Maré for example, Rua Teixeira Ribeiro in Parque Maré is a clear example of how a street can become an open air mall, or a street week market, with almost all of its sidewalks occupied by the commercial activities that happen along the way. There are also bars and small food services that extend to the sidewalks, and the whole street becomes a dynamic public space. There are many examples of this situation in Maré, with several food markets in different favelas, and with a very usual usage of alleys and smaller streets as an extent of the house.

There are also more formal public spaces, small squares or sport areas like Vila Olímpica and football fields. In the case of Vila Olímpica, being a gated areas with access control and with an extremely formal process of admission of people in their activities (with waiting lists, dependency on the availability of teachers, etc), it is a space barely used, and even though it occupies a huge amount of land and has several sports amenities, it is most of the times with

very few people using it. This severe control of public spaces also happens in other formal areas in Maré. Some football fields have their access controlled by the parallel activities of drug dealing, that charges the usage of some areas and the moments for them to be used. Even in some areas where this control is not done directly, there is an indirect influence of the parallel power over the usage of space.

The urbanization and improvement of public and common spaces, and also its morphological definition is fundamental for the structuring and development of the areas, as long as it reflects the flexible use of spaces and its capacity to be adapted to different functions. Once the priority of occupations in Maré is related with housing provisions, formal public spaces are usually neglected in the process, for not being considered a priority. However, the way that free areas are taken are a clear message that there is the need for qualified common amenities and infrastructures. Streets, sidewalks, or squares may have the potential to connect areas within Maré and concentrate or disperse local dynamics, if understood from the perspective of the local needs.

“The private realm often extends into the public sphere due to the proximity between homes and the narrowness of the roads and pathways. This proximity creates multiple social spaces, allowing conversations to take place from window to window, doorstep to doorstep, balcony to balcony. Rooftop gatherings, too, are a popular affair in a private extension of collective participation. (...)”

While the favelas inherently belong to residents, drug traffickers, militias and police forces have overarching effects over the public’s freedom to enjoy a space. Thus, the notion of scary space is introduced as one where crime and the fear it instills dominates the perceptions associated with a place and affects the ways it can be used.” (Dixon, 2014).

When in the 20th of April the Avenida Brasil was closed in the area that passes in Maré, for the execution of constructions works, the population used the area for recreational purposes. (GLOBO, 2014) It was an evidence that there is the need for quality public spaces, and also that the challenge of adapting urban areas for other purposes is something that the residents are used to do. It was a lesson given by the inhabitants of that area, of their intense desire of having public spaces and the right to a city that morphologically supports their urban needs. And public spaces may have the capacity of changing cities but more than that, changing them within a collective thinking.

The right to the city is far more than the individual liberty to access urban resources: it is a right to change ourselves by changing the city. It is, moreover, a common rather than an individual right since this transformation inevitably depends upon the exercise of a collective power to reshape the processes of urbanization. The freedom to make and remake our cities and ourselves is, I want to argue, one of the most precious yet most neglected of our human rights. (Harvey, 2008)

Ideas for re-classification, re-understanding and re-thinking planning positionings towards the favela

Idea 1: if maré is a slum, then it is a slum that is unslumming since ever

Slum and Unslumming – lessons from Jane Jacobs

Podem me prender
Podem me bater
Podem até deixar-me sem comer
Mas eu não mudo de opinião
Aqui do morro eu não saio não... ¹⁰⁶

¹⁰⁶ They can arrest me / They can beat me / They can even leave me without eating / But I don't change my mind / From the hill I don't move”. *Opinião*, by Zé Kéti.

Leveling this knowledge up to urban form, and focusing on the specific case of the favela, one will understand how the categorizations that favelas have had are resulting from specific contexts of relative comparison, and that actions within the favela do take place upon its regional classification. From Jane Jacobs we find an interesting perspective over what she calls “slumming and unslumming”. As we read through it, it states clear that, according to the history of favelas and specifically, of Maré, that when we approach these territories we shall definitely understand them as something else rather than a slum – or the regional classification she presents – , but take from her perspective the potential of understanding how situations, networks, interactions and, in the end, attachments may be the key for unslumming processes.

According to Jacobs, unplanned slums result from the abandonment of urban areas that are not welcome anymore to wealthy, usually white people. These inhabitants move somewhere else within the city, to more “valuable” places and leave their old neighborhoods deserted. This is the starting point for the formation of a slum: immigrants and usually black people buy these houses and settle in these areas. Usually there is a very fast population growth in these areas, and it gets overcrowded, and as Jacobs says, usually people are always looking for a chance to move from these places somewhere else in the city – a safer and more desirable place. Slums can also be planned, when the public authorities decide to build public houses for people relocated from other areas of the city.

From this understanding, one may identify the regional categorization that is given to a slum, and if Maré was build – as we will see during this study – from nothing, there are processes within the construction of this place that remind us of the traditional slum creation that Jacobs speaks about. However, as we will see later, if it is to consider that Maré was a slum, once upon a time, now the regional understanding must change.

“The foundation for unslumming is a slum lively enough to be able to enjoy city public life and sidewalk safety. The worst foundation is the dull kind of place that makes slums, instead of unmaking them.

Why slum dwellers should stay in a slum by choice, after it is no longer economically necessary, has to do with the most personal content of their lives, in realms which planners and city designers can never directly reach and manipulate – nor should want to manipulate. (...)

Indirectly, however, the wish to stay is obviously influenced by physical factors in the neighborhood.” (Jacobs, 1961. p.279)

From the lessons learned of American slums through the perspective of Jacobs, and thinking about Maré as a favela, the proposal is to find a relationship between unslumming foundation processes as proposed and the reality that is today being lived in Maré. The stories within the history of Maré tell us, similarly to many other stories of many other favelas, about places of struggle, of strong and persistent processes and actions from the populations in order to stay in those areas and not to be removed from there. In the case of Maré we may see from one side, the conditions that turned that area into a possible area for the poor ones to settle – a place close to job opportunities, in a mangrove area, not desired by the middle and upper classes, where people could built their houses free of charge – , so one may say that the population was directed to this area, but on the other hand, we see a constant strength to stay in those areas and to improve the houses and also the urban infrastructure.

“As the family grows, or additional resources become available, the shacks are improved through “puxadinhos” and the cheap materials are substituted by better ones in a continuing adaptation process.” (Vaz & Jacques, 2004)

So, if in one hand we have conditions that are similar to the foundation of a slum – occupation of undesirable land – on the other hand it is clear that the population carries within their territorial story lessons of an unslumming process that is happening since the very beginning of occupying Maré – with the army demolishing the houses and people re-building them on the 40's, the construction of their basic infrastructure and improvements of houses, building with more permanent materials, or growing the houses as the inhabitants economical conditions improve.

Considering this, one may say that, if we want to talk about favelas as being a slum, then we shall consider them as a slum in a continuous process of unslumming, and both concepts are then born together. Or one may consider, from a planning perspective, these evidences as open messages from the local population of a strong dynamic of urban improvement happening within the favela. It may be the role of planners and politicians to carry about supporting urban improvements, the achievements of greater urban quality and, as Perlman says, “sidewalk safety”, but it is not their role to define or try to manage the reasons why people choose to stay. But as we see historically, it seems easier for agents of formal transformation to create potentially “planned slums” than to support unslumming processes that are in action.

Idea 2: favelas are not informal settlements: they are full of form! Proposing an alternative classification – towards the spaces of adaptation.

Proposal for a contemporary updating of understanding urban dynamics and morphologies of the favelas.

Regular vs Irregular

Considering the specific dynamics of urban development within Maré, it is not possible to keep on talking about informality when considering these territories, and it is clear that these spaces are not urban ghettos or shantytowns as we know them from other international examples. Favelas, and specifically Maré, exist and develop within their very specific continuing struggles, resulting from a constant battle from people to find and build their place and identity in the city. Favelas have logics that are developed from their own necessities and challenges, and what is usually called as being informal is nothing more than the simple misunderstanding or no-understanding of another perspective of urban development.

As it was seen, the irregular territories are usually related with the local logics and the self building of the place. Irregularity comes from the sum and bridging of many individual efforts within a common ground. It represents the continuous struggle to fix a space within a territory, and its morphological definition stamps with great accuracy the flexibility of these actions and the logics that come from human needs and social life, much more than from technical conceptualizations, or Cartesian understandings of space. It is the planning upon the needing, in a constant adaptation to everyday challenges, threats and conquests.

On the other hand, the regular communities mainly results from planned initiatives of development. Either locally organized or resulting from state initiatives, these spaces have in their orthogonal and clear space definition the confirmation of a planning process that was based first on land, then on human life. In some cases, the regularity and ruling was so and inflexible that ended in prejudicing the improvement of some spaces (i.e, Nova Holanda). Regular territories within Maré represent the planning logics of each specific time, the planning paradigms and the political moments of the city.

Favelization or Adaptation?

If the more irregular communities are built on a bottom-up approach – people develop and build the territories and later on, the official services and infrastructures are provided - , the more regular ones follow an approach that is from above – the places are built and then people adapt them to their own needs. Somehow, when these events happen in poor areas, they are named as a “favelization” processes, for both cases: when people occupy land, and when popular housing or urban infrastructure is built and then transformed by the population. Considering that “favelization” is a very abstract concept, we rather talk about adaptation processes.

Both regular and irregular places, no matter how they are built, attest the societal development, political interests and economic strategies of the city. These realities are the real cards to play the urban planning games, since they are the greatest determination of where do

people live, how do people understand the relation between housing and work, where is social inequity based on economic values and accesses, which city is wanted and for whom. Then planning must be seen from a broader perspective – it is not the simple organization of space, but must be the understanding of the inner forces of urban development. Planning, in Maré, was done from the first moment, when Mrs. Orozina planned to stay on Timbau hill, when other people planned to build their houses to be close to the (planned) new industrial city. Planning was when the military turn houses down and controlled the occupations, when fundação Leão XIII had their roles defined, when the governor decided to put people in temporary houses, planning a more civilized city. And finally, in a classical perspective, planning was when Mr. Margarino Torres organized and controlled the development of two communities, when the municipality built low income modern and post modern housing units, when Projeto Rio relocated in new buildings people living in stilt houses.

What we may find different from Maré and other favelas in Rio from the rest of the city (or the “favelization” processes) is their continuous capacity of adaptation to reality and needs. In the formally planned city, the organization of space illustrates future investments and strongly organize the way people live in the city. In the case of Maré it can be seen that space is adapted to the population needs, to the topographical and geographical conditions, and in the end, to the logics of the other city. It lives a constant adaptation process and when space lacks flexibility it will be confronted by the local needs.

It seems necessary to propose a new classification for these territories, replacing the des-informed and obsolete informal vs formal dichotomy: favelas are *adaptive* and *adapted* settlements, that can be morphologically regular or irregular – they are spaces of adaptation and reciprocity¹⁰⁷. This new classification may help society, politicians, and also planners, to understand the direct relation among these territories and the local realities, and state clear that there is no such thing of excluded places, living in constant informality, and within some sort of local autism.

Planners shall understand that these are areas of constant change and that flexibility is fundamental, they shall shift paradigms when including these territories in their plans and researches and classify and work upon them understanding their specific logics and histories, their own challenges and never-ending stories.

Idea 3: breaking dogmas supported by the morphological understandings

On her great analysis of researches done upon the favela theme, Valladares (Valladares, 2005) presents us with a series of dogmas that appear frequently in the works done. The proposal is to try to understand, from the morphological story of Maré (considering its multiple inner stories and the greater story of the city as a whole) to reflect upon those dogmas.

Dogma 1: Favela as a completely specific and singular space.

Favela has a very particular way of occupying urban land, without urban infrastructure and in a irregular way. It has a very specific aesthetics of housing, and according to official perspectives, it is a place of exception, where illegality and occupation against the norms established are the main rule. Therefore, favelas shall have exceptional politics considering their exceptional and singular contexts.

As it was presented, favelas may have completely different realities within it. They are a response to established rules that regulate urban space, processes of urban market that exclude the poor ones from accessing housing in the formal and legal cit, só they don't appear from

¹⁰⁷ In its research about space organization in favelas, John Dawsey supports the idea of a space of discipline (resultant from processes of urbanization) in contrast to spaces of reciprocity, organized by residents of favelas in their struggle to survive to processes of marginalization. He supports that both organizational forms are resultant from contrasting cultural processes. (Dawsey, 1989)

exception but from the answer to the established rules that can't include all different urban needs and priorities. There are also different cases of favelas built by the rule directly, such as the case of all the popular housing built in Maré, or the housing projects (temporary or permanent) built back on the 60's. They are just examples of how favelas are not singular, independent or specific, but an urban fact that results, as all other urban facts, from its specific political, economical and social context.

Dogma 2: The favela is territorial and socially the urban place of the poor.

This dogma would mean the favela residents build a city within the city, the illegal territory inside the legal one, in a very well defined limited zone, with their own economy, inner laws and specific codes. It is the theory of the broken city, of urban exclusion.

What we know is that the favela lives economically and socially completely integrated in the city and that its territory results from the evolution of the whole city. Maré, for instance, has its territorial history completely dependent and connected with the urban transformations that were happening around and the economic opportunities that opened in the area, mainly related with creation of jobs in construction and industries. There is not the case of urban exclusion, but of urban differences within the same dynamics. If the favela is there it is because the city wanted and also needed it to be there in order to be the city it is today. Even inside Maré, there are different economic realities and valued places, there are different social relations and political consequences. And if the analysis would extend to the rest of the city, it is today very clear, with the processes of gentrification happening, that the favela can't anymore be considered as the place of the urban poor. Also, the favelas of Rio are much more an issue of inequality rather than a question of poverty.

Dogma 3: Favela as an unit. All favelas are reduced as a single category.

Favela is spoken in singular and lacks the interest about their inner diversities. There is the tendency of speaking about the favela as a ideal paradigm, with great number of studies and analyses focusing on the differences among favela and the rest of the city.

There are not only differences between favelas, but also inside a single favela in its different areas. Even morphologically speaking, there are favelas structured more organically, in hills, others located in flat areas, others that were slightly conquering their spaces and irregularly forming. There are favelas with different urban densities, and located in completely different places of the city. They have their own contexts and structures, and even socially, they have specific organizations and mobilizations among their life as urban areas. It is fundamental to take a deeper look to the differences of these areas instead of building generalizations and unifying wrong conceptualizations, that can only under estimate and misunderstood the common knowledge and weak the potential capacity of acting and work for the improvement of these areas.

Idea 4: rio and the mega events: this is not an excepcional moment in the city

In the past the city of Rio hosted several mega events. Specifically on the 20's and on the 40's, these events where strategic arguments for the public authorities to take action upon urban development and it had direct impacts in the life of the urban poor, with great number of removals in favelas of the city. When looking to the events with more attention, one may understand that the execution of those urban initiatives were planned and debated long before the events started.

As Soares Gonçalves presents, "he organization of mega events in the first decades of the XX century had a strong pedagogic role to build a new society and eliminate the points of diversity. The building of a pretentious agreement about the future of the nation was expressed also in the way to act in urban space. The time urgency to prepare the city allowed diverse

negotiations, with improper use of public budgeting and giving benefits to certain economic groups, namely the ones connected with civil construction and real estate market. Even the mayor was pointed of getting undue benefits in the demolition of Morro do Castelo”. (Gonçalves, 2013)

Some of the specific episodes help in understanding how the mega events had an important role in sustaining and acting as an argument for urban actions that have within them other interests and consequences. Today, Maré is facing this new urban context, with the same old stories. There is no perceived risk of any intention from the government to evict the favela, or to take the territory for other investments, but it is also true that new dynamics are happening, and that in total, around 30000 people were evicted in the context of the preparation of the world cup and the Olympics.

This year the army occupied Maré, with the main objective to take the organized crime out of there and, as it is usually said, to re-take the territory to the public power. It is promised since last year that Maré will have an UPP, a pacifying police that has been taken as a model and implemented in many different favelas of Rio. At the same time, it is true that the strategy to occupy Maré now has a direct relationship with the upcoming world cup event, and the territorial and geographical context of Maré – it is located on the middle way, from the international airport of Rio to the city center. The decision to position the army in Maré now has, once again, its origins in a perspective of control of this territory, and the understanding of it as something that need to be supervised and managed as a dangerous and informal place. Once again, the territory has its challenges and opportunities directly related and dependent on the history of the city, but once again being positioned as the different city, where the actions taken in order to get ready for the mega events differ from the processes in the other, formal, city.

The UPP process has brought in some territories a classical gentrification process. It is also a repeated story, that happens at least since the early XX th century in Rio, with the government of Pereira Passos and his great urban transformations. With UPP favelas, and mainly the ones located in strategic urban areas, become places of interest from the real estate market. Also with regularization, people that were using basic infrastructure self-built, without supervision, now need to pay for these services, and in some cases this is a strong reason for leaving the places and moving far away, into suburban areas. This gentrification events, with rise of house values and expenses with services are a real threat to places like Maré. On the other hand, the occupation of the territory and the certainty of a UPP coming to Maré opens up the perspective of new opportunities, and the population is organizing themselves to build up dialogues with the municipal and the state government.

On the 6th of April, the mayor announced that the program Bairro Maravilha, that was being implemented in areas of the city that lack interventions from the public government, will be implemented in Maré. The objective is to improve urban infrastructure, but the mayor had also announced a great investment in education for the area – the building of new 7 schools, 5 kind gardens, and an educational campus. The mayor has also confirmed that the public government is taking action over Maré for a long time, and that the biggest issue to face was actually the armed drug dealers.¹⁰⁸

It is clearly a positive perspective over the urban needs of the territory of Maré, but once again, it is made upon a principle that it is a territory to be controlled and that things could not be done without the presence of the army. The majority of the 30 000 people evicted in the context of the mega events are being relocated far away in the city (62% of Minha Casa Minha Vida projects, a federal program of low income housing to where some people that are being evicted from favelas are being relocated, are placed in Santa Cruz, in the west part of the city, extremely far away from the city center and the richest neighborhoods in the south zone), and these dynamics immediately remotes us to the policies overtaken back in the 40's and again in

¹⁰⁸ “Prefeitura levará obras do Bairro Maravilha para a Maré” in <http://oglobo.globo.com/rio/prefeitura-levara-obras-do-bairro-maravilha-para-mare-12111391#ixzz31SClzpUS>

the 60's.

Conclusion

The form of the informality is built through a series of relations, conflicts, challenges and achievements that build historical relationships between public authorities and the population. The urban strategies are tactics determined mainly to accomplish clear urban objectives, and the urban development of favelas – its origins and continuous evolutions – result from these relations. Economic strategies, political positioning, and social contexts define the final layout of urban complexities and definitions. It is not different in urban morphology. As we saw from Maré, the form of this territory is always built among these complex dialogues, revealing stories of struggle and resistance, or top-down initiatives of urban permanence, but it is always a plan that exists behind the plan. The idea here is to bring up in the air the notion that planning has much more to do with this level of decision rather than with the morphological conceptualizations of space. Therefore, favelas as places need to be considered and read from its own background and from how these areas are integrated in the whole sequence of local and global events. From the learning of Maré, one may understand for example how in the 60's the american financial support given governmental projects ended up in supporting a whole series of removals and urban traumas. At the same time, the fact that Dona Orozina herself, decided in staying in Timbau without allowance had a strong impact on the history and on the definition of that place. And today, the mega events, the processes of gentrification, and the pacification processes are also building new urban definitions, interpretations and also, new morphologies. The role of the planner or the architect in this game is, one may say, indifferent for the whole story. But then, what can we, as planners, as architects, and as social actors, do for the achievement of a more fair, equal and morphologically understandable city?

The question should be on what do we want for our cities, and how do we see our cities. The proposal of this research is to suggest that first of all we shall understand how we identify the space of favelas, and what could be, in the end, their common essence. And, to what concerns issues of urban morphology and layout, its common essence is a matter of process, and not a matter of product. There is not a single favela equal to another, there is no definition of form within these places, but there is a common process of *adaptation* that follows all paradigms. And understanding this first, may be a good start.

Acknowledgments

I would like to express my appreciation for the support given on this research from Mrs. Katarina Nitsch and Henrietta Palmer from the Royal Institute of Art and also from Mr. Rafael Soares Gonçalves, Mário Brum and Mauro Amoroso. This exploratory thinking may be continued.

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Fernando Távora and the portuguese urban space design

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Abstract. *Our urban context is considered in new and complex ways, in which territory is no longer a mere network or mesh, but an interaction of different plans and systems of urban life relationships. A territory constituted by several layers that either continue or split from urban collective memory, we are challenged to grasp the urban question by studying the processes that occur while a project is created. This paper aims to reflect on idea-based construction processes seeking to intervene in the urban space by looking at the theoretical and practical career of Fernando Távora (1923-2005) - a Portuguese architect who has influenced the teaching and practice of this subject in Portugal from the 1960s to the present time. It will begin from the General Plans and Urban Arrangements carried out by Távora and his team, during the second half of the 20th century in several Portuguese cities, namely Montemor-o-Velho (1951-59), Aveiro (1962-63), Barredo in Oporto (1969-76), Guimarães (1979-86) and Coimbra (1989-1992). Fernando Távora's work supports a methodological position of the utmost importance to our time: to intervene locally, according to global strategies, establishing as many relations and continuities as possible; in other words, to act surgically, promoting an effect of surrounding contamination.*

Key Words: methodology, urban Intervention, urban design, Fernando Távora, Portuguese space design.

Fernando Távora and the portuguese urban space design

The Portuguese Urban Space Project is, from the origin of nationality, a form of organization of human relations in the territory, building spaces of various kinds: political, social, economic, affective, among others. The definition of its forms has been throughout the ages, and for specific circumstances and needs, one of the objectives of the discipline of architecture.

With the project, the architect was able to idealize, imagine and design varied urban realities and communicate them. Idealistic, utopian, realistic, conceptual - cities experimented different ways of being, always needing to reinvent itself and ensure its continuity. Therefore, the act of designing had and will have an important analytical and purposeful role in helping the thinking and influencing the future of urban culture.

The Portuguese urban territory has followed different directions and forms. The use of urban design throughout the ages served various purposes such as defending and controlling, the affirmation of political, spiritual and economic powers, expanding the territory to colonize, unite or separate, strengthening or weakening, innovating, to modernizing and surprising, correcting, to aggrandize and / or improving the existing one. They all guided methodological approaches to suit each context, without ever having been able to define a 'methodology', which would serve as a disciplinary model. Perhaps for this reason, Fernando Távora understands that "in architecture, the opposite can also be true."¹⁰⁹

In fact, the design process is nonlinear and permeates each step to another, adjusting to the conditions and necessities of each time. The configuration of the phases and the choice of tools

¹⁰⁹ This is an autobiographical sentence from Fernando Távora which was referred to as "personal communication" in a note by Marius Kruger (2005:128, 147). The sentence was associated with a statement of Fernando Pessoa, in a text from 1927, related to classical and romantic poets (Person, 1993: 157), by Jorge Figueira (2012: 44) and Silvio Alves, who is devoted to the study of relations between architecture and literature from the work of Fernando Pessoa and Fernando Távora.

are organized to suit a problem. The architecture deals, thus, with dynamic processes and therefore has to reconcile different perspectives, while working with the very objective condition of the object and the subject's own subjective condition (Koselleck, 2009).

The understanding of architecture has changed over time and ought to continue its transformation, developed in the light of the main planning and methodologies reflected in future forms of social organization. The methodological indefiniteness is also a factor of the design of today's disciplinary inconsistency factor, placing the subject in a fragile position and with ill-defined borders in the urban context. These uncertainties raise some questions:

How should the discipline of architecture position itself in front of the urban reality? How should the architect intervene on urban problems? Will the creation of new methods of spatial analysis be necessary to argue more practical forms and their options, and thus be able to act in a multidisciplinary overview of more active and participatory way? Which is, after all, the disciplinary specificity that distinguishes architecture from other forms of intervention in the city? While architects, how do we contribute to the Portuguese Urban Space Project?

To think the architectural project to intervene in the future of urban space is now a necessity. According to the idea of Aureli (2013: 14, 15), the inability of the architect to shape the city, has been presented as a *fait accompli*. The growing ineffectiveness of architecture in providing answers to the social and political problems. This idea has been underestimating the power of architecture to influence our reality and the urban condition.

In this sense, it is the purpose of this writing, to reflect on the project of Portuguese urban space from some work carried out by the office of Fernando Távora in the cities of Montemor-o-Velho, Aveiro, Oporto, Braga and Coimbra. During the second half of the last century, Fernando Távora developed some studies and urban proposals that depict important moments of reflection and construction of an approach to urban intervention. The Portuguese urban narrative, learned from these cases, aims to raise awareness of critical issues and problematizing the current urban reality, subjecting them to a reading based on the reconstruction of the thought processes behind the forms, allowing us to understand the construction and the importance of a methodology disciplinary project for the Portuguese Urban Area.

This approach integrates the current debate on the contemporary city. The disciplinary position of architectural practice in the (re) urban design, identifies instruments and tools that can assist to research, to reflection and to question reality - a phase of analysis - for the formal implementation of ideas - synthesis.

From analysis to synthesis

"Being collaborative, works of Architecture and Urbanism will be summaries, plastic translations in those space organized by whom and for whom they perform. (...) It is largely in the hands of Architecture and Urbanism to organise the environment in where Man lives, the buildings where he dwells or works, cities, regions or countries where he is integrated. "(Távora, 1952:155) The preliminary plan of Montemor-o-Velho, 1959, still inserted in urban policies from Duarte Pacheco, was a turning point and confrontation with the complexity of urban problems. It was also the moment he entered as a teacher for school Fine Arts in Oporto. Thus, arising the opportunity to approach the teaching and practice of architecture, bringing the themes and works which we developed in his office for the school.

In 1951, Távora began to study the town of Montemor-o-Velho, which would last eight years, up to the formulation of preliminary plan's proposal. The document was written and composed by drawings, in addition to photographic records of the city at the time. In a descriptive memory all research and analysis was collected to support its proposal for territorial organization of the village. Távora analysed the current state, contextualizing Montemor-o-Velho in Portugal and characterized the natural conditions where it was implanted. He also prepared a historical evolution of human occupation and a demographic study.

In this process, Távora sought the understanding of the territory for the design, using it as a tool of analysis. He developed means of representation that reflect aspects of the organization of the territory of Montemor-o-Velho. Plans of situation were drew up, first in the country, then in the district, followed by the county until defining and limiting the area of study and intervention, by defining the field of action where urban life unfolds. Additionally, Távora produced plants topography - to show the direction of Montemor deployment in its relationship with the hill, river and canal. He Drew up a plan of construction of the building in relation to the castle district, other of the road system of the city, another of buildings representative of civic commercial, health, religious and sports centrality, types and condition of housing, etc.

Overall, this review process has looked at political, social, economic, geographical, cultural and spiritual organization way to, in the end, understand the city as an organism, realizing the way it works and feel. This methodology reveals an enormous sensitivity to the experience of place and people's experiences, always seeking strategies of continuity with the existing, avoiding fracture. The rupture understood as the loss and / or destruction of the references that connect people among them in space.

Based on these principles, the plan connected the possibilities of analysis from various disciplines to characterize the identity of the place. It culminates in a synthesis phase responsible for the formalization and realization of a proposal based on the economic structure of the village, strengthening the agricultural nature of the site. He proposes plots / lots for farming, strengthens the concentration of housing area in East slope of the hill, around the castle wall, and defines in the lower zone a track for the development of more public nature programs.

"Factors as varied as scientific thought or religion, economics or sensitivity, politics or philosophy therefore constitute facts of the organization of space, condition of the forms that organize, in addition to pre-existing forms (...). This makes sometimes difficult to discern from the importance of one on the other (...). The most understandable to the viewer so that they will better portray, that which he most identifies with, the one he knows by connaturally (...)" (Távora 1962: 22)

The act of designing is understood as an act of investigating in order to learn, operate and transform the territory. Involves a maturation process to clarify intentions and pin down strategies of organizing space.

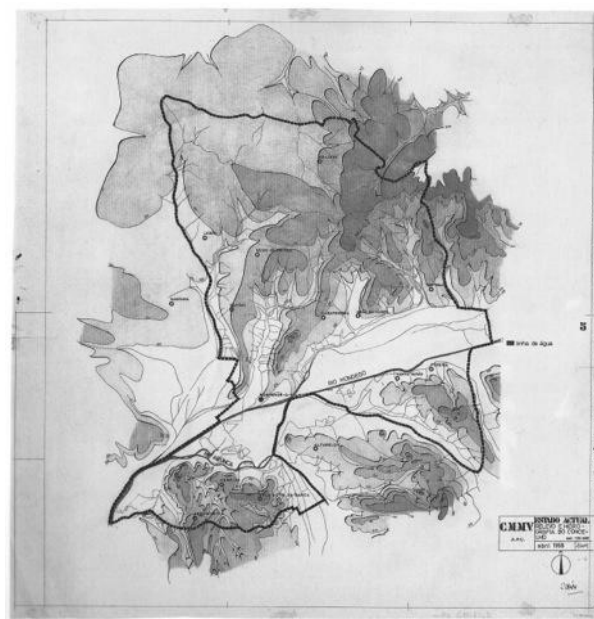


Figure 1. Preliminary plan of Montemor-o-Velho, Relief and hydrography of the council, April 1959.

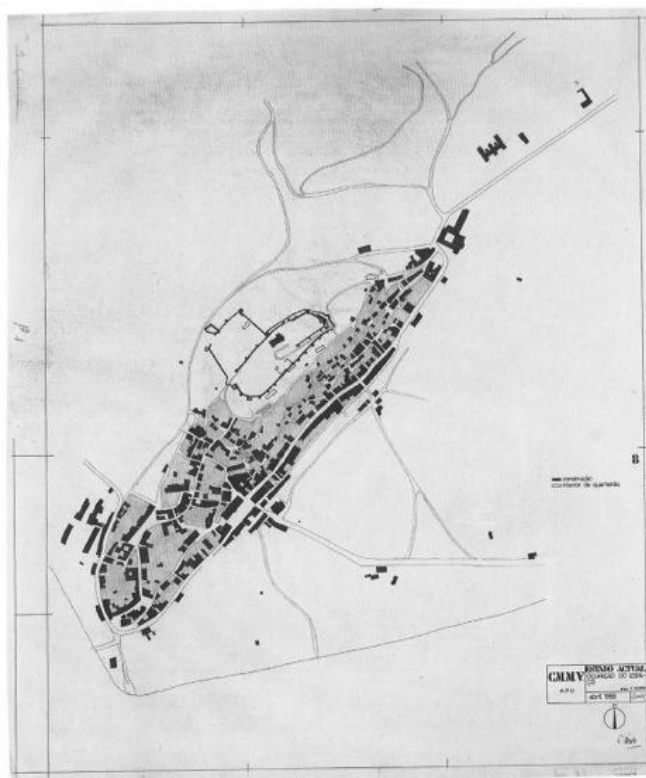


Figure 2. Preliminary plan of Montemor-o-Velho, Space Occupancy, April 1959.

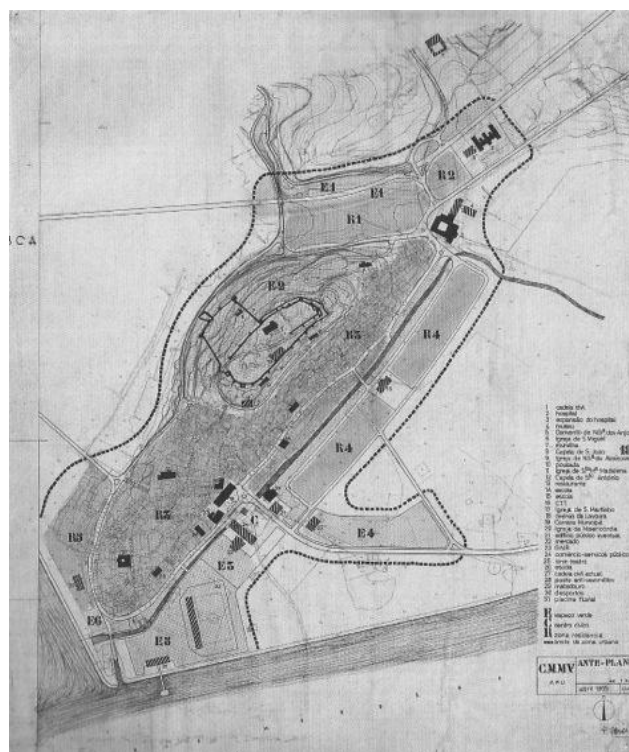


Figure 3. Preliminary plan of Montemor-o-Velho, April 1959.

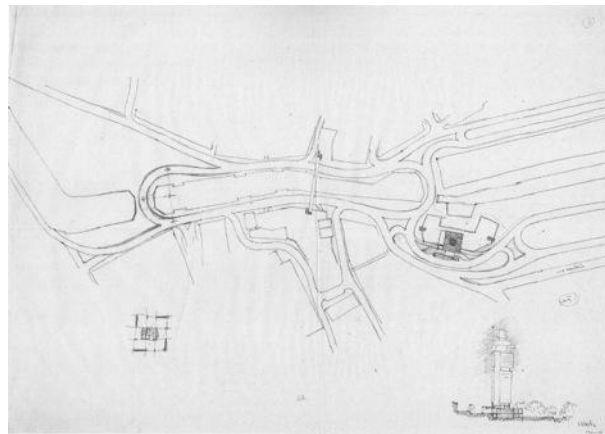


Figure 4. Aveiro's Centre Renovations, Tower, Plan, Sketches, 1962.

Rupture or continuity? The new medieval.

Two years after the Montemor-o-Velho plan in 1961, Távora was called by the Municipality of Aveiro to redesign the central part of the city, based on a scheme drawn up by the Office of the Director Plan. This proposed urban renewal sought to answer an idea of modernization and affirmation of a city in economic and territorial expansion.

Betting on the peculiar features of the urban landscape, the proposal promotes the binding of the two parts of the city separated by the channel, through the redesign of bus routes and pedestrian circulation around and perpendicularly through the arrangement of the block from the Republic Square. Moreover, it proposes a square tower (the medieval style) base to accommodate new urban programs (hotel, offices, commercial centre, car park) worthy of a city that wanted it to be modern.

The development work focuses on the design of the relationship of pedestrian and road, bridges and the contact of the buildings with the ground paths. The relationship with the surrounding buildings is carefully designed with games and openings volumetric gradations in order to provide continuity with the public space.

However, while it worries about spatial continuities, this proposal has aspects of rupture with the existing. First, because it eliminates all the buildings on the block located between Republic Square and the canal, with the exception of two bank buildings (symbols of economic power). Then, because it proposes a typology of the tower that had to change the relationship with the existing space.

Nevertheless, it resumes the typology of the medieval tower, a building that stands out as an architectural element of extreme functional and symbolic importance. In this case, the resource to some references and architectural typologies (at a level of abstraction) helped formalize the general intent of the intervention, enabling action on the form (reality). In this case, the use and understanding of history is an important design tool, serving as a reference and stimulus for formal implementation of the proposal. The discipline of history was used by Fernando Távora as design tool, showing clearly the Vidler idea (2003) where the history is understood not as a problem for the architecture, but as the solution.

I was in this way Távora projected the idea of a new city, while reconciling intentions of modernization, renovation, revitalization and concerns of urban growth and expansion, always with a particular sensitivity to recognize and enhance urban specificities of Aveiro. Those specifics that make it a unique and at the same time a part of the design of urban space Portuguese city.

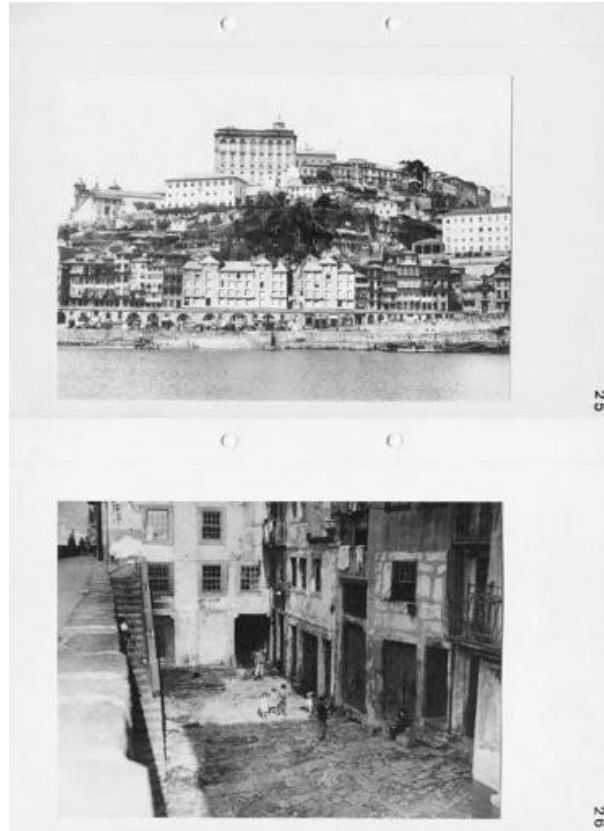


Figure 5. Barredo's photos.

Methodological experience

The Study of Barredo's Urban Renewal, from 1969, was a pioneering experience in renovation and rehabilitation that served as an example for future action in areas of recognized cultural and historical interest. It expressed all kinds of concerns that resulted of the paradigm shifts that emerged with the post-war and established a laboratory for experimentation on methods of intervention in the city (Moniz, Gonçalves Correia, 2013).

First, because it involved a team effort consisting of the Planning Office of the Oporto City Hall, the office of the architect Fernando Távora, the School of Fine Arts of Porto and the resident population in the neighbourhood. The possibility of a multidisciplinary work arose from the Teaching Reform of 1957, with the implementation of a new curriculum and the creation of a research centre to support research and the profound transformation of teaching methods in architecture and objectives of training of the architect.

Then, because it presented a revolutionary proposal, against the modernist tendencies of demolition and construction of new buildings as a solution to the serious problems of lack of salubrity of the old town. Instead, Távora proposal was to maintain and improve the existing spatial conditions, considering Barredo an integral part of the city and, therefore, an important area to conserve and rehabilitate.

In this sense, he consolidated methods relevant to the project-development analysis, making an exhaustive survey of the neighbourhood, through population surveys, using drawing and photography as tools to know and understand the reality. The information was organized in grids of observation, analysis and interpretation. Regarding the graphic part, represents the ratio of the block with the surrounding context; architectural aspects and interiors of houses in 1:200 drawings; he focus on the block level, exploring the systems of spatial organization of

vernacular construction; redesigns the interior spaces of homes, providing them with toilets and kitchens.

Through a real experience, he reclaimed the social function of the architect in Portuguese panorama, showing a completely different positioning of the architect for the time. In addition to technical and artistic skills, the architect was now understood as an agent capable of acting on behalf of social causes through interventions in the built environment underpinned by a process of human knowledge and spatial problems of the community. A work of architecture is thus a work of collaboration with ethical responsibility to integrate the diversity and uniqueness of urban culture, because people's relationship conditions and is conditioned by the space they inhabit.

Urban strategy: density

Another example of a General Urban Plan is the one of Guimarães in 1982, commissioned by the city to the Fernando Távora's Office, in 1979. Twenty years after the study Montemor-o-Velho, the plan of Guimarães was inserted into another political program of urban management that created the Local Technical Offices in the municipalities with the aim of forming multidisciplinary teams, depending on the municipal offices would ensure the preparation of studies, projects and actions to prepare renewal operations and maintenance covered.

It was the moment where Fernando Távora tried a new approach to urban territory through an analysis of the evolution of territory to various historical periods, beginning with Castro period to the current state, synthesized in eight plants. In Castro period, he sees the logic of settlement of the first people in that territory; in Roman times, he recognizes the importance of roads in the beginning of the urban formation; in the period between centuries IX to XV, he observes the logic of medieval pathways integrated in door systems of the urban centre and distribution network of churches and hospitals; in the seventeenth and eighteenth centuries period, he marks the manors, churches and convents extramural guiding the process of urban expansion and expressions of social, economic, cultural and spiritual comfort of the population with space (Távora and Ferreira, 1982:39); in the nineteenth century, there is new mark in the territory with the railway line and administrative rules to sort and delimit the urban area; in 1950 there is the consolidation of peripheral cores and the consequent abandonment of the urban centre; in 1975, the morphology reveals the serious problems of urban dispersion disorder; in the Predictable Evolution plan (name of the last plan) Távora anticipates the future design of urban sprawl detecting the ways that you can work to redirect the city back to its centre.

In addition, he makes a geographical analysis of the city located in *Vale do Ave*, a fertile region for crops, located in a mountain and valley system; he reunites all the urban plans carried out previously, collects data and promotes questionnaires to the population.

He aims at realization of a "territorial plan that intends to establish lines of development and use of the physical world and not a plan for economic and financial development or a social development plan. Thus, it is a plan that, not forgetting the constraints of road character that mark the territory, focus mainly its physical form and proposes ways to shape their future; or even a plan where the quality of form is considered as a fundamental determinant of quality of life." (Távora and Ferreira, 1982:4)

In general, as a methodology, aims to recognize the process of formation of Guimarães identity through the shape, de-constructing the process of memory construction of that body through registration of permanence and history, in order to give it continuity and find memories that promote recognition of Guimarães' citizens with space, contributing to building a positive identity of the city.

The great proposal of the General Urban Plan of Guimarães is a ring road, scoring entries in the city as doors. This system would work as a wall, and as part of the consolidation centre, referring to the medieval road structure represented one of eight plans of urban evolution, listed above. Távora also prepared detailed plans, in which he draws the "new doors" of the city, and

proposing the rehabilitation square to square and the rehabilitation of some residential buildings, serving as an example for future private investment.

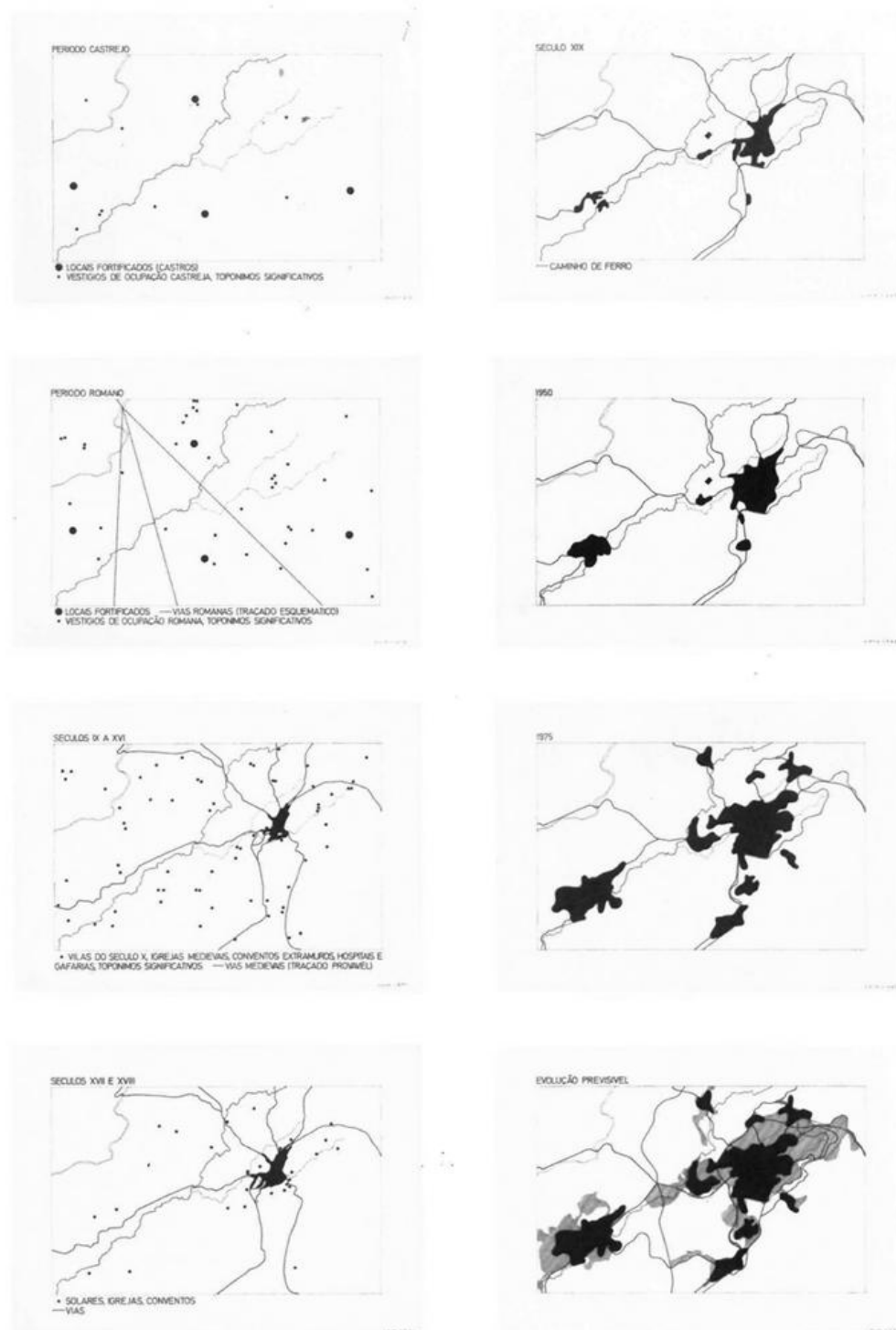


Figure 6. Urbanization General Plan of Guimarães. Plans of the urban growth historical analysis.

Thus, an engine of contamination was created, respecting the natural time for a real change of the urban system, because collective structures and tools were created, serving as positive guide to future choices.

Overall, these interventions intended to promote densification and consolidation of centre city and redirect it to the centre, controlling its form of growth and expansion.

However, the figure of the Municipal Master Plan turned out to counter the strategies previously advocated by Fernando Távora. Since the 80s, not only in Guimarães, the Portuguese territorial planning was promoted by such plans, where the city came to be structured according to the way of mobility, networks, infrastructure, a way of thinking systematized and sectorized territory, encouraging urban sprawl and large-scale planning, thinking about the city in extension.

The territory was resized and urban systems began to function as diluted and fragmented bodies in urbanized territory without limits or boundaries, essential to a cohesive and spatially defined tissue. This rational of thinking about the territory overestimates the functional and economic issues instead of cultural issues, because these introduce management models difficult to deal with inclusion and exclusion, connections and disconnections between groups and individuals.

Despite this, Fernando Távora could still carry out the design of the road node of Creixomil and rehabilitation of a system of squares, as part of an intramural route, thereby contributing to the much-desired centrality and consequent revitalization of urban life of Guimarães.

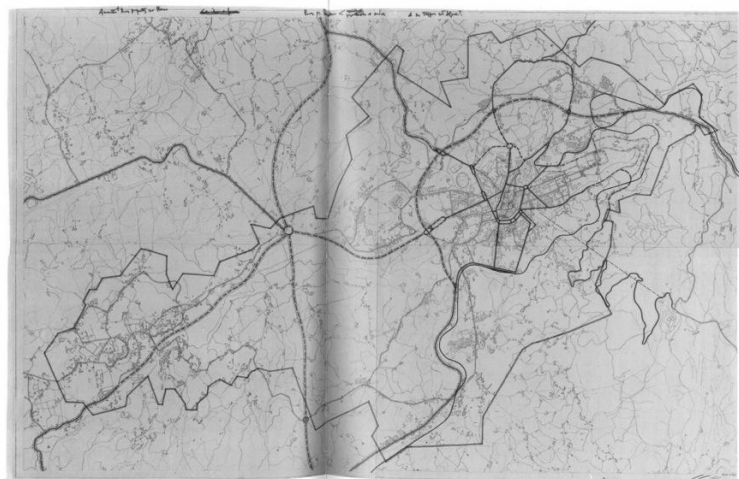


Figure 7. Urbanization General Plan of Guimarães. Routes and Public Spaces, undated.



Figure 8. Creixomil Viaduct, Plan, 1986.

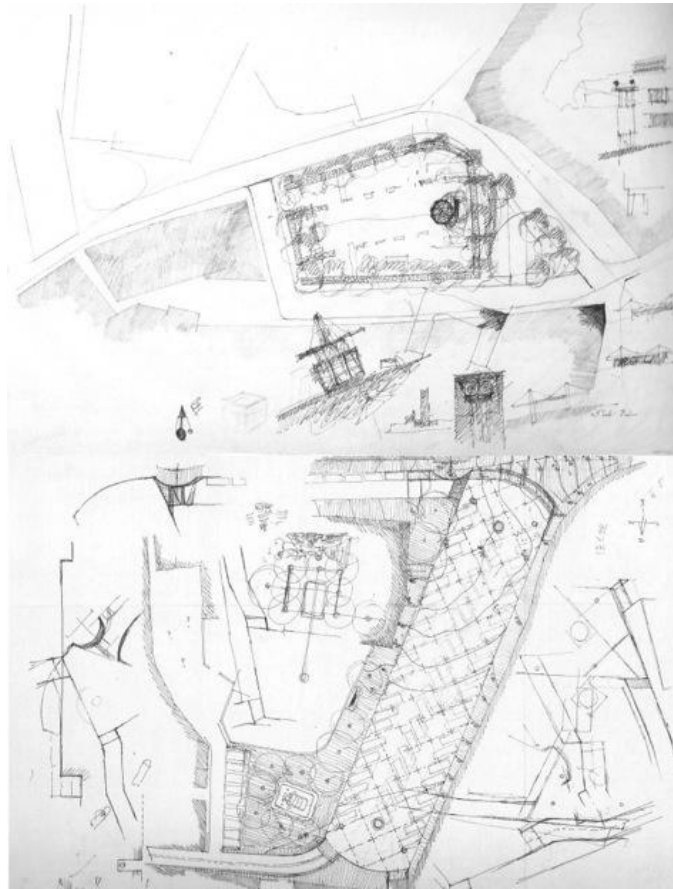


Figure 9. Condessa de Juncal and João Franco Squares, Sketches, 1992.

(Re) design (Re) order (Re) orienting

The experience and success of interventions in Guimarães, paved the way for urban arrangement of *8 de Maio* Square and its surrounding area in Coimbra. In the last decade of the twentieth century, following a series of restructuring measures in the downtown area, backed by urban policies aimed at solving some of the urban problems and create dynamics for the city by promoting local programs such as Polis Program and Metro Mondego. These programs favoured the revitalization of the city from specific themes to promote multifunctionality, pedestrian areas and to limit the automobile traffic.

Thus, this proposal aimed to recover the initial level of the square reconstituting the reading of Santa Cruz Church dated 1131, referenced to the streets that used to flow in frontal to the monument facade and remove motor traffic on this stretch.

If in the case of Guimarães, the intervention of Távora was "invisible", in a sense that it lets the form speak for itself, that is, limiting to take care of the elements that compose the squares and buildings from different historical periods, respecting the vernacular architecture and permanence of urban typologies that have always been part of the collective memory of a city, in the case of *8 de Maio Square* the intervention focused in a deeper way of resetting, changing relationships with existing morphology.

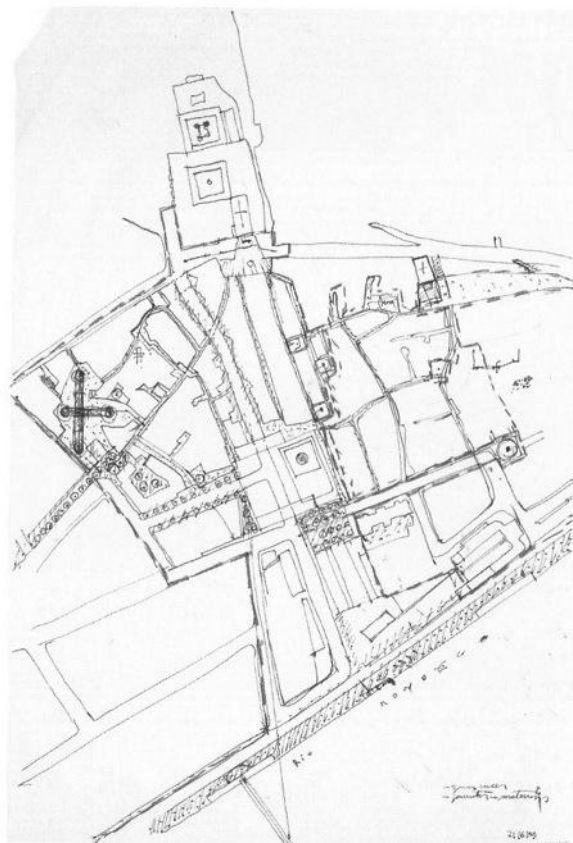


Figure 10. 8 de Maio Square and involving area, Sketch, 1993.

In this medieval urban morphology with irregular features, Távora will pursue a rigorous and careful formal composition method based on the principle of symmetry, which constructs a system of proportions that sets the dialectic between the parts and the whole, as a way of control and spatial stabilization to reorient and organize the physical space of the downtown centre of Coimbra.

To give back the of Santa Cruz Church its centrality, resuming the relationship between levels of the church entrance and the space of the square, organized by two lateral churchyards at the highest level of the streets. The connection between levels is made by two ramps, directing urban morphology towards the river. In addition, Távora proposed the implementation of a water fountain in each of the squares, setting the limit of its intervention. Thus, he sought to unify the surrounding urban fabric.

As in the squares of Guimarães, the materialization and image of the squares was built using native materials. In Guimarães, the granite rock of the area was used and in Coimbra the intention was to use Ançã stone, the same used in the facade of Santa Cruz Church. In both cases there was a careful design and placement of the stones, introducing power lines to direct the "promenades" and stabilize the shape, continuing the plan of facades on the floor. This plastic unification (an architecture "trick") intends to create a stable, solid, robust environment; a space of symbolic presence for the city life meeting.

This project found in classical rules a path for the formalization and realization of this urban piece. It brought uniformity and spatial clarification returning to the original character of "square" as public space with features that promote the centrality of the meeting and a better adaptation of city life to its physical space.

An (Architectural) Urban Project

On very work, Távora experienced new approaches to the city, visible in how it was investigated, in how he developed a narrative about each particular city, in how he explored the graphical work and the way he suggested pivot points of the city with territory. Távora had therefore developed a method to design and solve architecture's own problems, building a line of thought, which persisted among us, the schools of architecture where he was influent, having immediate implications of the development of architecture in Portugal. He also contributed to "a generation who considers criticism and history as tools of project that sees architecture as a process of knowledge, and refuses to separate theory and reality" (Montaner, 2001:139), while realizing that there are aspects of tradition of architectural theory that guided the past and remain essential today (Hearn, 2003).

Urban projects he developed integrated works, which his office garnered, working on them the same way he worked on building projects. These experiences and his training from school of Fine Arts in Porto allowed him to test approaches to urban design, proposing ways for architecture to act, seeking transformation of urban reality, by a methodology which was applied not only to the city but was generalizable to building projects.

In a text from 1957, "Casa em Ofir," Távora reflects on the complexity of the designing process of a detached house, where he aimed "(...), that it would result in a true compound, and, more than that, a compound in which a multitude of factors took place, variable value, indeed, but to consider every single one of them. That is, unlike the normal unfortunate case of caring mixtures of only a few factors, Távora tried here a composite of many factors. It's not easy, of course, list them all, given their variety and their number, nor is it easy listing them in order of importance".

The projects have always had implicit a work of criticism in order to uncover the roots and history, the theories, the way things work and organizations (or disorganization), contained in each city and its territory. From a diachronic reading Távora developed a synchronic reading, extending the interpretation of values, connotations and contemporary creations as temporal continuity, predicting the social impacts of options for the collective memory of the city. Therefore, he constructed a critical project methodology, since it is clearly a forecasting work. A future betting line is defended by the adequacy of urban form to the general requirements of the city. It starts from a problem and continues attempting to approach, suggesting and outlining possible paths and solutions across a broader vision that crisscrossed and connected multidisciplinary referrals.

Believing that the architect should take a more activist stance towards favouring the effective practice of changing reality, rather than purely speculative activity, the working process of Fernando Távora maintains a methodological stance of greater relevance to the present: act locally. According to global strategies, establishing relationships and continuities, or in other words, act surgically promoting an effect of surrounding contamination. This thesis argues for a more socially oriented practice in response to the uncritical position as the city as a mere cluster of complexities and contradictions that prevents the successful architectural practice.

On the other hand, Távora suggests a disciplinary way which reacts to major general urban plans and regulations for urban management as tools used for development planning and urban culture. In fact, for ease and convenience of thought, these tools have tended to simplify reality in order to understand and master in its entirety, considering the territory as a network or mesh. However, these tools made it harder to read the object from the outside, opening the possibility for another type of (non- explicit or literal) spatial relationships and awareness of the existence of an affective and emotional space that influences the form of more or less empathetic relationship with the place and creating memories (Caruso, 2001:13). He also ruled out the possibility of developing readings and images of the city that promote the identification of space with people, a territory of several layers built on continuity or rupture with the urban collective memory (Corboz, 1983). Thus, the domain of the territory is present in its parts, in the local interventions.

Urban agglomerations are nodes of a space organization according to human relations. Because each city is unique, attention given to each case requires rational, analytical, emotional involvement and at the same time, sensitive to their distinctive features that give name to each of them. As mentioned Orlando Ribeiro (1969: 66), "a city is always a creation, a key element of the organization of space, a node in the mesh voluntarily or spontaneously established relationships between people: an inscribed human work on a piece of ground, a fact of surface of small size but of greater significance for establishing connections. Trying to explain a conurbation is, first, enter it at this complex context (...). " The city is built by asymmetries, contrasts and discontinuities, which results in complex ways that do not let them sort themselves by theoretical models, or interpret geometrical models.

In this process of understanding and analysis of cities, Fernando Távora showed the importance of the architecture to develop new readings on urban reality, from main planning methodologies, aimed at solutions more effectively able to modify the social and political structures of the world. Architecture controls and directs the results of architectural practices in solving spatial problems of an object that "is conditioned in its preparation and conditioning in their existence"¹¹⁰ with the aim of organizing human relations.

The spatial relationship has become an important principle to devise new ways to build and refine the design of urban space, understanding that the relationship that man has with space are essential for defining boundaries and construction of their surroundings.

"This notion, that is so often forgotten, that the space which separates - and connects - forms, is also a form itself. It is a crucial notion, because it is what allows us to gain full awareness that become no isolated forms and that a relationship exists always either between the ways that we occupy space, or the space between them that although we do not see we know we can build forms - negative or model -. From apparent forms "(Távora, 1962:12).

The power of architecture is, thus, in its ability to irony, in its ability to relate opposites. Finding order in disorder; to focus on the ruptures and dissonances and asymmetries of reality; seek harmony and continuity; become predictable in the unpredictable and predictable in the unpredictable; transforming truths in its opposite and illogical in the obvious. It is the ability and capacity of Intelligibility architecture that gives the power "to speak in silence and to touch the senses as well as the mind" (Curtis, 2012:131). Ability to depart from the rules, creating space for innovation and creativity. Capabilities that is implicit in the dimension of the immaterial and intangible of human thought and emotion, together with the domain of relations of theory, history and criticism, learning from the past, thinking about the present and projecting into the future.

For all this, methodological consistency in Fernando Távora opens a field of research on project methodology, which undoubtedly contribute to a new awareness of the problem of Portuguese intervention in urban space.

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¹¹⁰ Quote from Fernando Távora in the book *Da Organização do Espaço*(1962), used by Mário Kruger (2001:33) while explaining when a new paradigm in the construction of theory in architecture not only from the Laws type I (material conditions of space) and II (society constraint of space), but also from the Laws Type III (space conditioning of society).

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Fourth dimensions urban morphology. Urban geographies of work as a new perspective of urbanity.

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Abstract. *New freedoms of individual choice and new possibilities of displacement in space and time of men, information, goods and energies have not liberated the «human condition» from all 'fears'. In contemporary urbanizations, a big dissociation of modern growth can thus be observed: the endless technological satisfaction of consumers' needs is not deprived of «uncertainties». If we consider contexts where preindustrial spaces, without work perspectives, and postindustrial activities, without urban features, are interacting, as in Italian urbanized systems containing small cities, the evolution of territorial relations seems clear and a new issue for urban morphologists is emerging. The Securitas value is now migrating from cities to new geographies of work. From this process, an exponential increase of «divergences among cities» emerged and is leading to inequities among individuals more and more difficult to spot and manage. If the reinforcement of globalization will bring new data on distances between new and old urbanizations, in front of the responsibilities of urban morphologists about the formation and growing of social inequities, we could draw a new perspective of urbanity only by tracing 'the work of cities'.*

Key Words: globalization, land use, social exclusion, maps, urban form

'From Medieval to Global Assemblages' (Sassen, 2006)

The spread on the territory of the most modern production sectors combined old settlements, new polarities, lands and infrastructures producing what can be defined as the modern growth of «rural landscapes», or the extension of the urban economic action to the (formerly) rural areas (Sereni, 1961).

New energy sources and more rapid and less expensive transports, after having made «non urban industrial settlement competitive with the urban one», allowed workforces to be recruited either in the cities than in the countryside (Portas, Fernandes Sá, Afonso, 1990).

In this way, the «city outside the city» was released from the constraints of proximity and spatial agglomeration (Fantin, Morandi, Piazzini and Ranzato, 2012) and the spreading of activities and people on the territory have been progressively superimposed by new territorial dynamics due to the reinforcement of globalization and free exchange of capitals and goods.

The activities of services to companies and to consumers in such a context became essential and in terms of growth established the predominance of some cities on the others (Sassen, 2010).

In an initial phase, the vertical growth of advanced tertiary economies saw the F.I.R.E. economy, based on Finance, Insurance and Real Estate activities, to feed on with infrastructural «kits» and public investments of Welfare State (Domingues, 2006). Following to the diminishing of public resources and to capitals global redistribution, some sectors of advanced tertiary, however, failed while others oriented, by sector, towards new market lines and, geographically, towards more dynamic territories inside the «new geography of work» (Moretti, 2012).

From this process, an exponential increase of the «divergences among cities» emerged and is leading to inequities among individuals which are becoming more and more difficult to spot and manage (Ascher, 2003).



Figure 1. Paris, June 23rd, 2013: flocks of sheep demonstrating for better conditions of rural trade in France (Photo: Reuters/ Gonzalo Fuentes).

The work as a privilege and the loss of *Securitas*

The distance from the reality of contemporary urban design, has ascribed to urban morphologists strong and specific responsibilities for the current increase in disparities between rich and poor.

The ability of urban morphologies to counteract emergence or increasing of social inequality has been also questioned, because of ineffectiveness of analytical and design methods that we are currently able to offer (Secchi, 2013).

The «new urban question» probably requires a new investigation of relationships between economy, society and territory. For this reason, it also needs to reconsider disciplinary «common values», such as technology, mobility and ecology, which have always built objectives of urban design.

«Socio-technical devices» (Allenby and Sarewitz, 2011), that brought new individual freedoms in economic exchanges and social relations, have allowed people to make incessant demand for goods and services but have not strengthened and stabilized the «human condition» (Arendt, 1964) in the globe as it was assumed.

The opportunity to imagine and satisfy infinite needs has generated «uncertainties» (Bauman, 1999) and divestment, outlining contents of a global crisis of production.

The major dissociation of growth is therefore observable in urbanized contemporary systems where the production of well-being satisfies «extendible needs of men» (Einaudi, 1933) and, at the same time, creates work uncertainties.

In the evident collection of economic injustices and territorial discriminations and exclusions, «the work as a privilege» (De Masi, 2001) emerges as a new issue for urban morphologists (Figure 1).

Although the work is an essential condition to humanize an environment, in the past decades it has been forgotten in the construction of conceptual problems and practice of urban design.

The current gap between wealth and poverty, is an effect of the «new geography of work» (Moretti, 2012) rather than a cause of the «multidimensional character» of the crisis, crossing major economies of the planet (Secchi, 2013).

For example, this is especially evident in Italian urbanized system containing small cities (Figure 2).

Here, there are radical effects in terms of «divergences between cities» (Moretti, 2012) due to transition from preindustrial, or «third Italy» (Bagnasco, 1977), economy, to the current postindustrial.

Right where spaces without work perspectives and new activities without urban features, are interacting, contemporary relations between work and territory, can be seen more clearly than in other situations.

From the beginning of the Industrial Revolution onwards, these interactions have always resulted in new urban issues and, as a consequence, in different policies and urban perspectives for the cities.

Up to this time, in a globalized environment characterized by loss of centrality of States and their ability to regulate social and economic processes, analytical and design devices have failed in order to reduce uncertainties.

In the considered contexts, «spatial forms of injustice», «consequences of climatic change» and «mobility as a citizenship right» (Secchi, 2013) are more and more effects of contemporary geographies of work.

Here, urban morphologists have the opportunity to design a new urbanity based on a modern *Securitas*: a new individual freedom of action in space and time.



Figure 2. Preindustrial and postindustrial, central Italy (Photo: Cnes/Spot Image, DigitalGlobe).

«Il bel paese ch'Appennin parte e 'l mar circonda e l'Alpe» (Petrarca, 1336)

Italian small cities have been hit by the modern economic transformations later than big cities, although, in some cases, they have had modifications even higher in terms of speed and intensity.

We have chosen these urbanized territories as our field of research, because similar situations offer a big opportunity in order to observe the link between new productive models and evolutions of urban morphologies.

In addition, social and economic degenerations faced by small cities, have provided a test bench for our research regarding 'urban geographies of work' as a new perspective of urbanity. In these contexts, the recent changes of economic models has activated processes of desertion of the physical production of materials and objects in favor of a network system for productions of ideas and services, typical of postindustrial economies.

We observed in small cities that the new dynamics have not found the same materials of big cities to pursue their objective and have been progressively characterized by breaking up into two parallel and distinct phenomena.

On the one hand, we have identified a first process consisting in the extension of new dynamics on territories, mostly beyond their geographical and historical circumstances.

On the other hand, we have found processes regarding a progressive reduction of preindustrial activities (Malanima, 1995). They had represented local economies for centuries, allowing in some situations the «industrialization without fractures» of rural territories (Fuà and Zacchia, 1983). If the first phenomenon seems to be related to the innovation of productive cycles, aiming to ride over the restricted areas of traditional productions and to find new markets, the second phenomenon should be linked to a new business dimension, finding its target in tourism and in a systematic exploitation of the cultural heritage (Marini, Bertagna and Gastaldi, 2012).

Beyond the above-mentioned differences, both phenomena share a common trend: the contraction of the spatial field of activities and the territorial extension of the firm size, searching the biggest cultural influence or the cheapest productive organization.



Figure 3. Bazzano Industrial Centre, L'Aquila, Italy (Photo: Cnes/Spot Image, DigitalGlobe).



Figure 4. Lorenzetti, A. (1339) Effetti del Buon Governo in città e in campagna, Palazzo Pubblico of Siena, Italy (Photo: Wikimedia Commons).

From spatial to reticular connections

Checking the relevant transformations of Italian small cities, we have immediately noticed clear differences between new situations of neglect and disuse and similar cases in the past.

Precisely, observing differences with the progressive emptying of these contexts during the postwar period, we noticed that, today, disused socio-technical devices are not isolated but close to other 'facilities' currently operating (Van der Ploeg, 2008).

In addition, this status presents several dissimilarities with situations of disuse in big cities: the potential intensive use of abandoned areas is not effectively the same.

The mechanisms of 'urban income' cannot develop quickly enough, unless there are special conditions of spatial proximity to larger urban areas with solid, diversified and tempting economies. This proximity is often due to a progressive approach to small cities of major ones by expansion or territorial diffusion of their settlements and new accessibilities.

Proximities between different 'devices', and unusual morphological synergies, led us to take a deeper look into the environmental effects of new dynamics.

The analysis revealed a substantial inability of recent transformations to activate new activities in their territorial surroundings. Basically, in the considered contexts, the exchange between new phenomena and the environment is always unilateral.

The new dynamics do not produce new urbanities and exceptionally the new firm size becomes a factor of collective development. Even if new geographies of work have a regional dimension, it's exclusively as scale, because they have not urban features.

The work can no longer be generated in this isolated status and it consumes itself, expanding dramatically in the territory without communicating with it (Figure 3).

As we have already said, a clear trend of postindustrial activities is to create dot links with urban spaces (Zevi, 2012). Certainly this relationship makes flexible and convenient the productive organization, but also unstable and unreliable 'the work of cities'.

Postindustrial companies set an extremely uncertain urban model, especially in territories containing small cities.

Towards fourth dimensions urban morphologies

This unstable and unreliable 'urban condition' is clearly exacerbated by an objective weakness that urbanism and architecture suffer even in contexts more favorable than those considered.

We only should think about the difficulties of changing morphological structures and density already defined. Even articulating mix of activities is complicated, without being able to provide infrastructural support for sustainability, communications and mobility.

In addition, especially in small cities, the design tendency is to conceive public spaces only as leisure places for local people or tourists.

In this way, common spaces between living structures have gradually lost some functions that have always had, such as the articulation of productive activities and the connection of those with domestic ones (Figure 4).

Ultimately, we found in the «landscape» (Palazzo, 2010; Baldeschi, 2011) an additional factor of anxiety for urban morphologists.

In these contexts, its socially significant features, combined with its new productive dimension in cultural and ecological terms, could make it become a useful tool for the transformation of urban spaces and the multiplication of interactions between existing activities (Magnier and Morandi, 2013).

Despite the premises, this did not happen because landscape design has been reduced to inclusion of geometries, depleting all the potential of transformation and adaptation of different contexts.

Typical schemes of the architectural composition, as aesthetics protection and mimesis, have oppressed intentions and have prevented the unblocking of new landscape processes and the achievement of new and better economic and social dynamics.

The landscape became a barrier to the regeneration of small cities because the landscape design became a morphological design on the landscape.

It means a design that is based only on the inclusion of objects in static environments. An action necessarily subjected to mitigation and compensation measures.

A similar design does not seem the best way for the identification and definition of new conditions of urbanity.

In fact, the reality is not static but dynamic. Any context we choose, it has four dimensions and to understand seriously the current «human condition» (Arendt, 1964) in different territories, urban morphologists should represent the fourth dimension of urban spaces.

Our traditional representations are not satisfactory because dynamic systems are considered inertial. In this way, our analysis always considers every issue in neutral space-time environments.

But actually cities are excitations of conflicts (Tafuri, 1988).

Sequences and overlapping analysis at different levels could be attempts to solve shortcomings of this approximation, but today only geographies of work offer some guidelines to produce proper studies on urban realities (Moretti, 2012; Sassen, 2010).

From analysis that we carried out on preindustrial spaces, we have developed different conceptions and interpretations of landscape.

Old 'preindustrial mechanisms' have enabled the reconstruction of the evolutions of urban geographies of work and, from the stratification of different processes and their changes, in spite of their fragmentary condition, a description of urban morphologies that differs from usual representations is born.

If traditional methodologies have a perceptive nature and are based on a fixed, or moving, external point of view, our description follows the inner flows of human activities in the landscape.

A similar representation of urban morphologies gives us a new design tool which is able to create new strategies for stabilizing existing geographies of work (Figure 5).



Figure 5. The work of city as a Fourth Dimension Urban Morphology (Authors' drawings).

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Change, utopia and ‘the public’: urban transformations and agents of survival in Brasilia and Rio de Janeiro

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Abstract. *This paper addresses changes to the urban form in two different contexts: planned areas and “organically made” urban fabrics. Two different processes of urban transformations are examined. Large scale urban transformations, designed by a few in response to specific purposes, and small scale urban transformation processes made of cumulative individual changes and perspectives. Brasilia and Rio illustrate the argument. This paper argues that vitality, and other interesting good-to-live-in qualities that distinguish a good city, requires a dynamic balance between ruling and allowing changes of different scales, purposes and agents. It comparatively examines processes of change in “organically made” urban areas - shaped by multiple individual socio-economic-cultural-spatial practices - and in large scale planned areas. It examines the ways and means that some agents of change, with different purposes, and resources, have helped to make vital urban tissues survive for the collective benefit of the city and “the public”, while others killed it. Survival strategies were associated with specific agents and spatial patterns of change, driven by forces of attraction, expansion and consolidation. They were found to intertwine with place and time related inherited attributes. Utopian space models have both inspired and justified significant large-scale changes in city shape, associated to a vision of the future with or without collective purposes. The question of how those utopian modeled spaces respond to different forms, dynamics and scales of space appropriation is here discussed. This paper finalizes highlighting ripple effects that different agents have triggered through changes made to the urban fabric.*

Key Words: *urban transformations; agents of change; utopia; Brasilia satellite-towns; Rio de Janeiro*

Introduction

The ongoing research whose preliminary results this paper presents has been partially sponsored by the Brazilian National Research Council for which I am very grateful. It provided the necessary support for the field work to be done and the scholarship of two research assistants, Ana Carolina Maia, whose dedication, commitment and social skills made the case study with the community of Rio das Pedras an enjoyable experience. This text was originally formatted for an opening lecture presented at the Post Graduate Course on Strategic Environmental Assessment, at the State University of Mato Grosso do Sul, Brazil.

The focus of this paper is on change. Change is here understood as a dynamic process that encompasses various phases of transition that have cumulatively altered distinct parts of the urban tissue. Time and space are interrelated in those phases of transition, through various means of attraction, appropriation and consolidation that have successively taken place, and that have made space significant, through human perception.

The process briefly described indicates how interwoven space, time and the public as agents of change, shape the course and forms of evolution of a city (Lepetit, 1998)¹¹¹. In this study, the idea is that the valued permanence of urban forms creates conditions for these to continue to serve other functionalities and to influence in some manner urban growth and morphology while defining the rhythm of change in the dynamic process of sedimentation. They coexist with distinct temporalities, with technological innovations that distinguish them, according to

¹¹¹ “The analyzed processes come from a more remote past and did not end with the steam engine, the train, and industry that continue to interact independently of the arbitrary “periods” that some approaches to urban history define that privilege round numbers” Lepetit, 1998.

different social, cultural, environmental and economic projections for the future, here understood as of utopian nature, of a given society in different times in different spaces. F. Thomas affirms that the “history of cities cannot be told by disassociating the citizens from the concrete territory where they live and which they contribute to produce and transform”. He consubstantiates the understanding that this study defends.

Utopia 1 – “the public”, city modelling and urban change

“The principle of utopia consists in defining a place that does not exist anywhere: designing a space in which and with which a given community will live according to new rules... that means fracturing any connection with the world around, a spatial de-linkage”, Thierry Pacquot, 1999, p. 91.

Social sciences have traditionally resisted the possibility to consider that the physical environment is an operative factor in human relations. Architects, on the other hand, tend to often believe that design by itself can *create* communities and places. Both professional standpoints appear to define the whole system, physical and social dimensions, according to one disciplinary insight. Understanding that purposive actions also establish unintended systematic relations is a crucial insight to understand how urban transformations are socially appropriated by the public and, by the same token, to understand the dynamics of change in the process of city-making.

Studying processes of change challenges disciplinary segmented views and their institutionalized categories of problems and professionals. It also induces different approaches to people and the spatial and functional patterns they define in their environment, how they interrelate, and the spatial and temporal contexts within which they occur.

Utopias have, apparently, emerged in times of significant changes. It often shows man as a major agent of History and master of his own destiny, equality among men, and between the public and their governors. Regarded as a response to an immediate problem, or as an anticipation of the desirable future or even as the fuel of social progress itself, *utopia* could be perceived as going along, hand in hand, with creative desire and wishful thinking with collective purposes. The perception of how the State related to individuals and how it ruled over their relationship to the territory, through specific legal and institutional arrangements were, however, often either obliterated by the very *vision* utopia proposed to illuminate or simply taken for granted as a side issue.

More recently there has been a shift between the trend towards *dreaming* new utopia - as a peculiar form of social ideal construction inspired by universal harmony - towards the more *pragmatic* and *utilitarian* approach where the future heralded is, more often than not, a terrible nightmare. Possible reasons for this shift may lie in the perceived shrinking presence of the National State on the *ground*. Drug cartel networks and other forms of self-government arrangements are allegedly taking over, in some areas in Brazil, as well as, in other areas, new social mechanisms bottom-up devised to rule over individuals and territory.

Meanwhile, to dream of better cities, and to design them - where better individuals would relate to better societies, and to better territories, where nature would play different but always better roles, and the State which would be responsible for universalizing the benefits would then issue better ruling over their distribution - has been, traditionally, regarded as part of the professional privileges and obligations of architects and urban designers. However, as Kevin Lynch beautifully pointed out in the very last page of the *Good City Form* - how defective his presentation was because the city concepts and models he discussed in the book were “too often stripped of the institutions of management that make them viable, and were described as if independent of the culture and political economy in which they must be applied” (Lynch, 1981, p.454). Generalizations are our downfall.

Design guidelines are often addressed ‘stripped of the institutions of management that made them viable’, originally, and, apparently, as a consequence, independent of the culture and

political context where they were generated in the first place, and, also, of the culture and political context where they are supposed to be applicable. What is sustainable in one given culture may prove to be quite the opposite in another context. Significant process of change is therefore required.

Change and dynamic balance between ruling and allowing

The perspective here adopted understands that a singularity (an exceptional condition) once perceived (therefore observers and physical accessibility are required) in one or more of its qualitative dimensions it attracts changes in all the others, in a ripple effect that will reshape the 'townscape' accordingly. Be it a characteristic that defines its exceptionality a natural feature, or produced by sedimentation, or designed from scratch, successfully, to that purpose.

This paper adopted six different perspectives, or genetic dimensions, of the cultural heritage of a city and its grid, and of the process of sedimentation that intertwine them with the lives of citizens and city into the landscape. Together they have influenced the stages of sedimentation, with different weights, in different time and space bound contexts, and distinguished their interrelations as they consolidated.

The first, the environmental dimension, is here understood as one or more geomorphological feature of the terrain - topography, coastline, solar incidence, and climate - which attracts the attention of observers, individual intentions which may grow into collective users in a given time and space context.

The social and economic dimensions follow. They comprehend different forms of appropriation practices and uses of potential values perceived in the area. Market activities and social encounters go hand in hand and they literally make place for more complex events and users who will benefit from their location.

The fourth dimension, here called institutional or normative addresses the rules that establishes the power to regulate uses and users, mobility and public access, the building activity and the built forms and changes allowed. Public sector with bigger or smaller political prestige, its normative and control mechanisms, and symbolic presence in the built landscape, are also part of the city genetic heritage.

The last dimension is morphological and it characterizes the singularity of space and form in the light of a mix of different references - formal repertoire, location in relation to axes of accessibility, quality of building materials, functional and symbolic contents related to the previous dimensions. It synthesizes the interrelations among the previous dimensions in built forms and shapes that tend to last longer than the former purposes to which they were designated. At the same time it enhances them. The many successive uses and built in values that usually follow are aggregated to the area. The relative permanence of these earlier forms and later uses enrich the process of sedimentation of heritage with new interventions, when the perceived image and identity are positively regarded.

Accessibility constituted the basic condition that allowed for those qualitative dimensions to interrelate, with distinct rhythms of changes in different time and space contexts.

Case 1 – Rio

This topic addresses the dynamic balance between ruling and allowing, in practice, as perceived in selected areas in Rio, and what has it improved. The objective was to *qualify* the community for participation in the urban policies announced by the local authority which would be implemented in the borough. In order to achieve that purpose the prospective participants had to be able to read blueprints, and to understand scale. They also had to feel comfortable enough with themselves, in the first place, and with these subjects, to enjoy participating in the public audiences conducted by the Local Authorities. These objectives determined the plan of the

research proposed. It had to begin by strengthening their identity as a community, respecting their migrant origins., their cultural values, and how these values, and their symbols, were reflected in the shape of the buildings and grids of access that characterized the settlement.

The settlement

The settlement selected was Rio das Pedras started in 1951, located in Jacarepaguá district, adjacent to Barra da Tijuca, the urban expansion where the rich suburbia in the shape vaguely reminding garden cities developments are spreading fast. The area of about 130.000 square meters, was officially granted to the settlers by the Government in 1966, as result of their own efforts to articulate with the government. They were mostly employed in building construction by the real estate developers working in the area. Proximity to their jobs proved to be useful. Located very close to rich condominiums, built during the 60's, the settlement grew significantly, through self-help of all sorts, to the amount of, approximately, 70.000 people basically migrants running away from desertification in Northeast Brazil.

Methodological procedures

The area selected for the research was a cluster made by a mix of different building typologies and functions, of housing, shopping, major municipal institutions, the cultural centre represented by the state school and the settlers association, all of which had clear social, economic and political links with the formal city and with the state government structure of Rio. A central open space made into a square with a canopy strangely scaled served as the major visual reference. Not by coincidence three of its margins were occupied by the school, the association and one small office of the local authority. The symbolic content of this area, due to this particular mix, determined our choice.

Interviews, participant observation in different sorts of meetings, and as idle visitors, urban environmental perception and analysis, historic data research gathering photos, maps and previous and present urbanization policies regarding the area, together with a great deal of story listening, made the basis of our initial contacts with the local community and the settlement.

The idea of building a model of the area as an acceptable course through which we could, at the same time, strengthen their identity and teach the school teachers and their students how to read and understand a blueprint was proposed. It was quickly accepted by the chair person of the state school whose strategic plan for the year comprised that specific subject. The teacher of arithmetic of the first grade for adults, accepted the challenge of supporting our initiatives. She also agreed to have me and my research assistant participating in her classes during the period.

A method was devised to create with the students a 'measure' of reference based on the one building in the area that had been architecturally designed – the state school. Drawing the area, maps and facades, exercise done by the various students, proved to be an effective method to raise their self-esteem as they experienced finding themselves in the maze and pointing their whereabouts to their colleagues. Updating municipal maps with all this information brought in through that exercise boosted their self-image even further. The second phase of the exercise demanded that each student would tell his or her story in Rio das Pedras and also illustrate it with drawings, photos or collages with several objects that reminded their common origin in the northeast of the country.

The building of the model came as a bonus. The very planning of the model, defining the scale it should be built, the materials to be employed, engaged and excited students and teachers, empowered by the perspective of explaining it to the Mayor – a significant change in behaviour - compared to their subdued silence observed in the initial public audiences.

Processes of change

Initial findings in this stage revealed that one local leader of the settlers association has gathered enough support to get elected local councillor. He helped to bring local government attention to the

settlement. However, some housing developments built since then show the marks of indifference that zoning based on functional segregation imposes.

The improved skills of the state school teachers and students with blueprints and urban grids, and the importance of mixed functions and building typologies, strategically placed and scaled open spaces, and how the whole lot improves local identity, have come as one important achievement. To collaborate to improve to improve public participation in the management and political process that rules over their city, or borough or settlement, has also boosted the self-confidence of my research assistants. They felt happier with themselves and the research received one of the three annual prizes awarded by the research Council of the University Federal Fluminense, where I teach urban design. The proposed method of modeling with the community, as a means to enhance participation in urban renovation programs, has found some support with other colleagues. But that, certainly, is not the main result of this whole effort.

There were major findings regarding the self-made urban design of the area which need to be further investigated as they surprisingly matches several recommendations regarding what might be considered a sustainable neighbourhood. They indicate further research to be done. They are listed as follows:

- a) The research area had an identifiable centre, the square with the high canopy, easily perceived as a reference point with symbolic meaning as it gathered in its margins the state school, the settlers association, the local authority office (Fig. 3).
- b) Most of the housing units were spread around within a range of five minutes walking distance;
- c) There is a great variety of building typologies, of row-houses, and two and three storey houses (Fig. 3);
- d) Mixed uses fill in the few gaps between buildings, with shops, offices and institutional buildings (Fig. 3);
- e) Several plots had more than one building serving different purposes, small shop or atelier or room to let;
- f) The presence of the school reinforces the singular identity of the area (Fig. 3).
- g) Several alleyways communicate within the block, for pedestrians only, as Fig.3 and Fig. 4 illustrate;
- h) The neighborhood is organized through self-ruling. When and where conflicts emerge they are brought to the local settlers association to resolve. Decision is negotiated with the those directly concerned. The association distributes some form of justice speedily.

Design and dynamic balance between ruling and allowing

Modernist housing schemes and garden cities' concept have not diverted much from the utopic trend of social redemption through town and country planning. The huge housing development schemes for the less privileged or altogether oppressed became the main target – they would, apparently, need to be redeemed sooner. Those schemes also became the image of the under privileged with all the stigmatizing contents associated with it in competitive societies.

Walter Gropius and Le Corbusier recommended urban planning as “medicine for a sick society”. However, more than one planned city, or district, have been severely criticized, and often with sufficient evidence, for the opposite reason – people have been made sick by the urban ‘medicine’. The critique of the model condemned the principles of the ideology at the same time.

Case 2 – Brasilia Federal District

The area of the Federal District of Brasilia was supposed to be occupied only by the cross-shaped Pilot Master Plan. This has been planned and originally conceived, in harmony and order, as a “work of art”. The ‘birth’ of the city was blessed by the creative efforts of some powerful minds, and politically influent, of that time. As “art”, Brasilia was supposed to have

been kept in a flawless frame, with no poverty, no shanty-towns around it, to 'stain' its purity. The theme of this paper, the settlements surrounding the Pilot Plan, were not part of the original project for Brasilia. The battalions of poor workers recruited to build it were not supposed to stay. They had not been invited.

The satellite towns have not been planned in 'harmony and order', but conceived through "rape", perpetrated through means of several foci of rebellions, by the thousands of workers that have come to help making the work of art true and subsequently felt pushed out of the 'picture'. The violence of their birth had been, apparently, tamed by an institutional homogeneous handling of space and shape. Their standardized urban design, the one standard plot – with very few variations from one planned settlement to another – the absent hierarchy of public spaces, the minimal provision of communal facilities, all these factors together indicated the mono-functional approach to the matter of satisfying the rebelled workers' request with a predominantly dormitory-town.

Prevalent approaches

A great part of the analytical work on Brasilia, and surrounding settlements, have been developed according to two trends. Either '*for*' the esthetics of the 'product' and the positive political catalyzing aspect of the 'process'; or '*against*' the functionally segregated aspect of the 'product' and social segregation of the 'process'. The string of the original 'free-towns', around the Pilot Plan, have been expelled to areas further removed from the center, named satellite-towns. These have been legitimized by the Government, through some kind of plotting, gathered in different shapes, and have long outgrown their original dormitory function. The process of historic development of each one of them, and corresponding social, economic and cultural deprivation that characterized the living conditions of the first settlers of Brasilia – the builders – which derived, to a great extent, from this spatial segregation, have been sufficiently examined by several authors such as Paviani (1987); Ferreira (1998); Farret (1985); Cony (1998); Santos (1985) among others, with different political focus.

One important aspect, however, seems to require further attention. The fact that these settlements have been undergoing a continued process of cumulative changes, over the last thirty years, which have transformed very positively certain aspects of the role they played in the region. What are those changes? What do they look like? What kind of initiative, and whose, made them happen? For what or which purposes? What do these indicate?

The objective

This part of the paper addresses the issue of planning spaces vs. making places. The object area comprises Ceilandia and Taguatinga, two of five major planned settlements located around the Federal District of Brasilia, capital of Brazil. The theme is urban design, the focus is on changes, additions and other alterations made by the residents on the original design of the area and pattern blocks. It analyses these alterations, how they have eventually a 'ripple effect' on the immediately adjacent planned spaces and neighbourhoods. The character of these areas, under the impact and influence of these gradually cumulative 'ripple effects', has changed significantly over a relatively short period of time – approximately thirty years.

The vector of change can be traced from Taguatinga, the first workers' settlement officially 'plotted' as satellite, 25km from Brasilia, outwards to the next satellite –Ceilandia. The economic and social rhythm of these two settlements are unparalleled in the Federal District. The original building patterns and urban grid have been appropriated in different ways. The two settlements have grown towards each other, mingled and blended, and have been substantially reconstructed, in many patches, in widely different scales.

The methodological procedure of analysis

The analytical framework was conceived in a different context, and city. It derived from a previous research on performance evaluation of large scale housing estates. It had a similar focus – changes and alterations of the original design, made by the residents. Originally orientated towards a different purpose – identifying the “why’s”, it gradually developed towards identifying the “what for’s and how’s”. The move from one target to the other, by the time of the previous research mentioned, was like turning the focus from the past to the present heading to the future. This move resulted from preliminary findings of that research, which questioned the original assumptions that changes would derive from either design flaw or vandalism. The alterations carried out by the residents showed a much larger span of choice, mostly geared to making productive the available space provided for whatever other original purpose. The major ‘arena’ where these changes took place was the space ‘in-between’ the semi-private/semi-public areas adjacent to the different building patterns. They triggered a process of social and economical growth with minimum State investment.

The analysis focus on three major points. First, it identified the different purposes and related perspectives that the various *agents*, or interest groups, introduced, on their own volition, into the process of making real the planned satellite-towns. Secondly, it tested the assumption that a different shape – and scale – would correspond to a different perspective – and interest group – at different times. The third step was to chose a sample area and to define the approaching scales of observation. Finally the analysis checked whether some of the more specific findings of the mentioned previous research proved valid.

The object area

Ceilandia is situated 35km away from the cross-shaped Pilot Plan of Brasilia. It was created in 1971 by personal request of General Medici, who was then the President of The Federal Republic of Brazil. He was annoyed with the string of poor settlements, also called *invasões*, that ‘lined’ his daily route from the ranch where he lived, out of town, to the Presidential Palace of Planalto. The Governor of the Federal District of Brasilia then started an official crusade with the purpose of removing these *invasões* – the Campaign to Erradicate *Invasões* – C.E.I.. A total of 82.000 people were removed from the area to a site 35km west of the Pilot Plan. The very name Ceilandia springs from the acronym, C.E.I. plus the English originated word land, *landia*, thus making fate clearer: the land of the unwanted ones. Short memory, hard work, and the ‘live one day at a time’ rule, that ever so often befalls Brazilians as the one left possible life-motto, for one reason or another, all together apparently helped to, fortunately, boycott the initial stigmatizing attempt on the town and its residents.

Taguatinga was created before Brasilia, in 1958, 25km from the future Capital site. It sprang from the urgent need to remove a pioneer housing settlement of 4.000 families formed close to the *Cidade-Livre* alongside one major federal road that led to what was then the huge building site of Brasilia. Six months later schools, hospitals, houses for the teachers had already been provided even though planning was never a strong aspect in the process nor had any study ever been conducted on the adequacy of the local environmental conditions. The growth of the settlement took place through plotting new sectors when thus required.

Processes of change

Over the last three decades, the initial settlement of 82.000 people grew to approximately 364.290 inhabitants. It became the largest of all satellite-towns around Brasilia. Constricted by a standard urban grid, with standard plots and plot size, as well as by a ‘residence only’ land-use regulation, Ceilandia has, literally, gone overboard in all aspects. Commercial developments, for different purposes and scales of capital, have spread over, once again, the *planned spaces for public activities*, an grabbed the ‘in-between’ semi-public/semi-private areas, with ill defined

tenure and worse maintenance, that often characterize modernist urbanism as found in Brasilia and neighbourhood. The initial part of the survey for the research whose findings this paper discusses, revealed 1.172 commercial establishments which have been gradually added to the original building design and planned intention for the area as well as 1.110 other irregular appropriation of public spaces for well-established commercial purposes. These changes concentrated in the older and more permanent patches of the town and along the high-street that linked Ceilandia to Taguatinga. The price of the plot in one of these patches can be three times bigger than in any other part of the mentioned satellite-town.

Each type of building in the selected patches, once identified, was mapped and its 'origin' was traced, first in the area of Taguatinga, and later in Ceilandia. By 'origin traced' this paper means the search for the original pattern, when this was the case, and the gathering of its 'family', i.e., its multiple variations brought about through alterations carried out for different purposes. These variations, once analysed revealed a typology of purposes apparently indicating a corresponding typology of perspectives – or non-physical dimensions - of the urban realm which have been, apparently, neglected in the original plans for the selected areas. They were the economic-productive, the administrative-regulatory and the place-making perspectives - or dimensions.

The economic-productive perspective emerged as a matter of consequence of the specific circumstances that marked the creation of the satellite-towns and of Brasilia. The great distances between the Federal District and the main centres of production in the country, distances made even larger by the precarious means of transportation then available, also made 'importing' any goods from anywhere, very expensive, particularly in its first fifteen years of existence. Prohibitive costs stimulated the enterprising initiative and talents of the many migrants that swapped their birthplaces for the desolate paysage of Brasilia early years. They bloomed rather in the neighbourhood of the federal capital than in the capital itself thus indicating the next dimension of the process of change that took place despite all planning: the administrative-regulatory or de-regulatory perspective. Permission was required to change social space perspectives. The severe rules regarding land-use in the Pilot Plan made it very difficult for industry or trade to settle in Brasilia. At the same time, income distribution concentrated in the federal capital made it an attractive market for business (table 1). The average income in Brasilia was three times bigger than in any satellite towns, and the whole Federal District, all together had by far the highest income in the country. Taguatinga was the longest established 'satellite community' with a growing population of desperate fast learners strongly motivated by the previous arguments. The making-place dimension regarding, for the sake of this paper, a space with a perceived meaning collectively achieved came, in the selected areas, as a consequence of the former two.

The patterns of changes identified comprised the initial alterations and their ripple-effects. They revealed a 'coding-system' made of a check-list of features and forces of change which were found to characterize the process of urban configuration of the selected areas. They have been initially tested and acknowledged, in a subsequent research conducted in another settlement, as indicators of local potential for development and self-government, in a process of continued change with minimum State investment. The mentioned check-list included static features such as design patterns, density, scale and size, as well as dynamic features such as forces of segregation, agglutination and polarization. When and where most of this check-list of features of change was found some common performance criteria were also perceived. They comprised: grater accessibility to major trade flux and visibility from these routes; perceived availability of whatever goods or services being offered, often implying forces of agglutination multiplying similar patterns of change in the neighbourhood; where singularity of services or goods being offered, regarded important, was identified it often implied forces of polarization defining new trends of change in the urban grid with strong impact on future changes in the area. Permeability to changes as well as environmental adequacy were also acknowledged as conditions to the desired process of change towards making the original 'satellite-dormitories' into better places. Taguatinga, the oldest settlement, proved to be the spatial and economic

model whose influence and ripple effects have set the standards for change among the ring of planned settlements around Brasilia.

Final considerations: dreams and nightmares

The forces that intertwine new and old space patterns, and meanings, sometimes juxtapose, sometimes overlap and hide, sometimes value and maintain them, sometimes abandon them, contracting, expanding and recreating. They make the city's heritage together with the agents of change that make them happen. They have been appropriated differently, along with various times of sedimentation, by different social groups, adapting to new and old functionalities under distinctive manners and management that rules over its use and changes. The changes introduced in any given era, understood as innovations, leave traces and signs in the 'townscape'. The individual and collective intentions that have successfully materialized into changes, and that are still happening, go into sedimentation, intertwining with new uses and users and public open spaces.

To face the challenge of allowing design approaches that interact with multiple agents of change, future and existing ones, requires the courage to face the risk of messing it up. The ripple effects of negative changes can jeopardize social, economic, management achievements that may have taken hundreds of years to consolidate into a certain level of urban quality environment. Positive changes may enhance value for all. The financial costs of changes in the genetic heritage of social and economic space related processes of city appropriation have yet to be evaluated. Maybe numbers will help those who have the power to redirect present and future investments towards more adequate useful preservation and innovation compatible policies.



Figure. 1. Aerial photo of Rio das Pedras settlement, in Rio de Janeiro, Brazil.

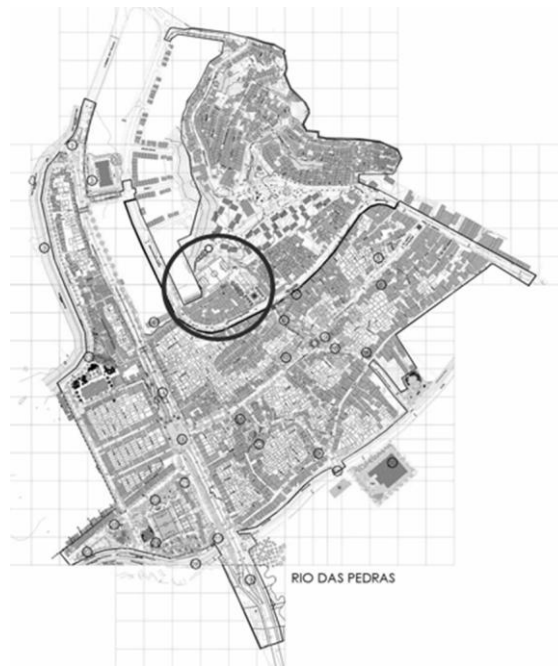


Figure 2. The area of the settlement Rio das Pedras. The circle indicates the area of the research project. Its main characteristics are – it is self-designed, self-built, self-managed and self-provided in justice and public safety.

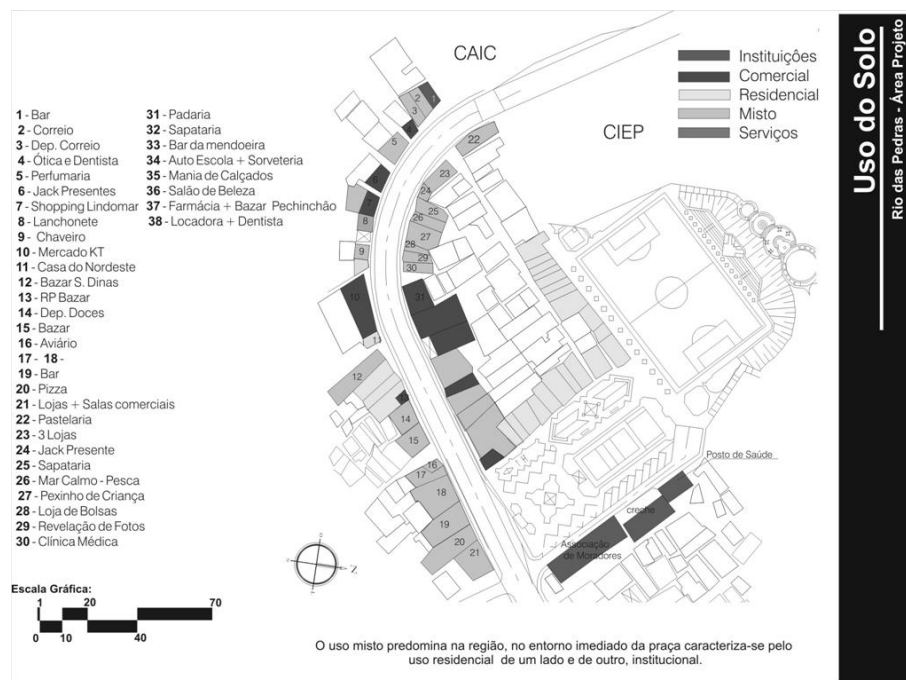


Figure 3. Mixed land uses, functional diversity together with morphological diversity and a clearly marked centre. The presence of the school reinforces the singular identity of the area. Several alleyways communicate within the block for pedestrians only as figure 4 illustrates.



Figure 4. The left poster in the photo indicates that bicycles and motorbikes are not allowed. It illustrates how the community of Rio das Pedras exercise self-ruling over the open space. The absent State is there replaced.

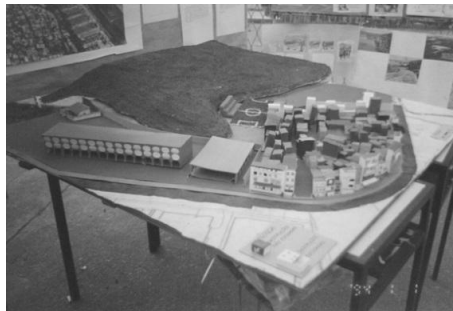


Figure 5. The model of the borough made by the students of the CIEP school as part of this research project. They are young adults, migrants, originally illiterate, beginning to learn reading and writing and basic arithmetic.



Figure 6. The model and the aerial photo of the whole settlement. It was exhibited in an open fair sponsored by the Settlement Association. The mayor of Rio and other Local Authorities representatives participated in the event.

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Public involvement transformation for best future of cities in Russia

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Abstract. *At recent years, the distrust of the government has intensified in Russia. It showed up in the criticism and denial decisions of the federal and local level authorities, including municipality development issues. This fact makes strategic urban planning a complicated and unenforceable challenge. Public discussion of the city strategic development is a mandatory part of the document approval. This measure is set forth in federal and local legislation. However, despite the enshrined laws, the quality of public debate still stays extremely low, and the results are not credible. Partly due to the Russian mentality, partly to the procedure of public hearings the event itself aims just to inform about upcoming urban life changes, but not to affect the decision. World experience of public participation illustrates that this approach to decision-making practice is beneficial for all urban participants: increases the trust level for local government and prevents future disputes, identify the real city resident interests for potential investors and land owners. Using the results of public hearings on General Plan Amendments, we propose to amend the public hearings procedure for the urban development projects in Russia. General Plan of the city of Perm is the main strategic document that regulates the urban development for more than 20 years. These public hearings focused on land use of significant city areas, such as the relocation of the Zoo into the urban forest, new outland district development for 75 thousand people (10% of the city's population), shopping centre development on the central city square - the Esplanade. Perm is an industrial city with a one million inhabitants, one of the first cities in Russia conducting urban policies based on the new urbanism ideology. Using the experience of public hearings in Perm, we identified the problems and "bottlenecks" of public participation. This experience gives us the opportunity to make recommendations for improvement of the decision-making procedure in urban development.*

Key Words: *public hearings, public participation, strategic documents, decision-making, surveys, new urbanism.*

Perm is located in the east of the European part of Russia on the Kama River and is a large diversified industrial, scientific, cultural and logistic center of the Urals with a population of one million people.

History of the city begins in 1782 during the reign of Empress Catherine the Great. At the beginning of the XIX century were defined the basic principles of the structure of the city. Like many cities the layout of which was produced in the period Perm received direct perpendicular streets and broad avenues with a high level of diversity of historic buildings with samples of almost all architectural styles and trends that had spread in pre-revolutionary Russia. In the postwar years, Perm grew all new residential neighbourhoods on both banks of the Kama River.

Documents the strategic planning of the city (in Russian it called General plans) developed since the founding of the city. In Soviet times such documents in Russia developed large urban institutions using the same approaches to various Russian regions, which actually led to the decrease in the role of spatial planning.

City development strategy simply reflected the next administration's plans for the building of new housing estates and industrial areas provide. With all the social benefits realized in strict accordance with the regulations and adopted at the state level typological series. These measures are used during the Soviet years and led to a general decline in the quality of the medium and the appearance of the same neighbourhoods with a whole set of problems.

In addition, a growing sprawl of built-up area of the city has led to an increase in cost the city budget for infrastructure development and improvement that affects the state of the economy of the city. In turn, the reduction in the level of development of the economy provokes outflow of human resources with those of the city, where the number of opportunities for the development is greater.

For these reasons in 2008 the Government of the Perm Region decided to develop a Master Plan for the city of Perm, covering questions of city's development strategy for the long term. The decision was the first example of the development of such a document in Russian and formed the basis for the development of the 2010 General Plan for the city of Perm - document the development of the city under the legislation.

The main principle of the Master Plan and subsequent General Plan was the failure of extensive development in favour of the development of the city within the existing boundaries due to the large-scale redevelopment areas.

Thus, Perm got an opportunity to increase the quality of the urban environment within the existing boundaries and create conditions for the effective functioning of the urban economy.

That's why large construction companies have lost the right to build up new territories and urban forests, the level of protection which was increased in these documents.

In the context of a change of government in 2012, the city has been a weakening of urban regulation that allowed developers and the administration to apply for a change in the General Plan of the city of Perm. In 2013 17 such applications were submitted by the city administration to a public hearing held in the period from 05.11.2013 to 28.11.2013. For Russia, a public hearing is the only legal way to get involved in solving urban problems for residents.

Public hearings on the changes in the General Plan aroused great interest on the part of all stakeholders. During the discussion of draft amendments have been collected more than 1,500 complaints of city residents, their number is three times the number of applications received in the discussion of the General Plan in late 2010, which attracted just 452 treatment.

The study was an analysis of the quality of public hearings, with the opening of the problems and the procedure as well as the collation and compilation of hits residents with the aim of identifying and evaluating the relationship to the residents to discuss the proposed project and their perceptions of quality urban environment.

Public hearings are expected participation of citizens in the following forms : 1. Appeal filed in writing to the Department of Urban Development and Architecture Perm Administration territorial or administrative authority; 2. Appeal filed in writing, through the Internet reception Mayor of Perm; 3. Appeal filed in writing in one of the official events held during the public hearings; 4. Oral treatment to the audience in one of the official events held during the public hearings.

Residents of the city of Perm got all the proposed forms of participation. Significant amount applied (63% of all applicants) got two forms: oral statement and a written request transmitted to one of the eight activities conducted by the Department of Urban Development and Architecture Perm Administration. Third of the applicants (36%) sent their written requests to the administration of the city of Perm. A small percentage of the applicants took the internet reception Mayor of Perm, working on the site of administration of Perm . Distribution of forms used appeals to all applicants can be traced in Figure 1.

Residents received treatment during the period of discussion projects unevenly. On curves registration applications to the city administration clearly expressed peaks of registered applications (Fig.2). These peaks fall on the date of the events in the areas of the city at 5, 7, 12, 14, 19, 21, 26, 28 November 2013. This is due to the fact that most of the applicants have used the forms of participation in the discussion, suggesting a visit to official events organized by the city administration. Greatest number of complaints registered in the last days of procedural delay discussions projects. This fact requires further study. This may be related to the peculiarities of registration written applications by the City of Perm, and with the escalating interest of citizens to the proposed changes during the public hearing in connection with the debate unfolded in the media and social networks. If the increase in the number of calls in the

last days of public discussion due to the second reason, it can be concluded that there was insufficient discussion term projects that should be investigated separately.

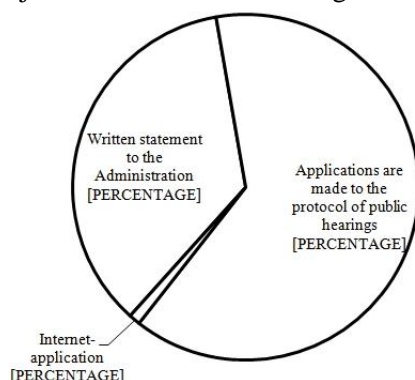


Figure1. Method of filing complaints of residents in the city of Perm administration.

It should be noted that in the last days of public hearings received 136 appeals, identical in content and designed to support all the changes discussed the Master Plan. The share of these appeals is about 9% of the total. In the generality of content applications and the ambiguity of their origin, in the analysis of complaints of residents they were placed in a separate group.

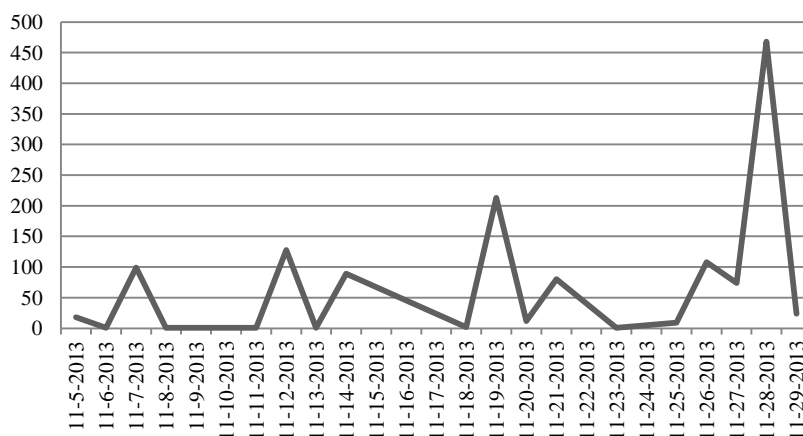


Figure 2. Schedule registering complaints of residents.

Projects change the General Plan of Perm offer changes associated with the form and content of the General Plan.

The first draft contains changes that lead document in accordance with Russian legislation, changed since the adoption of the General Plan in December 2010, and offers to put a grid on the base maps / diagrams to simplify working with them. However, this project contains changes that significantly affect the goals and objectives of the document, leading to a levelling the strategic planning and development of the city.

Second draft amendments prepared by the proposals received in the administration of the city of Perm municipal government authorities and landowners. All proposals relate changes in the functional areas of destination. On the proposals of the applicants was formed 17 changes the Master Plan. Suggestions included changing the zoning of different types of areas: residential, recreational, commercial and industrial.

Due to the differences between the proposals in the size of the territory, their social value, changes caused by different response from the residents. Rating Comments proposals shown in Figure 3. The most active residents spoke against the territory of Chernyayevsky Forest - large

forest within the city, the second highest rating by a wide margin took Esplanade - extensive free area, located in the city centre. Then follow with a relatively small number of appeals in the river valley area Danilikha who wish to build up the developers, the territory of the former airport "Bakharevka" suggests a developing neighbourhood in the 40,000 residents in the new territory. Following were rated territory, located on the border with low-rise buildings Iva -1, 2. Other changes General Plan Perm caused less significant response from citizens and are not considered in the ranking.

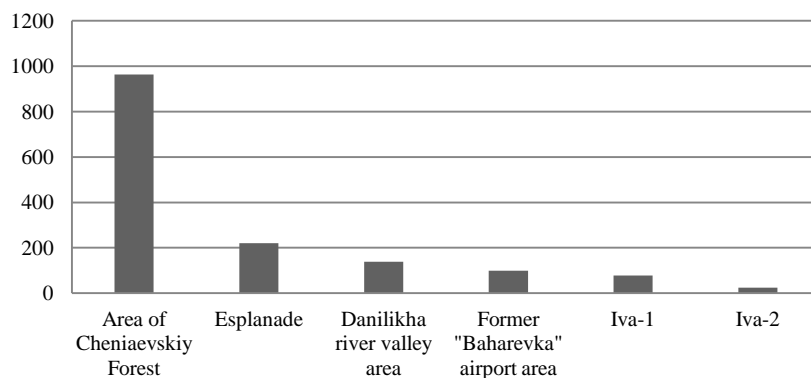


Figure 3. Rating comments proposals to amend the General Plan.

Within the protected landscape Chernyayevsky Forest, located in the city showed the importance of territory for the residents of the city of Perm. In the administration of 963 received treatment (about 62% of the total number).

The main objective of the zoning change was the transfer of the territory in the Permian forest zoo. Currently Zoo is negligibly small area of 2 hectares in the center of Perm. The question was raised repeatedly moving it once and has already received the decision on placement in one of the areas of the city. In accordance with the decision of the Spanish firm Amusement logic,SL drafted zoo. Subsequently, the decision was reversed and the administration has proposed for the zoo territory Chernyayevsky Forest. According to the results of the hearing majority of residents (58%) was not in accordance with the changed plans and administration insisted on keeping the current usage. Supports changing the intended use area is transfer the Perm Zoo, only 38 % applied. About 6 % of the requests contain proposals for alternative uses of this part of the territory.

Distribution of calls for an exemption of the proposal of the draft amendments to the General Plan has addressed the place of residence shows enhanced activity of resident's adjacent administrative areas. It is understandable that the said area fulfills recreational functions and is involved in the daily life of the community. For residents the opportunity to freely use territory forest park is valuable because their normal life is inextricably linked with the forest. Changing the functionality of the site will reduce the comfort of living in areas adjacent to the territory of the possible deployment of the zoo. On the other hand the situation of resistance increase in the activity of using the territory expected and occurs when discussing the possibility of placing any large urban sites (the tendency of "not in my backyard").

The main reasons given in explanation of position 'delete' are shown in Figure 4.

It should be noted that residents of neighborhoods in their applications using the emotional momentum to express their attitude to the territory of the forest park, "Leave the forest people", "last bit of hope for the rest in the neighborhood", "The only joy", "Miracle, existing in our city" and others. This demonstrates a high degree of sensual attachment residents to discuss the project.

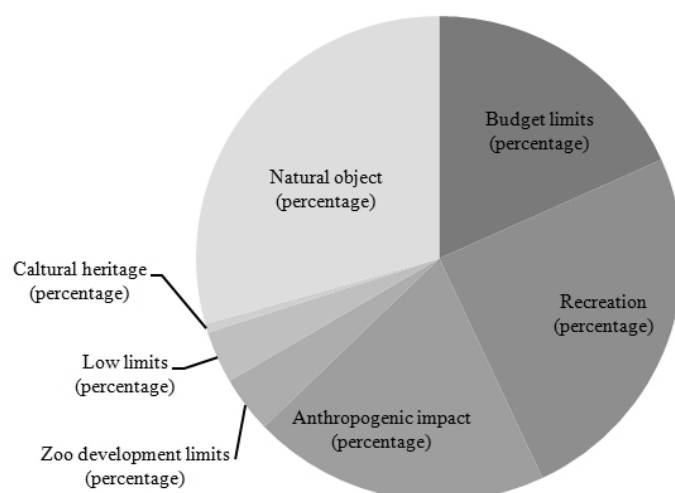


Figure 4. The prevalence of the different arguments of opponents of changing the status of protected Chernyayevsky forest area.

The addresses of residents reflected dissatisfaction protracted decision-making process for migrating zoo " should stop already discussing ", " need to take resolute decision " and others. With regard to statements supported by this argument, for the desire to change the designation of part of the territory Chernyayevsky forest to accommodate it for Perm Zoo , may be hiding hope of speeding up the process of government decisions on the construction of significant urban object.

The main reason residents in "voting" for making changes is the desire to have a modern zoo " European level ", located near the city center . Thus, references in support of changes to reveal the significance of the zoo inhabitants, not their attitude to the zoo on the placement of the Chernyayevsky Forest area.

Turning to the cultural context of the existence of zoos in Russia, we can say that culture zoo itself is not deep Russian tradition, unlike the culture of theaters or museums. In the world of zoos, in addition to its recreational functions may perform the functions of environmental education, upbringing respect for the environment and work as a research enterprise. While in the eyes of Perm , the zoo is a certain image object for the city, raising its status compared to other cities , that is, the city is a means of identification.

Territory of Esplanade ranks second in the ranking of the most talked about change. In 1960 - 70s during the active development of the city it was cleared the space housing construction, but the project of one of the Perm architects was transformed it into a large open space in conjunction with surround buildings form a single plan's composition. Three quarters converted to esplanade become the hallmark of Perm.

In comparison with the territory Chernyayevsky forest it caused much less excitement. Its opinion on the proposal expressed 220 people (14.3 % of all references), including 70% of them argued for the preservation of recreational functions esplanade share against 27 % of residents are in favor of a change in its use.

Most of the arguments for retaining the existing use (about 40% of the total) are based on the perception of the Esplanade as a recreational facility - the venue of the city's celebrations and festivals. The addresses residents say the probability of loss of these functions, due to changes in land use. The townspeople called Esplanade «The only place where you can relax with children ", 'place of favorite holidays." A group of residents insists on maintaining the Esplanade as a cultural heritage site. Thus, most people like to characterize the Esplanade important to identify their city, refers to her as a symbol of Perm.

In the public mind Esplanade residents perceived as an integral part of the city and its culture, as opposed to other provincial cities as "highlight" of Perm. At this point explanations used residents: "We can lose shape Perm", "This is the center of the city, its 'face', which is necessary to make beautiful", "Pride, heritage Perm" and others.

The arguments supporting the position of the applicant for change of use, based on perceptions of underground space development of the Esplanade as "a step forward for the city" and high-tech image project, which will raise the status of the city. As an example, speech: «Underground Mall - it's not bad. Breathes new technologies». This argument, like the previous one, reveals the need for citizens to identify, illustrates the importance of assessing hometown side. Hypothesis is supported by the statements of individual residents of the need for other unconditional attributes of "success" of Russian cities "indigenous Permiaks just dream about Metro and the water park." However, the nature of the change - placing the mall in these appeals is blurred for appeal of the idea.

All most discussed objects - zoo hosted part of the territory Chernyayevsky Forest and Esplanade - the elements forming urban identity. Identification processes underlie the formation of relatively stable social interests, that is, lead to the formation of the local community. [1] With the help of these urban characters formed stable mental communication within the urban community - a sense of community with the territory, a sense of "city".

For positive identification of members of the urban community is important, whether the territory develops and how it is evaluated by other [2]. In particular, the existence in the city zoo "European level", which is mentioned in a variety of applications, is a means of external identification, the identification associated with the estimation of the city outside.

Obviously, uniform, monolithic "urban identity" is not possible, since different social groups have their own, differing in type and content, views about the city, its values and interests in the citywide resources [3], such as, for example, an area of forest or small river valley.

The analysis revealed various appeals of citizen's awareness and mindfulness in making decisions and formulating their own opinions on Urban Affairs and the difference in the degree of readiness of citizens to take responsibility for their decision.

Some residents of the city characterized by the ability to perceive complex, consider several interdependent factors - is traced in the analysis-cited arguments. The situation unfolding around changing land use of urban forests and valleys of small rivers, allows you to select a group of people, differing development of environmental thinking, guided when deciding the principles of sustainable development.

Nevertheless, most residents look at the city's problems unilaterally, often expressed intuitively guided or conventional notions of "modern" city with multilevel underground shops, "European" zoo on site urban forests and high-rise buildings in the valley of the small river.

In a community that when making the choice based on the generally accepted ideas, simplifies the process of manipulating opinion using the media and invited experts. These technologies have been applied in the recent hearings on draft amendments to the General Plan. Feedbacks when we analyze complaints of residents in the administration of the city of Perm, research on this issue will continue.

An analysis of the complaints of residents concluded that public hearings could be an effective tool for strategic decision-making, only in the case of a conscious attitude to the future residents of the city, as well as if they have a comprehensive knowledge of urban development relating to legal, economic, political and social processes.

Under these conditions, of particular importance in the task of forming citizens citizenship and the creation of public institutions that act as intermediaries between citizens and the government, the business community. However, despite the active work of public organizations of Perm, some citizens in the appeals expressed dissatisfaction with such organizations. This indicates a lack of representation of the interests of the residents of the city by public organizations or distorted perception of the position of public men.

Conducted public hearings showed that neither residents nor the government nor the business community was not ready to discuss together solutions. Residents were not sufficiently educated in urban planning and put yourself at risk of manipulation by other party's debate. The administration has been unable to provide the necessary conditions for effective discussion of projects and businessmen do not want to look into the eyes of their customers.

Educating residents conscious attitude toward the city can be stimulated from above - by providing the most comfortable environment discuss urban projects (and informative handouts available, exposition materials, equal opportunity to speak to all participants of the discussion) , or through the creation of alternative possibilities for participation of residents : preliminary public discussion on the draft , Civilian expertise, project seminars, surveys and more.

The experience of countries that use mechanisms for involving the urban community in planning for a long time, shows that the change in terms of the debate in making strategic decisions in the direction of the interests of all stakeholders benefit all [4]: power - in enhancing its legitimacy and credibility with citizens, residents - in consideration of their needs and desires and the business community - to identify the interests of consumers.

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Unidade Residencial da Reboleira Sul. Critical reading of the “Optimist Suburbia” that Sá Rico designed and J. Pimenta built in the Lisbon suburb

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Abstract. *This communication aims to present part of an investigation that, by surveying 30 cases study unpublished sought to understand the phenomenon of residential occupation of the northern suburb of Lisbon. Questions whether the evolution of the territory built in the suburbs (architectural and urban planning) when, in the late 1960s, the ideals of neoliberalism, the emergence of large property developers and a large demographic pressure reshape the process of urban growth and the logic of metropolitan relations (the traditional building lot to lot by the production of large urban packages) and urban area in the suburbs of Lisbon acquires its contemporary shape. The suburban growth recorded in Amadora is the most emblematic expression of the suburbanization process from 1950s reconfigured the territory of the Lisbon Metropolitan Area. Specifically we intend to present the Urbanização da Reboleira for being a "pioneer" and paradigmatic case. These large residential construction packages ex-novo found in Modern tabula rasa and its social optimism a model of easy operability. Designed by architects trained in the values of Modernity, this also enables us to identify the time when the Portuguese architects were losing capacity to intervene, from primary responsibility for the design of the territory (up to 50s) to figure technicians ensured that only approval of real estate projects. The Urbanização da Reboleira Sul is an initiative of a group of small landowners and their masterplan is the responsibility of the architect Sá Rico. Once approved the masterplan, the construction process proceeds to the liability of J. Pimenta (then the largest real estate developer and builder in the country) who, with the connivance of local government, adulterous urban principles originally defined. This was a usual strategy of this promoter - clearly speculative process that obeyed only to the logic of the market.*

Key Words: *J. Pimenta, Lisbon Metropolitan Area, real estate developers, suburb; Urbanização da Reboleira Sul.*

The formation of an urban Amadora. Amadora Masterplan

Urban growth recorded in Amadora is the most emblematic expression of the suburbanization process from late 1950 restructures the entire logic of metropolitan relationships. These territories that until that time were dominated by an agricultural landscape punctuated by small urbanized centers, a lapse of 20 years, gave rise to extensive densely built-up urban networks by mostly residential buildings (Figure 1).

The beginning of 1950 marks the beginning of the general awareness of the need of urban planning instruments that covered much of the urban territory. It is according to this new consciousness that in 1949 the *Ministério das Obras Públicas (MOP)* is the first to approve a planning public source for Amadora designed by Faria da Costa.

This Plan is intended to consistently organizing the process of urban growth in Amadora, following the logic of building lot by lot (yield buildings with four floors) that had been practicing in Amadora, typology which also came to be practiced by "official" program *Habitacões de Renda Económica*. Following an urban structure based on the street, in the square and the block, set up the main road traces, areas of expansion and the number of floors of the buildings to be constructed in conjunction with the existing urban fabric.

In March 1958, presents a second Amadora Masterplan designed by architect João António de Aguiar (Figure 2). This Plan establishes the scheme circulations of all Amadora, determine

the main roads connecting the village center and links this to the city of Lisbon. It also made a comprehensive zoning scheme which establishes the main uses for each territorial unit and especially sets up housing densities allowed in each. There was also concern Amadora endow a certain autonomy in relation to Lisbon, so set up the profiles of the necessary equipment to which that territory was autonomous in terms of housing, job/industry and equipment. (Nunes, 2011, pp.195)



Figure 1. Aerial photograph of Urbanização da Reboleira, 2013.

João P. Silva Nunes (2011, pp.196) cites a diagnosis made by the team that participated in the studies of *PDM Amadora* summarizing an exemplary way the application of the plan.

“The Aguiar plan was followed in the areas of immediate expansion of existing settlements (Amadora, Damaia, Buraca) (...) (but) now with respect to large areas of urban sprawl of the '70s and '80s, Aguiar Plan is abandoned and replaced isolated projects by the private sector who shall be assessed and approved on the basis of general criteria of the Lisbon Regional Master Plan meanwhile completed (1964). Based on these general criteria and sample approval of proposed subdivision, centers on the Direcção Geral de Planeamento Urbanístico, alter morphologies, types, uses and densities of previous plans”. (CMA, 1990, pp.168-9)

This analysis allows us to trace well the three stages of growth that characterized the construction of the Amadora urban fabric: 1) phase of homes for either housing or homes that were ordered individually builders; 2) phase of buildings yield four floors promoted by “*potos bravos*”; 3) phase of large urban and real estate transactions for private promotion in a short time, once transformed agricultural farms in residential housing developments.

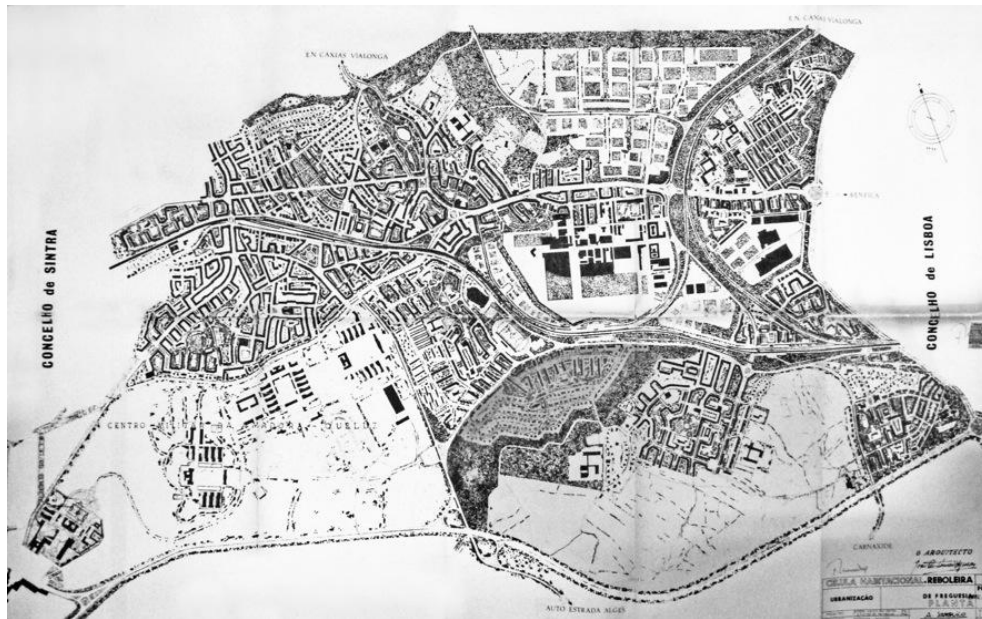


Figure 2. Amadora Masterplan, Architect João Aguiar, 1958.

Reboleira Norte

In late 1950, two private developers, Rodrigo Barbosa Araújo Leite da Silva and Amadeu Cotrim Garcez acquired an extensive farm located in *Casal Brandão* ou *Casal da Reboleira*, bounded on the west by the railway line linking Lisbon to Sintra, by *Estrada Militar* south and to the west by the *Quatro Caminhos*.

This location will not have been a fluke, because it allowed benefiting from a series of strongly attractive factors for this type of venture. Enjoyed is the low cost of purchasing agricultural land; benefited from the synergies created by the "front" of urbanization that is recorded in the neighboring land of Benfica, the Buraca and Damaia; the recent (1957) electrification of railway line that allowed substantial technological improvements in the management of the traffic line and consequently the frequency of trains; easy accessibility to the center of Lisbon, either through private road transport either by public transport (train) in less than 10 minutes put the potential residents of central Lisbon.

These promoters wanted there to create a new "garden-city/satellite" of capital seeking to attract a population group to aspire to reside in a suburb evocative of an experience that is associated with the countryside and green spaces to the benefits of urban life and the dynamism that of city services offer.

*"Eight minutes from the capital
is simply herself
built in top condition and a lovely place
here is the satellite city of Reboleira
true garden-city". (O Século, July 4, 1964)*

In December 1959 shall be submitted to the technical services of the Oeiras Municipality design of streets that prosecutors plan to send the couple running in Reboleira land could begin to urbanization in accordance with the Amadora Masterplan (Figure 3). This plan follows the planning assumptions previously set by the architect João António de Aguiar and is one of the leading builders *EMUR – Empresa de Urbanismo e Construções Lda*.

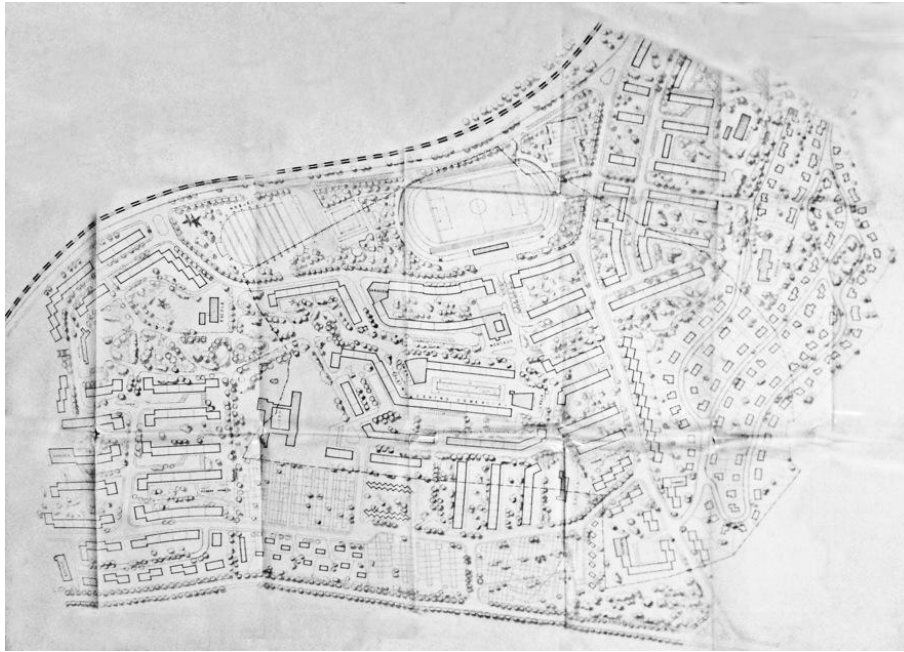


Figure 3. Reboleira Norte Urban Plan, Architect João Aguiar, 1958.

At this time is a celebrated deed transfer of land between the municipality and the promoters. This scripture was to be adjusted several times during the year 1960, and in July 1960 signed the final version of the urbanization contract. Under this contract settled down land that would be assigned to building public facilities (playground, school, college, church, market, sports park with swimming pool, skating rink, basketball and volleyball) in an area of about 50000 m².

The urban principles established in the plan were based on contemporary studies developed internationally in the English garden city. Thus the center of the housing development was planned location of buildings with height between six and eight stories, with the ground floor was planned location of trade. The remaining buildings would be organized in band housing buildings with four floors. On the hillside to the south, across the main boulevard linking the *Quatro Caminhos* (current Av. D. José I) was provided for the construction of about 250 houses. The set was completed by an inn and a car garage.

"There was concern the Reboleira buildings obey a design that does not hurt the entrenched traditions preferences and therefore did not have style too bold, but not ceased to be modern and attractive lines." (Diário Popular, June 1, 1963)

In about 24 hectares was envisaged that a population that was around 140 inhabitants/hectares had been established as the Amadora Masterplan.

"The Reboleira will be a residential unit and not a neighborhood. Will satisfy the needs of its people with their own resources (...) In Reboleira is to take the effect of making an urban plan that's best interest and can integrate into the spirit of a satellite city. Is noteworthy, however, that Reboleira will become self-sufficient urban center. (...) [According to the general plan] have all the requirements of the most modern urban centers, the characteristics of order, cleanliness, convenience and taste indispensable to the existence of population centers in the civilized world. The Reboleira will not shy but authentic "lungs" of vegetation gardens. A vast park and many garden areas provide a healthy life". (O Século, July 4, 1964)

In urbanization contract was also established that the plots assigned and for the construction of buildings of public interest ground, could not be given another use, but they would return to the immediate possession of the original owners. The Municipality was also in charge of endeavor, to the extent that it is possible for the brevity of construction of such establishments.

Was initially scheduled starting date of construction that established the late 1962 and early 1964 as the deadline for the construction of the facilities. However many of the efforts of the promoters were not met and shortages experienced by populations made him feel. The Municipality was justified that some of this facilities to Municipality relied on foreign entities and therefore could do little. However, it is reported the construction of a Police station on land previously intended for movie theater, preventing future construction of this, and the construction of a playground outside the ceded plot for this purpose.

In August 1965 the construction of the Reboleira railway station was embargoed by works are being carried out, for access to the station, which collided with a *Aqueduto das Águas Livres*, as well as the sewerage system. In a letter of June 1966, CP advises homeowners to operational the way station was not considered a priority issue because it could only come into operation while the new Santa Cruz station, and saw no urgency in solving this problem the much demanded by residents.

In August 1967 a large part of the streets, public parks and green spaces of trees were already completed.

With all already "customary" adventures in this type of processes that extend over a long period of time, the work planned on the southern slopes were not proceeding as designed, and it is thus that in 1966, require the approval of the Oeiras Municipality of Reboleira Sul Urban Plan.

Reboleira Sul Urban Plan

The Reboleira Sul Urban Plan marks a new cycle in the process of urbanization in the Amadora. These lands were given to a large number of owners and were given responsibility for building, among others, *Empreendimento Urbanos e Turismo J. Pimenta, SARL*, at the time the most important real estate developer to work in Lisbon Metropolitan Area (LMA).

Fernando Canêças de Moraes, owner of land in the Reboleira south zone, whose review was provided for the MOP in November 1964, presented in May 1966 the study of urbanization the responsibility of the architect Antonio Sarrico Santos (Sá Rico) (Figure 4).

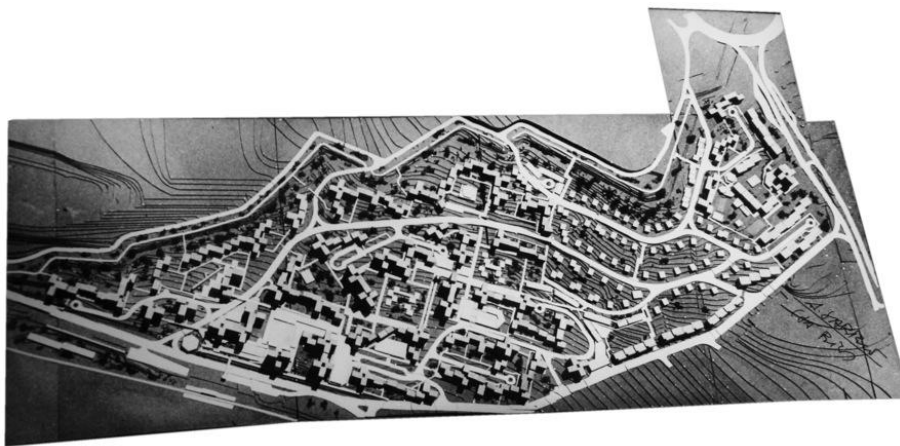


Figure 4. Model Reboleira Sul Urban Plan, Architect Sá Rico, 1966.

The Reboleira Sul Urban Plan follows the experience that the architect Sá Rico had experienced in 1963 Buraca Urban Plan. Although recalling that this plan, this has been the plan of Buraca followed the previous assumptions expressed in the urban lan of the Amadora designed by architect João Aguiar, the author stresses that "*this work is in relation to the Buraca*

a breakthrough. All the space from the exterior to the interior has been carefully considered and studied". (Sá Rico, 1966, pp.5)

In the previous plan was expected to Reboleira a density of 141 inhabitants/hectare, corresponding to a ground occupation divided into three functions: about 1/3 of the area was intended for four-story buildings, one third the houses and the rest as green zone. This new plan was reviewing all this data, and the cell with about 39 hectares provided an occupational density of around 157 inhabitants/hectare, which corresponded to 1923 dwellings in tenement buildings and 103 townhouses, for an estimated population of 6078 people.

This urban plan was prepared over and over and its descriptive memory is an exhaustive document that deserves emphasis here. This text about urbanism and general considerations about the topics of discussion at the time, characterizes the whole of difficulty representing the production of a plan of this scale in the Portuguese context in the 1960s. Objectively explains each option taken, always based on comparison with other proposals "official" promoted by the regime (Olivais Norte, Olivais Sul and Chelas) and other contemporary international experiences in vogue (in particular the experiences of British new towns).

Buraca essay

"This work follows as urban study certain amplitude of the Buraca officially approved approximately two years ago by MOP and currently running, and experience which necessarily benefit.

Although considered a correct solution for all those who are linked to the problems of urbanism is about me outdated, not only in its general conception of organizing spaces, as in the work processes adopted. There are aspects that I consider negative and that its development in detail accentuated. Too bad though it had been a very low level of collaboration in the implementation of the road and sewage project that very committed and the solution led to a review of final settlement, but have committed certain aspects of the initial solution.

Among the many negative aspects of this work, whose attribute blame myself, regard as key:

I have limited, due to commitments made by the official plan, the definition of outer space and the study of their organization, starting from the abstract definition imposed on that plan, determined lot sizing.

This necessarily led me to a disintegration of human space by solving the truncated, only one of its aspects, which will lead implicitly to an adulteration of the final development of the scale of the lot.

The lack of an initial synchronization, due to an in-depth study, could lead to the disintegration of the space itself, been further accentuate all negative positions.

Were all these negative aspects, the result of my previous experience I deleted the job that I now present [Reboleira Sul], a consequence of a much more in-depth study that led to the search for a comprehensive solution and the proposal which I now present, and that is a remarkable advance in respect of that work". (Sá Rico, 1966, pp.19-20).

This excerpt is particularly important because it demonstrates quite clearly awareness that architects participating in the construction of the Lisbon suburb had on their achievements. Allows us to refute many preconceived ideas that these authors considered as "minor" only guided by the profit motive inherent in real estate.

Urban and populational reality of Reboleira Norte

To start the urban plan, architect Sá Rico calls attention to the lack of a sociological study able to characterize the Amadora territory with a rigor/depth that allows making architectural choices based on that diagnosis.

Reference is made to the survey conducted in 1960 under the responsibility of the architect João Aguiar when the Amadora Masterplan, which, though done with some care, rested on bases considered, outdated when the population forecast provided for each dwelling. This simplicity of position and the lack of a greater depth of study and objectivity of the plan were stated as the cause for the uncontrolled number of dwelling that were occurring in the execution in the north. Thus Sá Rico lies on the task to conduct a survey to the situation in Reboleira Norte in order to gather data for designing a system based on real facts and not on outdated estimates urban plan.

"From the survey it was possible to do that and the northern part of Reboleira ever built and which represents one third of the whole area, I concluded:

- over 1413 dwellings in 1002 provided the official plan were executed.*
- this represents an increase of 411 dwellings which corresponds, according to the same plan, a population increase of the order of 1233 people.*
- beyond that increasing the number of dwellings, there to consider further 62 stores, 6 offices, 26 garages, 10 warehouses, storerooms 7 and a small factory.*
- assistance of worship is taken through a Protestant church in a working area for a shop.*
- buildings set in the plan with greater height, 7 floors, were built with 8 floors.*
- the buildings are built higher floors and 10 were included in the plan with only 5 floors.*
- a building with four plots that corresponded to the plane 32 dwellings were built five lots and there was an overall increase of 30 dwellings.*

In addition to the checks made on the built and part of which is only one third of the whole area, I am aware of some studies and projects approved with 261 dwellings for 85 provided in the official plan, which gives a further increase of 176 dwellings and therefore more 428 people.

From here I can only conclude that for the northern area of Reboleira, with a part already built and running another shall be given, according to the data plan a population increase of the order of 2,000 people". (Sá Rico, 1966, pp.38-40)

General Structure of the Proposal

The first projective plan options passed by the restructuring of the connections to the surrounding areas. With this reformulation, we sought to better integrate this cell housing in major regional roads in the AML and the large circular Lisbon, which quickly lead residents to the city of Lisbon. In terms of structuring the proposal is clearly highlighted the importance of the train station, while iron pole generator centrality of whole cell (Figure 5).

"Due to the two movements that create a daily flow of people, with greater strength at peak times, one in the morning and another in the late afternoon in the opposite direction. These two movements create lines necessarily constraints of the physical strength of the cell. This led me to consider the season the dominant axis of the whole composition, thus seeking to give physical expression to a strong human condition". (Sá Rico, 1966, pp.24)

Thus, the movement of pedestrians lines were drawn, with different expressions according to their flow from the attraction pole of station. In the vicinity of the fundamental elements vitalization of cell were found, *"according to a structure that almost reminds the correct form of a large tree trunk, its branches more or less long, to unfold in other smaller coming out of it"* (Sá Rico, 1966, pp.24). *On the hill opposite the station and the culmination of the largest power line was proposed location of the large shopping center.*

The overall composition of the cell is affected by this central shaft which are derived from two orthogonal axes that determine the whole composition of the cell and from which all external spaces are shaped. Sá Rico states that *"this sense of composition is what best suits the natural development of the land, and in it we find a quite space organization that comes close to our traditional area of strong Mediterranean incidences". (Sá Rico, 1966, pp.25).*



Figure 5. Reboleira Sul Urban Plan, Architect Sá Rico, 1966.

Every cell development, following this axis follows the natural development of land extending in gentle upward slope from the station, watching the *Estrada Militar* to the *Quatro Caminhos*. Hence the composition of orthogonal blocks that will progressively combining altimetry oscillation creating several spaces.

"Just so, a certain physical space can give strength to a human space that corresponds to it and in which man can find that scale of values which lead him to identify it with you and appropriates it, then feeling sir what to it was created. Only then urbanism identifies with the architecture and from there all his abstract sense became reality, serving the purpose it is intended, man". (Sá Rico, 1966, pp. 26-7)

The human cell center

Sá Rico stresses that the human element was considered in structuring the plan and organization of spaces, *"all his strength"*. Its strong presence is evidenced by not opting for a large civic and commercial center located in a single point. Choose to organize and conveniently treat a number of walking routes that they would play the role of "canal space" public and civic experience (Figure 6).

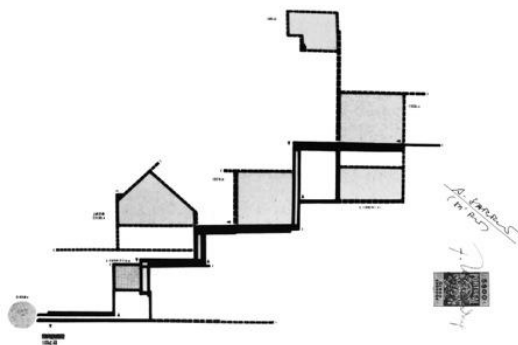


Figure 6. Scheme of the Human Center of Reboleira Sul, Architect Sá Rico, 1966.

Classified in the general line composition, the center extends along the central part of the cell following a orthogonal composition. It extends almost from the movie theater (way station train) to the area of housing, including the two major shopping centers and rises orthogonally to the church. Around it, integrating it, gravitate fundamental elements aimed at equipping children: two primary schools; the kindergarten; two playgrounds; and the medical center. Then the pawn, with special emphasis on the child can move "freely and wildly". The car gives access to it from all sides, without the trespass.

Circulation

"It has such force the presence of the car in urban space that cannot be forgotten in structuring any neighborhood. Must be equated directly linked to the man with which it forms a binomial, the better or worse resolution of which results in a better or worse urban solution. (...)

The binomial vehicle-pedestrian was here equated forming a system of two equations each of which corresponds to a scale so that both, in their own space if you continue and complete without counter". (Sá Rico, 1966, pp.27-8)

As already experienced in the Buraca Urban Plan, also in Reboleira Sul, entire road system of the cell was chalked within an integrated overall scheme considering four different types of roads, the V1, V2, V3 and V4, designations adopted by Le Corbusier in its rule of 7V (Figure 7).



Figure 7. Road Structure of Reboleira Sul Urban Plan, Architect Sá Rico, 1966.

Although taking a different scale and dimensions, we adopted the same principle: V1 - Freeway, via extensive regional traffic flow and speed of exclusive use for mechanical transit; V2 - roads intercellular distribution of housing unit, are responsible for channeling all the different mechanical cells for V1 transit. Make the connection between the cells and the common center of the unit, having no direct contact with the housing; V3 - roads penetration and mechanical movement of each cell. Completely individualized pathways for pedestrians give direct access to these dwellings and through parking areas. Also be avoided crossing of the paths of pedestrians in the main points intersect at different levels, by "bridging" or tunnels; V4 - roads and paths for pedestrians only.

"By analyzing the urban structure of the cell, easily verifies that the pedestrian was given such presence that almost all the solution evolves from the power lines down by it.

Leaving the station, core of the entire drive at peak times, to the most distant zone, along the four paths, a series of platforms serving a regular route. They have however increased expression, which corresponds to a larger footprint at the point of gravity of the cell, those who track the movement towards the station represents the largest movement within". (Sá Rico, 1966, pp.29)

The issue of parking was also equated with the fundamental structure of the residential unit. It was thus destined for an area of 21070 m² open and parked in an underground area of 3998 m².

"Although it has not been able to achieve optimal prediction of 1 car per house, that they need to check only come among us many years from now, however could exceed the averages of many European countries, where the rate of cars per capita exceeds our". (Sá Rico, 1966, pp.35)

Three large garages at key points, such as run a gas station were also provided. *"The individual garages were not considered here, for fear that given the structure of the cell, were transformed into small workshops, improper appearance"*. (Sá Rico, 1966, pp.57)

Facilities

Sá Rico, warning that the items of facilities referred to in the Amadora Masterplan was meager that claimed many changes during the implementation of the plans. It was said that the situation should be changed as part of a broad-based review of the entire Urban Plan revision that was considered urgent and which had been requested by *Conselho Superior de Obras Públicas*.

"As I mentioned in the Buraca Urban Plan of our sociology studies are poor or virtually non-existent, which further aggravates the problem.

However, we cannot sit back and imposes the programming for the whole cell from a ware able to give you the self-sufficiency of its scale. (...)

For the human mass that forms our neighborhoods is quite heterogeneous, economically weak, socially poorly structured, very far from saturation of their human potential, behaves in a disorderly and unpredictable prey to the harmful effects of the recent past of disabled proper conditions, which correspond to conditions of habitability also disabled. (...)

If we are only just beginning, for reasons of natural social evolution, to look seriously for the housing problem, without a basic structure that still meets, no wonder that only several years from now, after the experience of some valid constructions , begin to have some elements capable of providing us with the data necessary for the establishment of certain facilities programs. (...)

That does not prevent me however that, based on the data and information within my reach at this time, in consultation with foreign counterparts accomplishments, in direct observation of certain behavior of populations, establish a program of urban equipping of certain scale". (Sá Rico, 1966, pp.42-4)

Thus, considering the assumed population and scale of the plan, several devices have been provided in order to make the cell self-sufficient in their primary needs.

Although the absence of a pre-primary education official in Portugal, two kindergartens were provided. With regard to primary schools, has mentioned the experiences of English new town where was considered the primary school as the starting point for structuring the city itself. Thus, it was based on the route of the child that the cell was scaled. Were therefore envisaged two primary schools located in the center of gravity of the metric and human cell. Each school would be well served by the network paths due to the mechanical individualized pedestrian traffic.

The level of health care services were provided to local own medical center, in buildings of differentiated for housing, located in a central area that is served by car access and privileged pedestrian access.

It was also provided the location for a church, the possibility to install a movie theater at one end of the cell, located along a route of intercellular transit and railway line, thus benefiting from the possibility of attracting public outside the cell.

Trade

In the study conducted for the resolution of commercial program experiences that were being made in several English New Towns and Olivais Sul and given the characteristics of the cell, the topographic development at pedestrian pathways and their structure were observed were considered four commercial centers: A great center opposite the station, which cumulatively play the role of civic center; another which proposed a new model in which the function normally performed by a market were replaced by a supermarket that worked the most hours according to the life of the inhabitants. *"This whole cell mode, despite its fusiform configuration*

would be covered by a commercial ware that does not oblige a housewife for your needs day-to-day, long distances". (Sá Rico, 1966, pp.51-2)

Green Spaces

At the top of the slope, and corresponding to the zone of protection of the *Estrada Militar* will develop, under the proper afforestation plan, a dense wooded area that will frame the new neighborhood (Figure 8).



Figure 8. Green Spaces of Reboleira Sul Urban Plan, Architect Sá Rico, 1966.

"Perfect green line separating the living from the white buildings and bright blue Lisbon sky.

From there, cascading, born various branches of trees, through the villas that bathing the linear center in order to give greater strength and comfort to footpaths and some free, spaces corresponding to the schools the most powerful, the kindergartener, the playground, end up coming faintly die against the strong and dense area of trees that must be born after the train line to protect the natural noise of the trains". (Sá Rico, 1966, pp.54-5)

Sá Rico proposes that all open spaces, the permeable zones and afforestation are the subject of a timely landscaped study, consciously prepared by a landscape architect. These zones would be designed so seamlessly with playgrounds considered "indispensable in any neighborhood." Recreational areas for teens and older were also thought in relation to green spaces.

Regarding games area, was considered a games area-wide cell, regardless of considering the games area designed for the Reboleira Norte, but is separated from it by a cell via high flow of traffic. Thus a basketball and roller hockey, a tennis court, a swimming pool with attached and integrated them an assembly center buildings and a clubhouse was planned.

Home Organization

The time of presentation of the Urban Plan, also pointing-three housing typologies combined in various ways, would serve the residential function of the whole. Regarding home T2 to T4 were provided (Figure 9).



Figure 9. Plans of housing typologies of Reboleira Sul Urban Plan, Architect Sá Rico, 1966.

“The internal organization of the home must be considered a program that satisfies certain human requests. And for completing it must sit on certain data that clarify the sociology of mass human behavior that will serve.

Whereas this cell to home an internal program to serve a population of already evolved middle class or continuous evolution, it was structured and organized, taking into account all the above principles.

Thus, a single dialog, speak the whole neighborhood”. (Sá Rico, 1966, pp.37) (Figure10)



Figure 10. Photograph of the model of a housing block of Reboleira Sul Urban Plan, Architect Sá Rico, 1966.

Approval process and review of the Urban Plan

In May 1968 the review of the Reboleira Sul Urban Plan, designed to give satisfaction to the comments made by the various entities involved in the approval of the Urban Plan was presented at the Oeiras Municipality (Figure11).

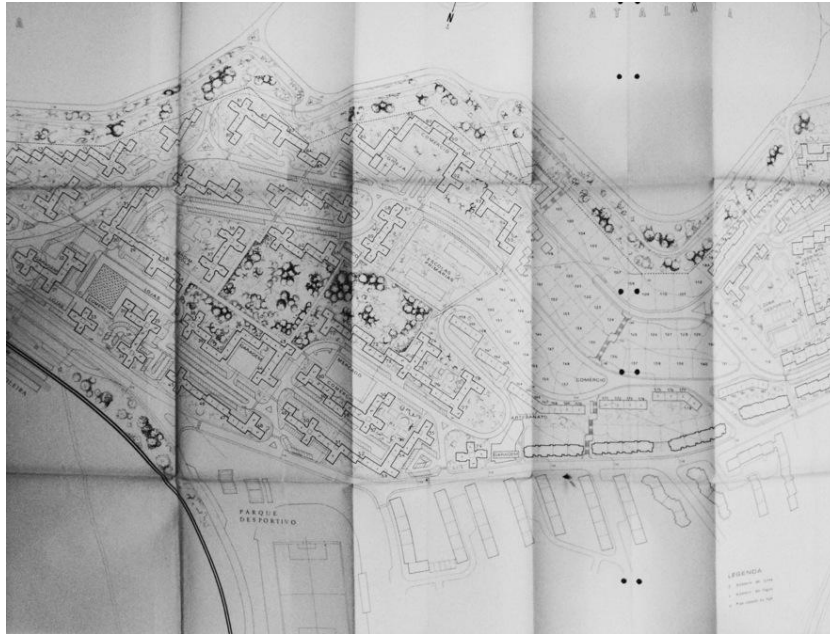


Figure 11. Review of Reboleira Sul Urban Plan, Architect Sá Rico, 1968.

Imposed changes were related to the need for improvement of the road system, for improved handling and mechanical irrigation transit through the entire cell trying yet not completely penetrate the core. Thus pedestrian crossings are reduced uneven leading to obvious economic benefits, as well as pedestrian pathways are reduced. Also makes repairs to the street level design, including the requirement walks the streets of most car traffic and were eliminated the underground car parks, distributing them to the surface without increasing the area for parking. It has also increased the area of the central green area to constitute a true lung plan and revised the height of volumes, proceeding to the standardization aiming to make the most economical running.

In April 1971 it signed the final contract for the donation of land between the city and the owners of the land where the following final values are established: Total area 38.75 hectares; 6078 inhabitants; 1923 block houses; 103 homes; population density of 156.8 inhabitants/hectare.

Implementation of the Plan and construction of buildings

Shortly after adoption of the Urban Plan, begins the work of earthworks for the construction of buildings. The construction process is then controlled by the *Empreendimento Urbanos e Turismo J. Pimenta, SARL* the meantime had acquired some parcels of land to the original landowners and developers of Urban Plan.

From that moment begins a new process that will lead to many changes were clearly misrepresenting the approved plans. As had already happened in the Reboleira Norte, this company starts a speculative process clearly about lots already approved.

In 1970 are subject to the approval of the project for residential buildings designed by the architect Sa Rico and would be built by *SUIÇOPOR – Imobiliária Suíço Portuguesa Lda*. In these projects the housing typologies previously presented as small simplifications to the interior design of the homes were observed.

For the same year, the responsibility of *J. Pimenta*, a change in some portions is required. With the pretext of pursuing some adjustments in retaining walls and track alignment (resulting from the work of moves land) intended to increase the number of parking spaces. It is also intended to extend the zone of construction through the implementation of eight new lots, and

seven of the lots already approved, increasing the number of floors. As justification was advanced the need for reimbursement from increased expenditure generated by the arrangement of the soil and the various works of rectification. This request would be accepted by the council and was the "first stone" to the process that would follow.

In terms of the types of buildings, tabula rasa on the work of the architect Sa Rico was taken. The types T2, T3 and T4 proposals were replaced by T0 and T1 types, offering only the regulatory minimum areas required for a bedroom, living room and a kitchenette. Thus T0 apartments include a bathroom, living-room and kitchenette and T1 presented bedroom, bathroom, living-room and kitchenette. These properties were offered for sale and rent already furnished. In the room was provided a bed, bedside tables and wardrobe; in-room room was included a sofa bed, a bench and coffee table, dining table with four chairs, a cabinet with storage shelf and two lamps; the kitchenette was installed a stove, water heater and countertop sinks.

The justification for this change typologies was repeated throughout the various change orders:

"In general, the buildings set in the plan intended to dwellings of a kind apartment of one or two divisions, systems that has proven model in solving the housing problem in the area concerned". (Sá Rico, 1966)

This process was being followed by the same promoter company in the Espargal neighborhood in Paço de Arcos (Ferreira, 2010, pp.156-60). The request for change of type was joined often changes the configuration of buildings, number of floors and occupation of the ground floor with trade by claiming that the configuration previously approved (as in buildings already done) *"caused poor conditions of insolation, rectification and visual relief"* (Silva, 1969). This strategy obviously configured a market strategy development company, because with these types T0 and T1 could be an increase in population density with natural economic benefits (Figure12).

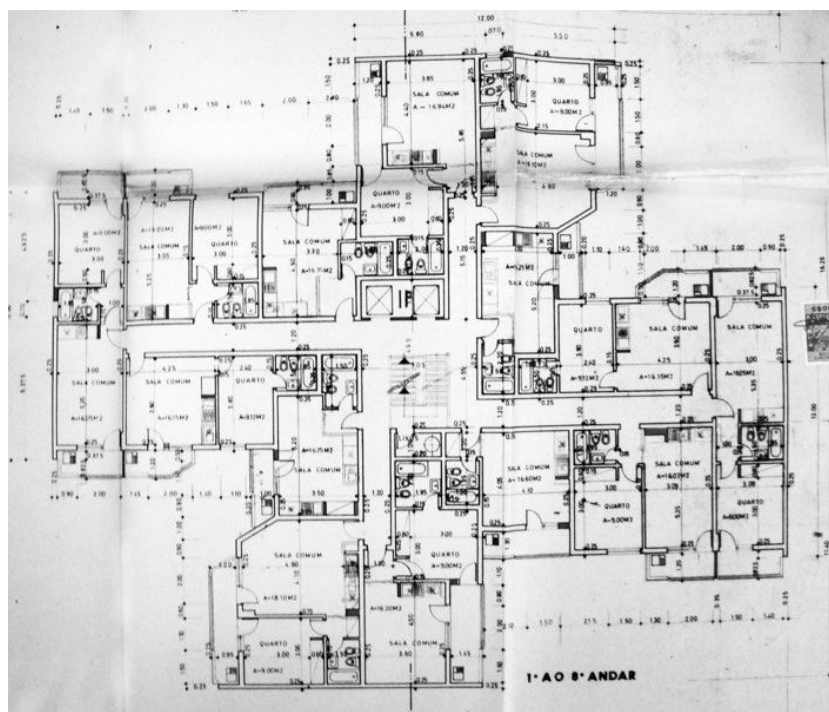


Figure 12. Type plan of cross buildings promoted by J. Pimenta, Architect Hélder Silva, 1971.

Final considerations

This text is not intended to present a critical reading of the urban and architectural options adopted by the various stakeholders designers throughout the construction process of urbanization of the territory of Reboleira Sul. It is rather a first survey that subsequently compared with other cases study, will be the subject of this critical view that will surely be useful to extract more fruitful conclusions.

Thus made a first survey of facts which will then be subject to analysis and framework regarding the responsibilities of both parties - developers, architects, builders and authority. This is also the first basis for understanding the transformations and the type of ownership that the suffering was built over these 40 years.

Future will be framed commercial strategy construction company J. Pimenta whom great responsibility can be assigned in the construction of urban-metropolitan territory of the LMA, as can be easily proved with the construction of Urbanização da Reboleira in Amadora, Espargal neighborhood in Paço de Arcos and the Pampilheira neighborhood in Cascais among others, as well as in the city of Porto. The commercial strategy and market logic of this company has been the subject of study (Nunes, 2011), as well as strong advertising campaign that was promoted at the time of construction in various media. This study also highlights the notoriety that its founder João Pimenta was acquired over the decades of 1960-80 in the social structure in Amadora.

We can conclude with a journalistic piece "*Reboleira: the landscaped gardens to the monumental disappointment*", which illustrates the transformation that occurred in this area over 20 years - a garden city to a "forest of reinforced concrete"

"The city Reboleira it really is more concrete, dehumanized buildings where many, many floors are honeycombs of human hives where people are stowed coo cheap merchandise, uninteresting. The law of money, and fast income overlap with the values of the man-man. Instead of the promised gardens and socializing, sites where mercandaja love easy. Because Reboleira (...) has become a true "cashbah" where every corner and through the night it sells and buys love and no requests for debasing vices. In easy but well enroupada of sound "nightclubs" where prostitution is practiced widely and suggested coverage. Given this (and more) ... We can only ask - which houses the original draft Reboleira, "Garden City"? How could so radically change". (O Século, January 28, 1975)

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Tenure of urban land: structure, form and transformation of the original urban space of the city of Ribeirão Preto - Sp, Brazil

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Abstract. *The purpose of this paper is to discuss the urban morphological aspects of cities governed by the juridical regime of the emphyteusis, recurrent situation in northeastern São Paulo state - Brazil, with special attention to the city of Ribeirão Preto. The land concession to the Catholic Church was recurrent in Brazil during the colonial and imperial periods for the foundation of cities. As these lands were destined to the formation of patrimonial goods of a devotion saint of the residents, they couldn't be commercialized. The tenure reveals a relation in which there is an owner - landlord - who has the direct control of the urban land, granting another - leaseholder - the useful domain of the land, giving the latter the right to use the land, the obligation of an annual tax payment and a compromise of giving a percentage of the property sale. In 1845 some farmers donated a tract of land for the formation of the land assets of the saint São Sebastião, where is now the city of Ribeirão Preto. This conjuncture defined the structure, the form and the transformations of the original urban space of the city.*

Key Words: tenure or emphyteusis, urban land, Catholic Church, Ribeirão Preto-SP, morphological urban aspects

Introduction

The urban space is formed by a social diversity, so every society seeks to reproduce forms, whether permanent or not, on the surface. This means that these forms obey a given sociopolitical order of the group that builds them, functionally responding to a present sociability which also regulates the use of urban space and the resources contained therein, thus defining their own modes of appropriation of the city (Moraes, 2005). Hence, we can consider the full character of a social process in the urban morphology studies.

When our eyes are directed to Brazil, attempting to list the aspects that outlined the urban space of Brazilian cities, the study of urban morphology, according to this methodology, must consider our social, cultural, geographical and historical contexts.

According to Vasconcelos (2009) in the examination of Brazilian cities, their morphology and their aspects, it is possible to identify "modeling agents". These agents have not been jointly present in the urban setting, but when we lean in each case we identify, if not the presence of the majority, at least one, common for all cities. There were five "modeling agents": first, the State, especially in its upper level, ie, the Portuguese Crown, which played a key role in the implantation of the first towns and cities in Brazil. The Portuguese Crown sought to manage its colony from orders sent directly by the Metropolis; second, the Church, which had a role as decisive as the State's one in the structure of the Brazilian cities. The Church in Brazil had been conditioned by the patronage system, in an agreement between the Vatican and the Portuguese Crown. The Church counted on the presence of the Secular Clergy, which was the high hierarchy of the Church (bishops, archbishops, ecclesiastical courts and seminars) and Regular Clergy, formed by religious, male and female orders; third, the Lay Orders, actually Catholic institutions, but relatively independent of the official Church, formed by volunteers of lay men and women; the fourth "agent" is about the economic agents, these agents could be identified as external economic agents, who were landowners, and domestic economic agents, such as traders and financiers, slave traders and craftsmen; finally, the last agent, The Population and Social

Movements, composed by small employees, especially staff, master of letters, surgeons, along with the poor and freed, the slaves (until the year 1888 when slavery was abolished in Brazil) and social movements, the latter extremely important to national history due to the various uprisings, rebellions articulated by dissident social groups.

Urban morphology: some considerations

In recent studies, the understanding of urban morphology presents diverse perspectives of methodological approach; from assessing the physical form of urban spaces, listing as fundamental elements, streets, lots and buildings (Oliveira, 2013); to description and prescription of urban form according to a multidimensional, systematic, exploratory and quantitative environment (Gil, Beirão and Duarte, 2012). Studies of multidisciplinary discussions about urban morphology have made social sciences and humanities studies relevant in the construction of urban space (Whitehand, 2012); in some studies, as developed by Kim (2012) on the urban form of South Korea, we observed a particular attention to the formal aspects of cities and towns having as parameters of analysis the history, as well as the influence of European morphology in the country. A range of different urban forms are examined through a cultural perspective which the construction of the form is the result of theory and practice, describing representations of particular culture and historical conditions (Ehlers, 2011).

These various methodological approaches to urban morphology point us to the fact that the analysis and understanding are configured according to the interdisciplinary relations of science, with different views, as well as specific, economic, cultural and social conditions of a country, a city. In this sense, our work seeks, as well as Ehlers, to discuss the structure, shape and the transformation of the urban space of the city according to social and political articulations in the representation of the physical urban space.

The urban morphological study for us is a cumulative process, every temporal dimension identifies a result and a possibility, a continuous movement. So we pondered that, somehow, every urban formation is also a social formation because the latter necessarily spatializes itself (Moraes, 2005).

The morphological elements are directly related to urban size and can be identified by the form; the analysis of this form requires movement and pathways. Lamas (2010) considers these elements as: the soil, the buildings, the lot (land parcel), the block, the architecture, the layout (the street), the square, among others, "defining and explaining the urban landscape and its structure." (p. 37).

The formation of the religious heritage of Ribeirão Preto

The religious heritage emerged in Brazil in a discrete way, it constituted a tract of land that allowed the construction of the chapel and also the external space recommended by the First Constitutions of the Archbishop of Bahia for the formation of houses to shelter the small *sesmeiros*, giving rise to what would be the future urban core. "On one hand, it occupied a predetermined ground and planted the desired temple; on the other hand, it propitiated the agglomeration of houses and businesses." (Marx, 1991, p. 41).

The territorial plots tended to be large in the progress of the colonization process of Brazil, which hindered the full use of these plots because of high costs and charges. Many of the settlers ended up not having access to land. Those who had the resources could acquire lands, so this large contingent formed by the poorer class ended up forming "clusters" of large landowners.

In the formation of the city of Ribeirão Preto, the researcher Lages (1996, p. 216-217) reports that the religious heritage of the city was dedicated to the Holy Saint São Sebastião and

that the strip of land was donated by many owners over the years 1852, 1853 and 1856 (Table 1).

Table 1. List of donors of land for the constitution of the heritage of São Sebastião of Ribeirão Preto-SP

Donors	Farm	Extension	Date
João Alves da Silva and Ana Delfina Bezerra	Retiro	30 acres	19 Dec, 1952
Severiano João da Silva and Gertrudes Maria Teodora	Retiro	12 acres	16 Mar, 1853
José Borges da Costa and Maria Felizardo	Retiro	9 acres	20 Mar, 1853
Inácio Bruno da Costa and Maria Izidora de Jesus	Retiro	9 acres	19 Apr, 1853
José Borges da Costa and Maria Felizarda	Retiro	12 acres	20 Mar, 1853
José Alves da Silva and Pulcina Maria de Jesus	Barra do Retiro	2 acres	1856

The tracts of land were ceded by one or more landowners so that these disadvantaged workers could settle there. However, the granting of this strip of land did not happen directly to them, the benefited part was always a Catholic saint of devotion, being up to the Church the administrative care of this heritage (Abreu, 2006). In the case of Ribeirão Preto it was possible to identify the boundaries of the religious heritage of the city through the information about the blocks properly listed together with the Archdiocese of Ribeirão Preto and the 1st and 2nd Notary Real Estate Registry (Figure 1).

The management of this heritage was under the care of the Factory of the Church, which constituted an entity formed by the religious and the good men of the town who watched over the goods of the parish, disposing of land donated in urban dates, ceded under the jurisprudence of the institute of long lease or tenure to those interested in residing in the heritage lands (Ghirardello, 2010).

Once constituted the patrimony of the Holy devotion, local people gathered to build the first building, the chapel. This could not be built everywhere, according to the *First Constitutions of the Archbishop of Bahia*, it should be built on a "high and decent place, free from humidity, private homes, and other walls in a distance in which the processions could walk by without impediments (...)." (Vide, 1853, p. 252, our translation). At this time the religious building and the urban status were defined as a chapel.

With the increase in population, the inhabitants of the chapel could ask the Ecclesiastical and Civil Institutions for the elevation of its urban condition to Parish. The elevation from a Chapel to a Parish status would take into account criteria of demographic and economic order, but the political interests ended up prevailing (Derntl 2013).

Feeling strong enough, the Parish could ask the Civil and Religious Powers for the promotion of its category, achieving the status of village, which meant "finally its political autonomy, the status of a municipality." (Marx, 1991, p. 62). In this condition, it was up to the Village the definition of its term, a territorial limit that could contain chapels, parishes and neighborhoods and corresponded to the territory controlled by the city council. It would also be up to the Village the definition of its park, that was referred to as a smaller geographical area, intended to the division into plots willing to integrate the assets of the city council. "This could divide them into "grounds" (lots) and grant them, upon payment of annual pension, to the residents who asked for them to build their homes." (Fonseca, 2011, p. 30).

To the religious heritage, "property" land of the Saint and managed by the Church, was superimposed a new demarcation, the park, public land. A conflict, however, was established between the civil and religious power about land ownership, a situation that was resolved overlapping the civil power to religious power in most Brazilian cities, but in many other the conflict remains until the present day, as it happens in Ribeirão Preto.

Thus, in the composition of the Brazilian urban landscape, religious buildings outlined the structure and perceived the form.

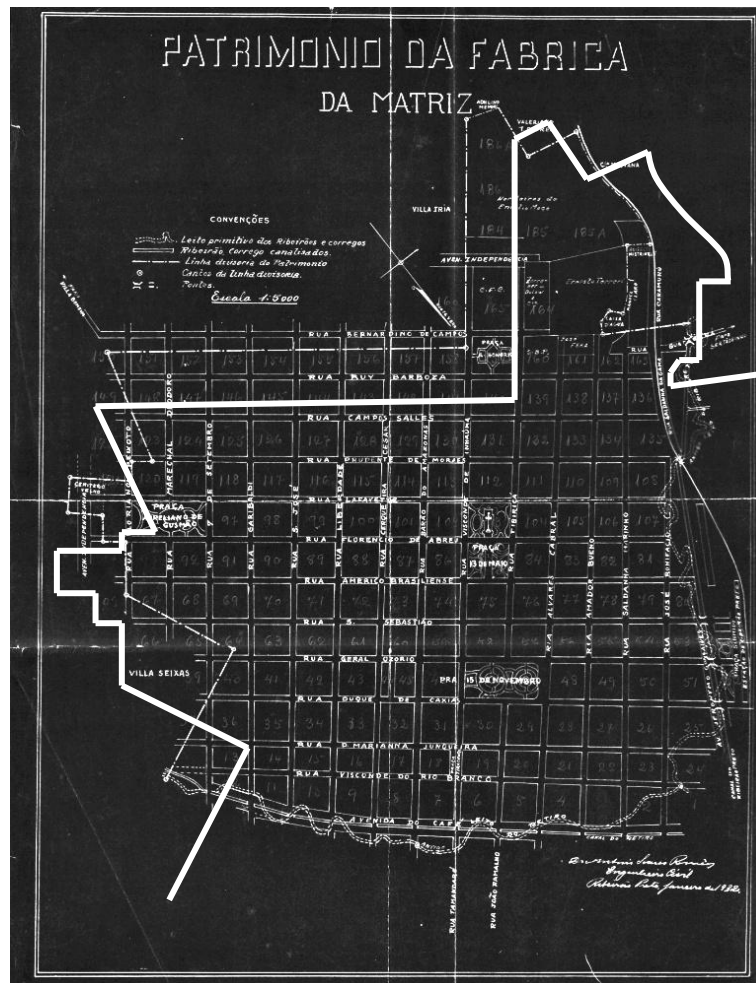


Figure 1. Heritage Factory of the Mother Church of São Sebastião do Ribeirão Preto, 1932. We highlight the limits of the patrimonial lands in the urban space where the city was originated and it is possible to observe the blocks slightly listed (Public Archives and History of Ribeirão Preto).

The presence, poise, refinement and especially the privileged position in which were placed the religious buildings made them ordering agents in the urban space of small and large agglomerations (Marx, 1980).

What is observed is a result of the pragmatism and constructive need that initially demanded simplifying procedures, traces and architecture, however, these principles can be considered as a condition for innovation, transformation of urban space (Teixeira, 2011).

The Institute of Long Lease

The Institute of tenure or long lease of land is a legal instrument formulated in ancient Greece later assimilated into the Roman Empire in order to legitimize the use and retention of workers on the ground. Portugal, during the Middle Age, included this instrument in its set of laws: the first was the Afonsina Ordinances (1500-1514), then the institute was again included in the Manuelina Ordinances (1514-1603) and finally in the Filipina Ordinances (1603-1916), the latter prevailed in Brazilian lands until the year 1916 when it was enacted the first Civil Code which recognized the right of Long Lease. This code remained until 2002, when a new Civil Code was formulated, but little changed about tenure. For this paper, we will take as a source of

analysis the Civil Code of 1916, because it recognizes tenure as a right and because it remained until the beginning of the XXI century. The long lease or tenure is a way to break up the property by a perpetual contract, that is, its holder gives others the powers of use, enjoyment and disposition, only transferring them to third parties with his approval.

The long lease can only occur in uncultivated land or in lands intended for building as the article 680 of the Civil Code points out. One can't therefore establish long lease on the mobile nature goods, or on buildings already constructed or plots already colonized. The long lease's economic purpose is to encourage the use of uncultivated or unbuilt lands.

The institute of tenure or long lease is a territorial alienation contract which divides the ownership of a property into two types of domain: the direct domain (imminent) and indirect domain (useful). This means that there are necessarily two people: the direct landlord who owns the property, and the copyholder that acquires real rights. The first one is the holder of the domain, while the second one has the possession, use and disposal, although subject to certain limitations for the benefit of direct landlord (Monteiro, 1953).

According to Amorim (1986), in Brazil the lands tenured by private personal have as landlord the Church and its religious orders and religious institutions established by them, there is still the imperial family (urban land in the city of Petrópolis-RJ) and some hundreds of individuals in the following percentage: Church, 60% of the tenured lands; 30% are public lands; 3% refers to the former royal family, and the remaining 7% belongs to private individuals.

It is peculiar to the long lease the payment of an annual pension. The value of the pension is a small, symbolic amount and in many cities this tribute was abolished, unlike *Laudêmio*.

The *Laudêmio* is a compensation that has to be paid directly to the landlord for not having exercised the right of purchase option. The obligation to pay the *Laudêmio* is the "seller's" and not the "buyer's". It is important to clarify that in the buying and selling process what is being negotiated is the right of using the land and not the ownership of it.

In Ribeirão Preto, when a resident of heritage lands puts a property on "sale", he will transfer to the new owner only the right to use, because the Church has the ownership of the land. The *Laudêmio* is prepaid, the deed of sale is not tilled and the letter of auction is not issued without having solved the mentioned tribute. The value of *Laudêmio* is 2.5% of the total value.

Ribeirão Preto-SP and its morphological conditions

During the sixteenth, seventeenth, eighteenth and nineteenth centuries, occupying unoccupied and uncultivated lands became a constant attitude among those who wanted to settle, it could be considered, according to Lima (1990) as a "legitimate way of acquiring domain at first, and after in replacing our distorted system of land grants, *sesmarias*" (p. 47). A good escape for these men who had no titles was the foundation of a chapel with a holy of devotion. The grants of land intended to the Church for the establishment of a religious heritage were a way of regularizing the possession of the land.

Under such conjuncture, Lages (1996) and Garcia (2013) agree with the view that the donation of lands to integrate the heritage of São Sebastião do Ribeirão Preto, holy devotion of the locals, was beyond the religious content, that is, these residents had a strategy to legitimize and regularize the land possession.

According to Costa (1955), Lages (1996) and Garcia (2013), there were two attempts of donation to the formation of the heritage that failed, precisely because of the lack of documents proving the legitimacy of the land: the first one happened in 1845 and the second one happened in March 1852. It was only in July 1852 that Ribeirão Preto began to be constituted into the lands of the farms Retiro and Barra do Retiro (Table 1).

Once constituted the patrimony and granted the lands to the formation of the urban space of Ribeirão Preto in lands of São Sebastião, it was essential to nominate a vestryman, who would take care of the patrimonial lands and manage the parish goods. Costa (1955) points out the

figure of Manuel de Nazareth Azevedo, however, Manuel Fernandes do Nascimento, an important figure from the first donations, was the witness and signer of the donors who could not read and write.

According to Garcia (2013), from 1859 on, the responsibility of taking care of the territory, tracing the first streets and building a chapel in honor of the patron saint was entrusted to Manuel Fernandes do Nascimento, however, the researcher points out that there is no document that effectively proves the tracing and the division of lots of the urban territory were actually made by Manuel Fernandes do Nascimento.

Costa (1955), Laureano (1973) and Lages (1996) inform us that even before the final regularization of the third and final donation, the residents of the farm Retiro had built a temporary chapel. This small chapel was located in front of the current Rio Branco Palace, where today stands the City Hall.

The courtyard open to build this modest church comprised the block Viscount Inhaúma, General Osório, Cerqueira Cesar and Duque de Caxias; the chapel was located on the block comprised by the streets Barão do Amazonas, General Osório, Cerqueira Cesar and Duque de Caxias (Figure 2).

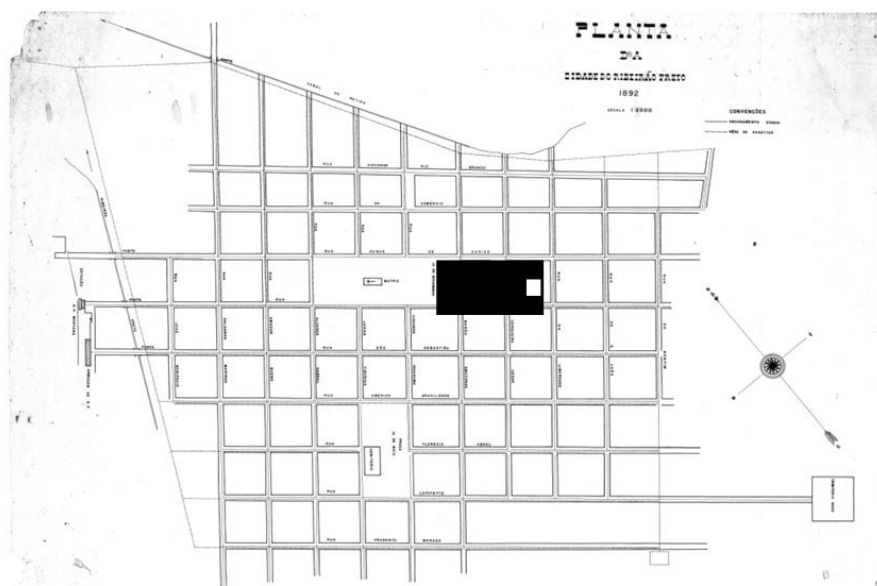


Figure 2: Our interpretation, referring to the block, highlighted by the black rectangle where the first chapel in Ribeirão Preto was located, in the center in white, on the City Plan credited to the Engineer Olímpio Antunes, made in 1892, as part of the studies for the implantation of sewage and supply networks (Public Archives and History of Ribeirão Preto).

According to Laureano (1973), it was around this chapel that "have emerged the first roads and the first buildings, still primitive, of a village." (P. 11). Lages (1996) adds that at this time (in 1857), according to an analysis of the packet of voters of the Historical Archives of the State of São Paulo, there were 23 voting residents, eligible voters according to their annual income; however, the number of residents was certainly much greater because at this time the slaves and women could not vote.

In August 1859 Manuel Fernandes forwarded a request to the Diocesan Bishop, D. Antônio José de Melo, to have a baptismal font in the chapel. Before the request and supported by the local population, the Bishop authorized the construction of it, but as long as it was in a "decent" place. In 1861 the resident Maria Felizarda made a large donation in favor of São Sebastião, this value, possibly instigated the vestryman in the building of a new Parish Church proper to progress of the growing region. In 1862 the permission to build a new chapel on the left side of

the stream of Palmeiras was granted by the Bishop of São Paulo, location that had guaranteed diocesan provision and patrimony legalized by the court.

Interests and disputes among residents of Barra do Retiro led the priest Manuel Euzébio de Araújo, under the guidance of the priest Jeremias José Nogueira, to demarcate a new location for the construction of the new church. The place was chosen in the patrimonial area of São Sebastião do Ribeirão Preto, where nowadays is located the 15 de Novembro Square. According Laureano (1973), while "buildings were erected, the population of the village gradually increased, to the point of having 3,000 or even 4000 inhabitants as others say" (p. 12) (Figure 3). The plots of land granted within the patrimony were placed under the institute of long lease in accordance with the descriptive request document from August 1882, from the City Council.

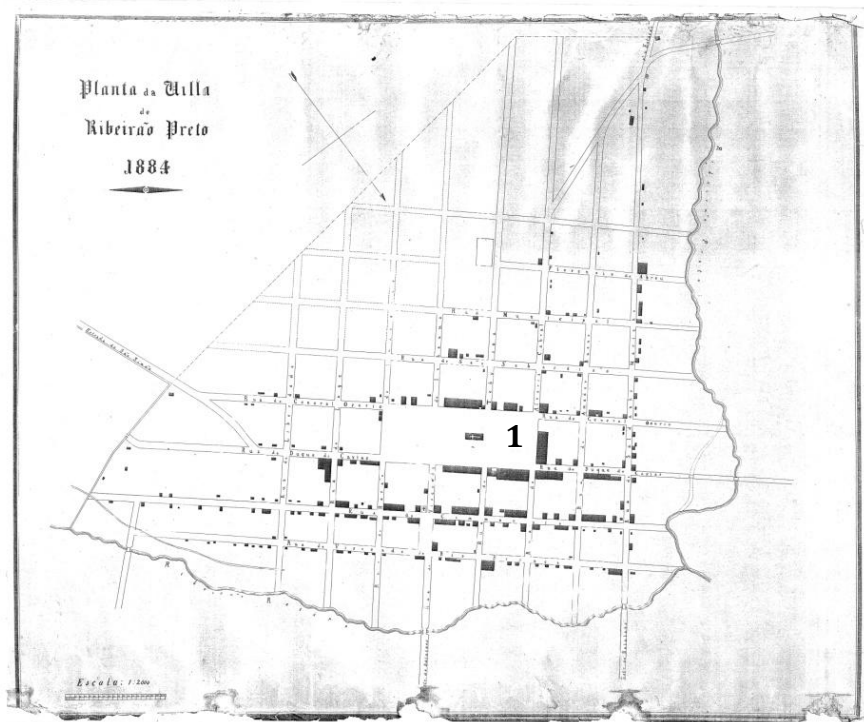


Figure 3. The village plan of Ribeirão Preto, 1884. The urban structure has as guiding point the Church (1) located in the center of a large and open space. Around the church and nearby, there are the first buildings on tenured plots (Public and Historical Archives of Ribeirão Preto).

The importance of the vestryman as a street architect, as an organizer of the orthogonal layout of the original urban core of Ribeirão Preto is of great importance. A proof of this was the murder of the vestryman Manuel Fernandes do Nascimento on February 10, 1867 by a wealthy merchant, Manuel Soares de Castilho, because the vestryman had determined, without his agreement, to open a street in his backyard.

The rapid growth of the town was considerable. On July 2, 1870, the President of the Province of São Paulo, Dr. Antônio Cândido da Rocha, elevated Ribeirão Preto to the category of Parish through the Provincial Law #51. On July 16, 1870, the Vicar of São Paulo, Monsignor Dr. Joaquim Manoel Gonçalves de Andrade, signed the decree creating the Parish of São Sebastião do Ribeirão Preto, confirming as the first vicar the priest Joseph Philidory Torres.

According to the Law #67 of April 12, 1871, it elevated the Parish to Village, whose term was dismembered from the town of São Simão His first Board was elected on February 22, 1874 and installed on June 4 of the same year.

In 1883, the tracks of the Railroad Company Mogiana reached the village of Ribeirão Preto, from this moment, the economic, social and cultural contexts have a big impact. The Church will no longer be defining the morphology of the urban space of the village, but the station of the Mogiana Company, built on the right side of the heritage lands, next to the stream of Ribeirão Preto, which is nowadays channeled because of the construction of the avenue Jerônimo Gonçalves.

In the transition of the 1870s to 1880s, Ribeirão Preto joined the "pioneer front" of coffee production, which had as a conditioning point the private property of the land. The land turned into capital and the social relations were now to be regulated by the commodity. "These relations do not end in the personal contact sphere anymore. The functioning of the market is the regulator of wealth and poverty." (Lages, 1996, p. 247).

The interest was not the proximity to the Church anymore, the proximity to the market and to the railway station were the ones that now played this role; it was the place of loading and unloading of goods, also the place of arrival and departure of people, a new meeting point, movement of ideas, ideals and culture. In the Books of Tenure in the Archdiocesan Curia of Ribeirão Preto, we can observe a continuous application process for tenured plots by the church next to the Mogiana rails (Figure 4).



Figure 4. Detail of the city plan of Ribeirão Preto organized by the office of the Força e Luz Company, 1911-1914. In this detail of the heritage we can identify the old square of the main church (1), current XV Novembro Square; at the top of the plan, the buildings of the Mogiana Company (2), and, in the nearby blocks, the occupation of the tenured lands; the left side at the top, the 13 de Maio Square, where now stands the Cathedral (3) (Public and Historical Archives Ribeirão Preto).

Ribeirão Preto had an important role in the national and international scene as a major producer of coffee, the major local landowners, the general population and the small group of religious people were organized in a Construction Committee to raise funds for the construction of a new main church at a new location from 1900 on. This Commission was formed by priest Joaquim Antônio de Siqueira, President, and Francisco Schmidt, one of the largest owners of lands producing coffee, as Vice President, and other important members of the society of Ribeirão Preto.

Furthering the studies of urban morphological structure of Ribeirão Preto to the setup of the tenured land, we observe, according to surveys conducted in the Books of Tenure along the Archdiocese of Ribeirão Preto, certain irregularity in its dimensions. According to the Book of Tenure from 1929, which transcribes the tenured lands since the 1870s approximately, we identified a wide range, for example, 17.20 meters of width by 23.70 meters of length; 7 meters of width by 23.00 meters of length; 11.00 meters of width by 23 meters of length; 9.80 meters of width by 27.00 meters of length; 20.50 meters of width by 44.10 meters of length; 11.40 meters of width by 24.45 meters of length, plus plots of land that ended up not having the geometric shape of a rectangle (Figure 5).

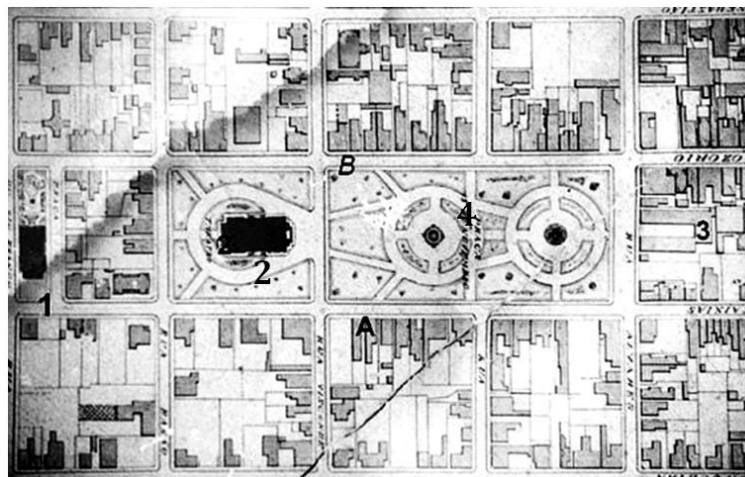


Figure 5: Detail of the City Plan of Ribeirão Preto, in the 1930s, where we highlight the ancient Main Church Square, where Praça XV de Novembro is located today and where you can see the settings of tenured plots of land and buildings thereon. Standing out the Rio Branco Palace (1), the Carlos Gomes Theatre (demolished) (2), the Central Hotel (demolished) (3), the location of the former Main Church (4), the Duque de Caxias street (A) and the General Osório street (B) (Public and Historical Archives of Ribeirão Preto).

The original land structure of the city has undergone changes in its form, a fact that was not restricted to drawing or factors, but the "modeling agents", who had in the social articulations their greatest contribution in the morphological constitution of Ribeirão Preto.

Conclusion

The urban morphology itself does not constitute a physical and structural analysis of the tracing and planning of a city, it also involves conflicts, joints and interests of a society or an individual.

The formation of the religious heritage in Brazil and the tenure of its lands were procedures that timidly but decisively participated in the setting of urban areas of many cities. The Institute of Long Lease which aimed to unite residents to work became a "modeling agent" of cities.

However, the tenure that should give rise to civil land during the development of the locality ended up just keeping itself in some cities, creating conflicts, agreements and especially defining the shape of urban space.

Ribeirão Preto is an example of this reminiscence, however, it is also the crystallization of a context that leads us to the colonization of Brazil, which involved the movement of people, interests, classes and religious orders in structuring and transformation of urban space. Decidedly the urban space is formed by a variety of social agents. The form follows a given sociopolitical order of the group that builds it, responding to a current sociability that regulates the use of the urban space and resources therein, thus defining the processes of appropriation and transformation of urban land.

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An introduction to the research on use pattern of lushan National Park based on its cultural landscape process: case study of Kuling Town

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Abstract. *“Cultural Landscape” originally appeared in the 19th century in Germany as an academic concept. As time went on, the comprehension of this concept had changed. When “Cultural Landscape” was introduced into the field of World Heritage. Because of the neglect of its academic tradition, it was defined as a sub-type of Cultural Heritage, adding confusion to identifying the heritage value and conservative management of cultural landscape. In 2013, UNESCO Beijing Office, Lushan Administration Bureau and World Heritage Research Centre of PKU established a project to improve the understanding and management of WHCL in China, presenting effective and promotable conservative utilization strategy in the case of Lushan, especially in Kuling town. The research group of PKU adopted Conzenian approach of urban morphology into Chinese practice. Research findings improved the understanding and management of Cultrual Lanscspe in China and indicated new issues of Conzenian approach to be discussed.*

Key Words: *World Heritage Cultural Landscape, Conzenian Approach of Urban Morphology, Lushan, Kuling*

Project Background

In 1996, Lushan was nominated on the World Heritage List as Cultural Landscape. Untill now there are 4 Cultural Landscapes in China on the World Heritage List including Lushan. However, there exists puzzles about the understanding and conservative management of cultural landscape. For this reason, UNESCO Beijing Office launched a research project on cultural landscape in 2010, taking Lushan as an example, for promoting a more thorough understanding of the cultural landscape listed as the World Heritage in China, as well as posing method and other suggestions for conserving and managing. The Lushan project in 2013 was taken as an advanced research under the framework of UNESCO Beijing Office, which conducted a research on use pattern of Lushan National Park based on its cultural landscape process. At the same time, an international Cultural Landscape Forum was held in Lushan, proposing references for the conservative management of World Heritage Cultural Landscape (WHCL) in China on the List and the Tentative List.

Participants and Purpose

Under the sponsorship of Mercedes-Benz (China) automobile sales co. LTD, UNESCO Beijing Office established a partnership with Lushan National Park Administration Bureau and invited the World Heritage Research Center of Peking University as academic adviser. Together with Ministry of Housing and Urban-rural Development P.R.C., national and international experts and scholars as well as the officer of heritage sites, following activities are conducted: 1.

Research on use pattern of Lushan National Park based on its cultural landscape process; 2. World Heritage Cultural Landscape forum; 3. Paper collection and Lushan Statement of Intent.

The purpose of the project is first of all to improve the understanding and management of WHCL in China, presenting effective and promotable conservative utilization strategy in the case of Lushan, especially in Kuling town, where the conflict of conservation and utilization is the most incisive. Secondly, the purpose of the project is to launch Cultural Landscape Forum, to create a platform for the discussion of Chinese WHCL conservation and management.

Process and Output

After signing the contract, the World Heritage Research Centre of Peking University immediately started preparation, such as gathering basic data, making investigation plan and etc. From March to September 2013, research group conducted multiple investigations in Lushan under the academic mentoring of Professor Jeremy Whitehand and Mrs. Susan Whitehand. The investigation covered every single building in Kuling town. Based on investigation data, historical records and maps, taking Conzenian approach as methodology, the research on use pattern of Lushan National Park based on its cultural landscape process, especially the case study of Kuling town, is completed.

From October 24th to 26th in 2013, the cultural landscape forum was held in Lushan as scheduled. Participants are project stakeholders, administration bureaus, representatives of WHCL, reporters and local communities. During the forum, World Heritage Research Center of Peking University made precise introduction to the research report. Professor Jeremy Whitehand from the University of Birmingham made a key note speech about Conzenian School of urban morphology and WHCL theories and practices. After discussions on WHCL heritage value, conservation and management strategies, consensus are achieved in the form of “Lushan Statement of Intent”.

Significance

First of all, about the theory and practice of urban morphology, this project explored the possibility of Conzenian Methodology to Chinese WHCL practices. Cultural landscape is physical space entity as the result of human activity intervening natural process, which can represent the evolution under the influence of both human and nature. From the perspective of town, this kind of physical spatial entity is shown in the form of a mosaic of the remains from different historical period. Town plan, building type and land utilization as three elements of urban form, are carriers of heritage value. Based on a large-scale map, a dynamic developmental perspective can help not only with precise spatial identification of heritage value carriers, but also overall historical interpretation of heritage value. Character regions based on 3 components of urban form complex system can reflect the space and time character of townscape with hierarchy, which can be helpful for administrative management and set conservation strategies from micro-scale to macro-scale.

Secondly, about World Heritage Cultural Landscape, this project mitigated the existing confusion in the field of world heritage. Cultural landscape as an academic concept has a long history, which can be traced back to the end of 19th century in Germany, when Schluter identified cultural landscape as the objective of geography and generated systematic methodology. However, during the successive spreading, the nature of this academic concept was changed. When “cultural landscape” was introduced into the field of world heritage, people had little knowledge of its academic background. Cultural landscape was defined as a sub-type of cultural heritage, adding confusion on the existing misunderstanding of this concept. A misinterpretation of cultural landscape as a type of heritage may lead to serious problems, such as misidentifying heritage values, choosing wrong methodology to conduct heritage practices, and blocking conservative management effect. In this project, the research group of PKU systematically traced the academic history of “cultural landscape”, reviewed UNESCO

documents of WHCL and sorted out a clear developmental route of cultural landscape from the academic origin to the heritage practices. By this way, the project somehow mitigated the existing confusion in the field of world heritage.

At last, this project is an exploration of the suitability of British urban morphology tradition to a different cultural background. To be specific, what may happen when Conzenian School met Chinese town. The reflection of research problems and achievements is helpful to World Heritage conservation and management. This research is also an important case study to promote the cross-cultural comparison of Conzenian School.

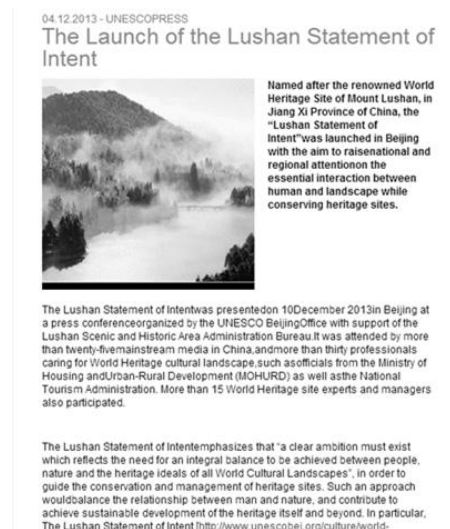


Figure 1. Lushan Statement of Intent, source: www.unesco.org.

Academic Research and Conclusion

This research, paying special attention to Kuling town, studied the use pattern of Lushan National Park based on its cultural landscape process. The goal of it is to discuss the following questions: 1. How to propose an efficient methodology to study World Heritage Cultural Landscape? 2. How to use the methodology to carry out a case study in a heritage site of World Heritage Cultural Landscape? 3. How to apply the methodology and its research result in the practice of conservation and management?

Research Methodology

The two main methodology of this research are cultural landscape process analysis and Conzenian approach of urban morphological analysis. Process analysis is the basic method and was applied to the analysis of Lushan as a whole, while the Conzenian approach, focusing more on the townscape, was applied to Kuling.

For more detailed method, documentation analysis, fieldwork, morphological analysis based on large-scale plans and statistic method were taken.

The Evolution of Lushan Cultural Landscape

Lushan is in the middle and lower reaches of Yangtze River, and near the confluence of Yangtze River and Poyang Lake. Meandering is the main feature of northern Lushan, which helped shape a beautiful ridge-valley landform. Southern and northwestern parts of Lushan have a series of bluff layers and a lot of peaks. The highest peak of Lushan, Han Yang Peak, is within

the southern part. There are some canyons between the mountains and more developmental terraces in outlying region. This is the natural base on which Lushan cultural landscape has been developing.

Overall, until the end of 19th century, Lushan had been developed naturally and in a low pace. At the very beginning, people only lived in the foothills or the plain down Lushan. When Buddhism and Taoism were spread to Lushan, people began to have more activities in the mountain and settled more towns. In Ming and Qing Dynasties, the population of Lushan grew quickly, while religion and Academic Culture declined. Later in the late Qing Dynasty, with the invasion of foreign countries, the worldly development in the mountain became more intensive and mainly focused around Kuling Town. And the trend remained today as well. After the Reform and Opening, tourism flourished and the ancient relics of Lushan had a chance to restore.

The cultural landscape process of Lushan features in: human activities stretching from the foot to the top of the mountain; the pattern of human activities changed from the scattered to centralized pattern; development activities being secularized and more intensive.

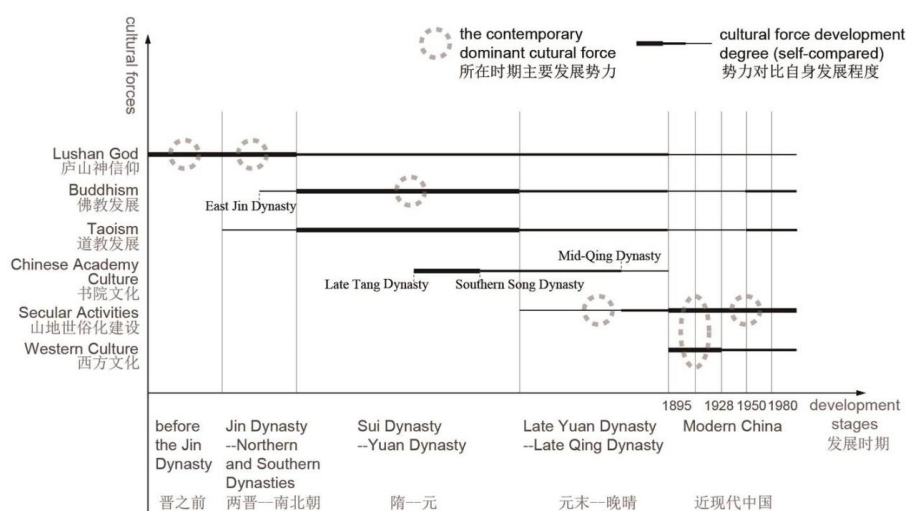


Figure 2. The cultural landscape evolution process of Lushan (influencing factor).

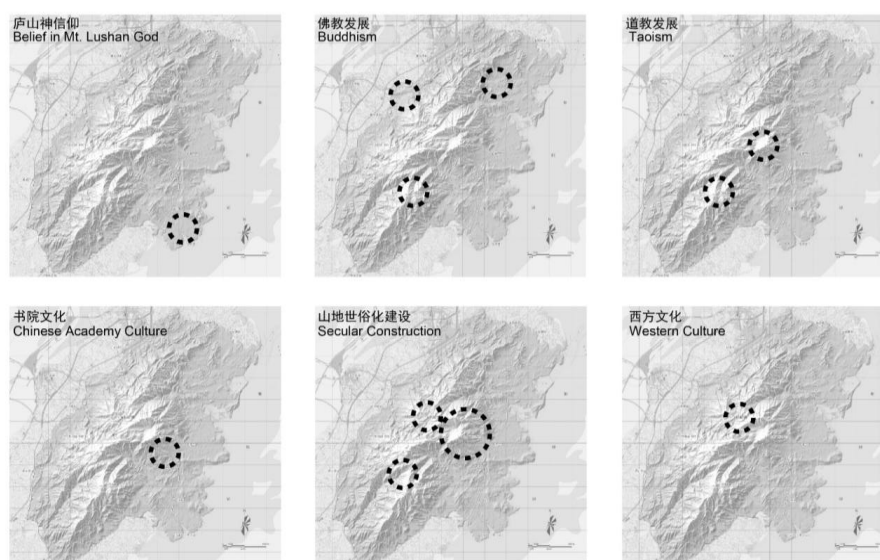


Figure 3. The cultural landscape evolution process of Lushan (location).

The Evolution and Value of Kuling Town Cultural Landscape

During the historical development of Kuling Town, there were varied cultural and political switches and socio-economic requirement, leading to different construction features, which were shown in space as particular morphological characteristics. According to the existing characteristics and historical development, morphological period of Kuling could be divided into five:

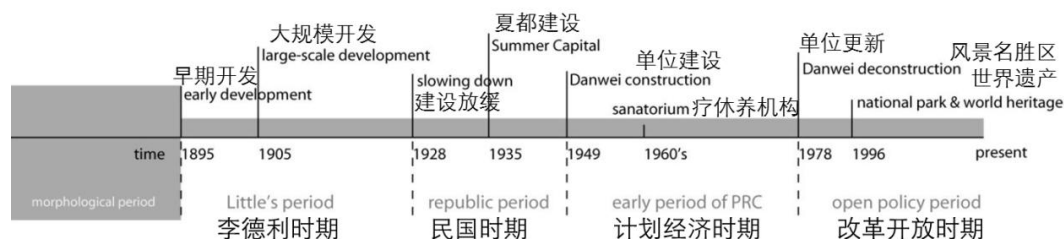


Figure 4. Morphological Period of Kuling.

Pre-urban Period (-1895)

Kuling Town, located in the north part of Lushan, involves the East Valley (Changch'ung Valley), West Valley (Dalin Ch'ung Valley) and the relatively narrow and long saddle between the two valleys. Before Edward Little's exploitation of Kuling, there existed some Buddhist and Taoist temples in this area, where secular developments were rare and only a few villages scattered around.

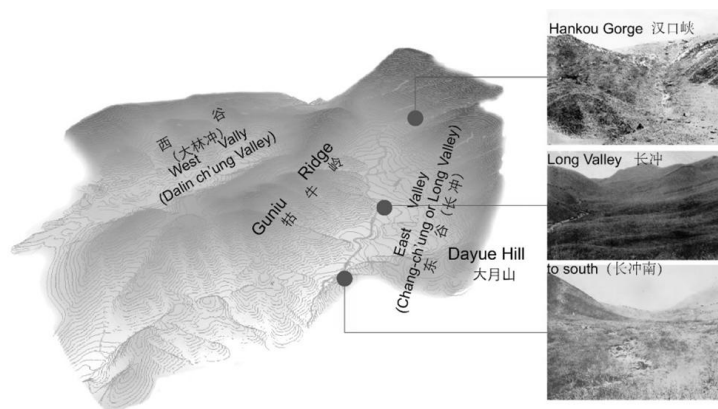


Figure 5. The natural landscape of Lushan.

Little's Period (1895-1928)

After the Second Opium War of 1858, Hankou including Kiukiang became a trading port and thereafter many foreigners came to the neighborhood. It is unbearable hot in the summer of Kiukiang, thus the foreigners were eager for a summer resort. In Dec. 31st, 1895, the Twelve Testation of Guniu Ridge (牯牛岭案十二条) were signed and thus the exploitation of Little in East Valley became legal. He divided the land into plots and sold them to foreigners of many countries to build villas. Yishenwa and Lulin area were also developed by other missionaries. In

1904, the local government rented another 900 mu land in Caodipo, Xiachong, Houzi Ridge and Dalinchong to Little, thus the size of summer resort was enlarged.

Along with the development of the town, the need for service people increased. Thus Yaowa, in the neighborhood of Kuling high street, became the settlement of these people.

In the beginning of Kuling's development, the first road to well link Kiukiang to Kuling via Lotus Cave and Jiandao Gorge was built. This was the first road to well link Kiukiang and Kuling. As for internal transportation, it was divided into rectangular plots with Changch'ung Valley as the core under the influence of topography. Little controlled the plots divided by the roads to about 3.7mu. One villa was built in the middle of a plot and facing the valley along the hill. They were linked to main roads through individual paths. Around the villa plants were acquired. In this period, the dominating building types were bungalow and detached house, both the popular type in temporary foreign countries. For instance, No.86 West River Road and No.29 Zhihong Road. The main construction of this period was for residence, while as the town developed, the service installation were also constructed and improved, such as the Linsayd Park located in the centre of the town as public open space, and Kuling Street as commercial street. There were also religious, official, education buildings as public building utilization.

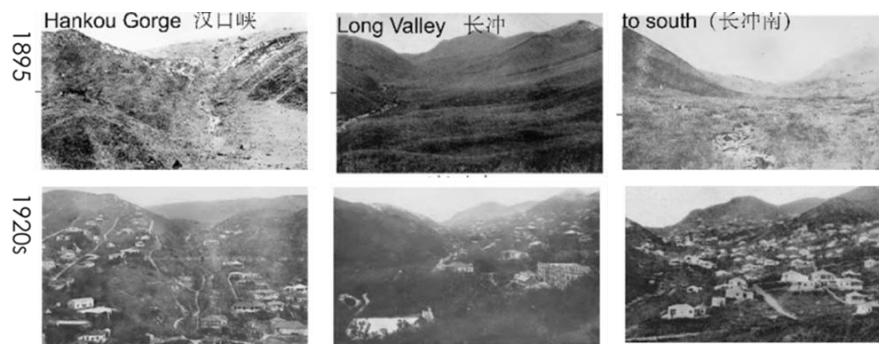


Figure 6. Morphological process of the East Valley during Edward Little's period, (source: Lushan Administration Bureau).

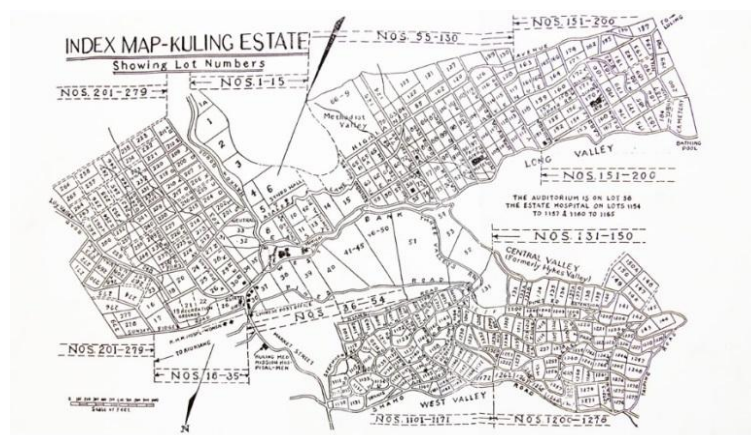


Figure 7. Plot distribution and number during Edward Little's period, (source: Lushan Administration Bureau).



Figure 8. Building type: Bungalow (Left) and Detached House (Right), (source: left-Luo Qi (2008), right-Luo Shixu (2005)).



Figure 9. High Street in Edward Little's period (Left) and modern time (Right), (source: Left-Lushan Administration Bureau, right-author).

Republic Period (1928-1949)

In 1928, the Nanjing Republic government established. Since 1930s, Lushan was regarded as Summer Capital. In this period, the residents in Kuling Town are mainly Chinese with a few foreigners in the west valley. The main transportation and travel path network was constructed. The former path to Kuling from Lotus cave via Jiandao gorge was gradually abandoned and the Lotus-Kuling new road was used instead. The main constructions of this period were residence and public buildings. Most of the newly-built architects, mainly in the west valley, covered relatively large area. The overall style remained as the former period. Kuling also constructed some public buildings, among which the Three Buildings, namely Lushan Library, Lushan Mansion and Auditorium, are of significance. Three Buildings reflected the turn of building idea from following the west to maintaining both European characteristics and traditional Chinese style. In this period, the land utilization pattern was basically similar to that of the former period. municipal installations such as waterworks and power plant were improved and in residential areas as well as commercial areas repletion process happened in the morphological frame of the former period. Besides, Shengli Village and Chaoyang Village began to prosper.

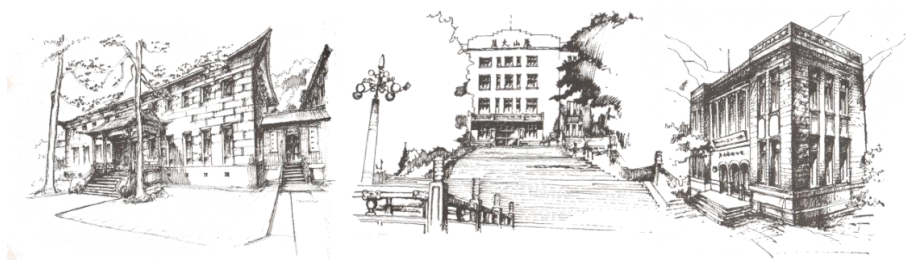


Figure 10 The Three Buildings: Lushan Library (left), Lushan Mansion (middle), Auditorium (right), (source: Luo Qi (2008). p154\157\162).

Early Period of P.R.C (1949-1978)

In May 1949, Lushan was liberated and Lushan management office set up. Three important meeting of Chinese Communist Party Central Committee were held here, during this period, a lot of service people came to Kuling and some new sanatoriums and hotels were newly built. In the aspect of external transportation, the north road began to work in 1953 and in the same year, Lushan motor station was constructed. In 1971, the south road began to work. In the aspect of macro structure of the town, the northern part of the Kuling developed rapidly. Under the socialist system, the ownership of land and the distribution pattern changed dramatically, which contributed to the change of the townscape characteristic of Kuling Town. Firstly, the land in the town were owned by the government, thus for townscape, the significance of plot boundary decreased while that of the individual buildings increased in the distribution process. Secondly, with the Danwei system introduced, the organization pattern of urban space changed dramatically, as well as the function and ownership of buildings.

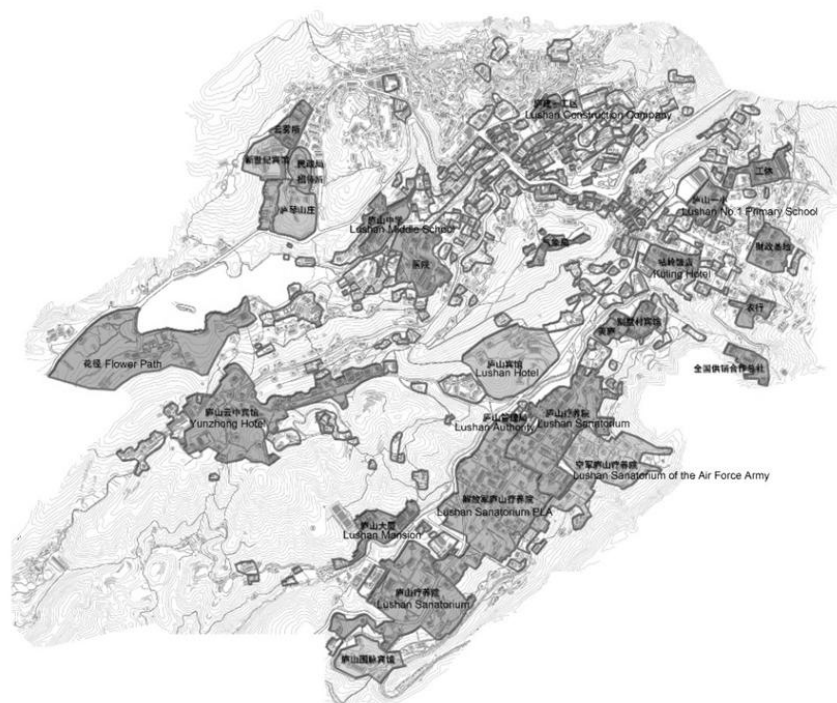


Figure 11. Danwei in Lushan, 2013.

Open Policy Period (1978-)

In 1996, Lushan was listed in World Hseritage List as Cultural Landscape. Since the Reform and Opening-up, the rapid development of economy stimulated the travel industry of Lushan. Some sanatorium made some change and served also travelers instead of only the members and guests of the Danwei and other tourism installations were also built. Newly-built buildings of this period tried to conform to the existing buildings through learning from the building language of them, thus formed a mixed style. Kuling Town became the town in a national park, thus the function of it changed and consequently the land utilization. The alteration to tourism service function of many other-function buildings is remarkable. The numble of hotels, stores and restaurants increased rapidly.

The Heritage Value of Kuling Town

Based on the morphological analysis of Kuling Town, heritage value of three levels could be identified as follows: Firstly, the site selection and the process of construction of Kuling Town reflected the organic integration of human activities with natural environment, which formed characteristic cultural landscape. Secondly, in the evolution process of Kuling Town, the East Valley and West Valley were closely related as organic parts of the whole townscape, which together illustrated its value of cultural landscape. Thirdly, the present amounts of micro-scale physical remains, such as street pattern, boundary marker, and outer wall, etc., embody the cultural landscape, which are of conservation value.

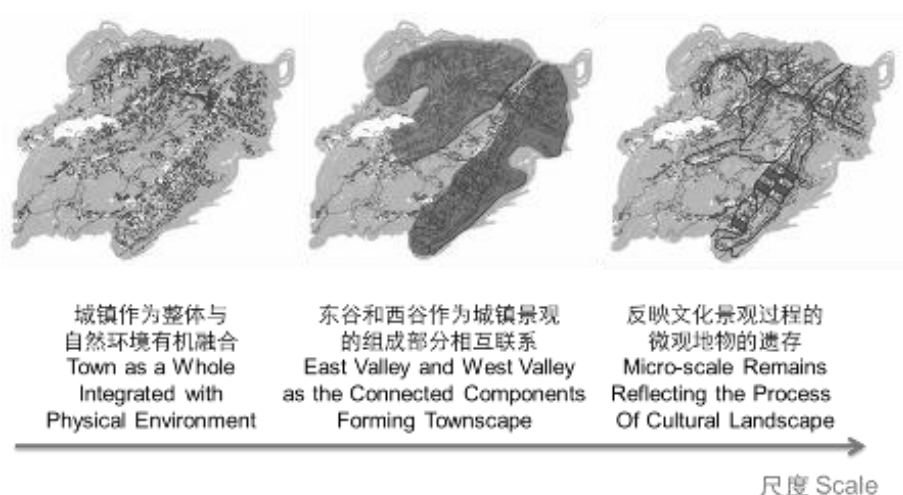


Figure 12. Multi-level Reflection of Heritage Value.

The Strategy Analysis and Intensity Threshold Measurement of Kuling Town

The current cultural landscape of Lushan thus became the accumulating record of its development process. The multiple factors contributed to the differentiations of cultural landscape in different regions of Lushan. The conservation and management should be based on the differentiations and apply different character regions. Based on the principle of integrity to represent the cultural landscape process, the principle of independence to delineate the geographical spatial unit and the principle of operability to implement conservation and management, a two-hierarchy conservation and management units are demarcated, namely 5 rank-1 units and 20 rank-2 units.

Next, the measurement of intensity threshold was carried out to evaluate the development intensity of Kuling so as to provide quantitative basis for the strategy of conservation and management. Firstly, units are divided based on the property rights of the buildings and the landscape around. The current situation of each unit is assessed as U_0 , then the threshold, also marked as U_{max} , is figured out according to the current situation and future expectation. The Differential Intensity (DI), is the result of U_{max} minus U_0 , which measures the space between current and expectant intensity, could have three possible values. Negative value means a larger current intensity than the expectation, which would possibly need fixation; Positive value means improvement could still be made; zero value, which means an accordance between current situation and future expectation, maintenance and preservation in small scale is enough for these area. Development intensity of a unit is decided mainly by natural condition and activity, we built an evaluation index system consists of 3 first-level and 11 second-level indexes, combining with AHP Approach to evaluate the development intensity and intensity threshold of each unit.

Finally, according to the threshold analysis results of each unit, detailed and appropriate strategies of conservation and management were proposed.

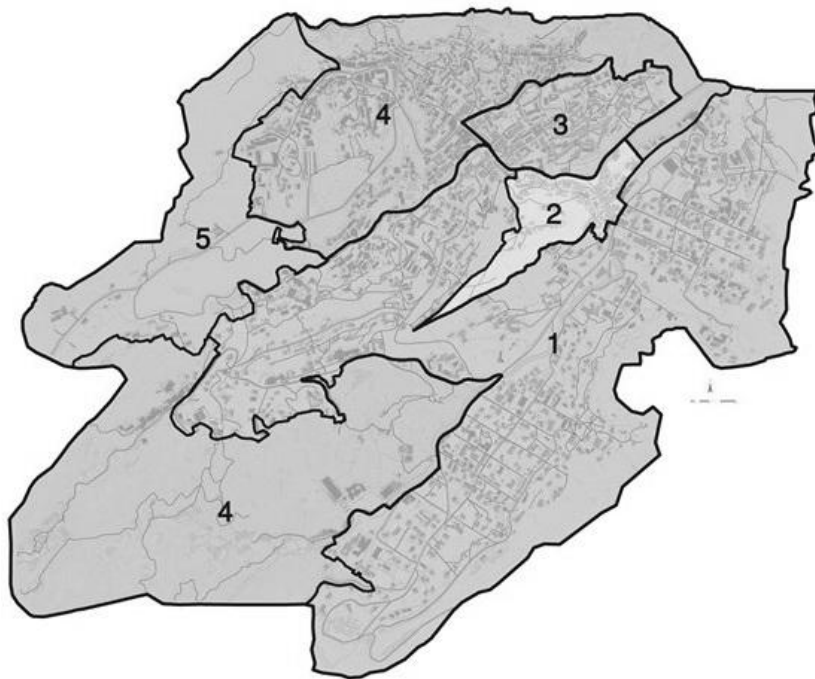


Figure 13, Conservation and Management Units (First-Hierarchy)
1.Core Villa Area of Little's Development; 2.High Street and its Adjacent Area;
3.Early Settlement of Service People (Yaowa); 4.Fringe Belt Area; 5.Scenic Area.

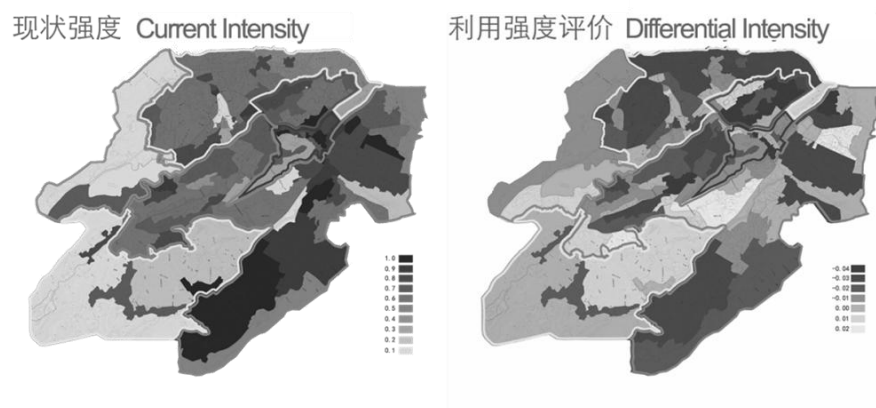


Figure 14. Intensity analysis of the Conservation and Management Units.

Discussion

A Chinese-specific Way of Space Division and Organization

Under the socialist system, the ownership of land and the distribution pattern were changed dramatically, which contributed to the change of the townscape characteristic of Kuling Town.

Firstly, the land in the town were nationalized, the significance in the distribution process of plot boundary decreased while that of the individual buildings increased. Secondly, with the Danwei system introduced, the organization pattern of urban space changed dramatically, as well as the function and ownership of buildings. Danwei, combining the function of production and life, integrated the work, residence, commerce, education and recreation functions in a compact space, forming a relatively independent complex.

Danwei has several space forms. Firstly, the space integrity of Danwei compound is strong, with wall as its ownership boundary, and inside the wall, the function of work, residence, commerce and education is orderly organized. The typical Danwei compound was often designed by the Soviet experts with its layout and architectural design carried out on the spare land. Secondly, the space of non-compound Danwei is less integrated, generally without wall and the organization of all kinds of function depends on the specific condition of the site. This situation occurs in the case of spatial redistribution of existing substances, the government took building as its distribution unit and allocated it based on the principle of living adjacent to the workplace. The spatial distribution and organization of Kuling Town belonged mostly to the latter situation, besides, there were expansion and construction of residential buildings in the vicinity of the existing building. Some large Danwei which has higher demand for space got buildings in more than one site, so that the space integrity was further weakened.

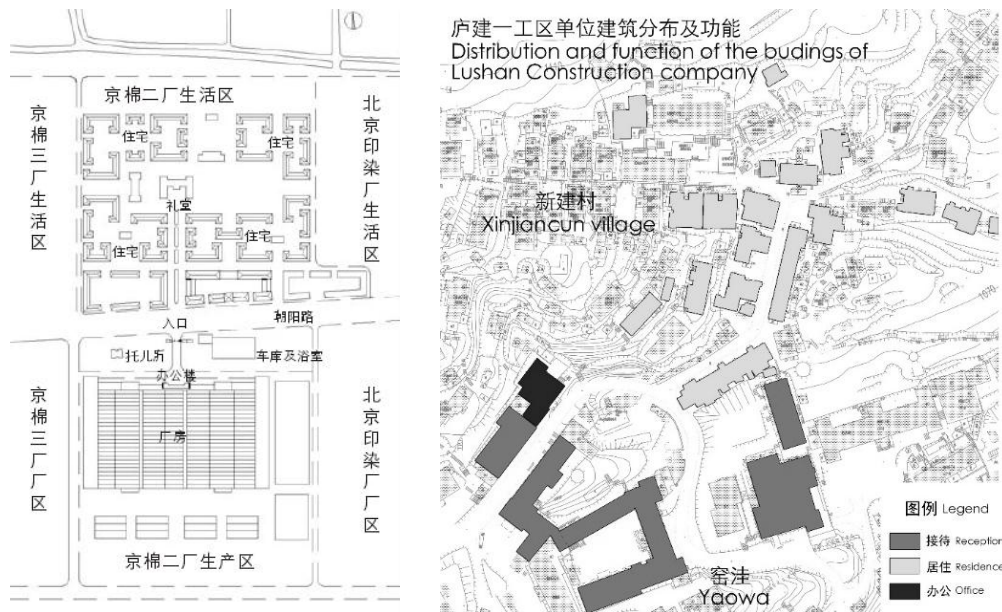


Figure 15. Plan of Beijing No.2 Textile Factory (Left), Distribution and function of the buildings of Lushan Construction Company (Right), (source: Left-Zhang Yan (2009), Right- drawn by author).

The Decline of Importance of Plot Boundary to Urban Landscape

According to the experience of England, town plan, including street pattern, plot pattern and block plans, is dominant among the three basic elements of townscape and the most resistant to change. However, it is really different in Kuling, where the importance of plot pattern decreased. When revolutionary change happened and the ownership system changed totally, the plot boundary which contains relatively less capital lost its dominance over the following evolution of townscape.

This was exemplified by No.8 middle 6th road and No.33 west river road. These two villas, belonging relatively to the Air Sanatorium and Lushan Sanatorium, were very close to the road, which went through the original plot. These two villas were both in No.109 plot in Little's

period. It was subdivided into 109B, where No.33 west river road locates, and 109C, where No.8 middle 6th road locates. Nowadays, the door plate, the ownership as well as the physical remaining of the two villas show little relationship to the original plot.



Figure 16. Newly constructed road dividing original plot.

The Deficiency of Research Material

The research method of Conzenian School of urban morphology has a high demand of richness, historicity and continuity of research materials, such as large scale map, historical map and local chronicles. And the microscopic scale and accuracy of its methodology lead to the higher accuracy of these materials. However, China has been in war in a long period of history, especially when the western society was going through rapid scientific and technological development, China was concentrating on the post-war recovery. As a result, Chinese have failed to map and collect the historical data, and the scientificity and accuracy of the materials was restricted, which had a negative impact for the popularization of Conzenian methodology in China.

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From urban sprawl to a compact city policy: the primacy of process over form

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Abstract. *Cities represent a challenging demand for contemporary society. In a time when the majority of the world population is already living in cities, urban areas are showing an exponential enlargement, having heavy impacts on social, economic and environmental sustainability and a tremendous footprint on the globe. The canonical response to the problems of extensive urbanization has been the return to a compact city model, as a less predatory and more sustainable type of urban form. Nonetheless, the subject is controversial and has generated misconceptions related with the compact city concept itself, with the advantages and disadvantages of urban concentration and with the misunderstanding of urban density. After the compact city has been presented as a paradoxical fallacy, new perspectives are now emerging opening the debate to a wider point of view, less related with the city shape itself and more oriented to the process of planning, managing and governing the urban development; i.e. to a compact city policy rather than a compact city model. This article aims at exploring the contemporary debate between urban sprawl and the compact city, especially addressing the question of whether urban form is crucial in pursuit of urban sustainability objectives.*

Key Words: Compact city, urban sprawl, urbanization, urban policy, sustainability

Introduction

It is of general consensus that last decades have brought deep transformations into the spatial organization of cities. Beyond the changes in demographics and population density, critical changes have happened in the form of cities, namely throughout phenomena such as the urban sprawl - low density settlement patterns, leapfrog unplanned developments, spatial segregated land uses, large outward incremental expansion, widespread commercial strips, disseminate land ownership and land uses governance (Angel *et al*, 2005; EEA, 2006; Font, 2007).

Urban sprawl is therefore considered a challenging demand for national urban policies and territorial development agents due to its high impacts on energy inputs, land consumption and soil sealing. This is especially critical in Europe where cities have traditionally been much more compact (EEA, 2006).

Envisaging progress towards a sustainable urban development, doctrinal thinking and literature on the benefits of a compact urban development for a sustainable urban form came up, becoming a dominant doctrine on urban planning theory after the release of the Brundtland Report (1987) which consigned the emergence of the agenda of sustainability. The compact city has become one of the most discussed concepts in contemporary urban policies and much attention has been put into the relationship between urban form and sustainability (Elkin *et al*, 1991; Breheny, 1992; Jenks *et al*, 1996; Rogers, 1999; OECD, 2012; UNHabitat, 2012).

Nonetheless, several criticisms came forward arguing against the abusive position that considers the compact city as a sort of panacea for the ills and problems of extensive urban developments (Neuman, 2005; Westerink *et al*, 2012; Hofstad, 2012; Echenique *et al*, 2012).

The paper aims at discussing the accuracy and timeliness of compact city policies, reviewing the rationale behind the compact city and exploring the relationship between urban form, urban processes and urban governance.

The paper is divided in two different parts. The first one is dedicated to the discussion of the compact city concept striving for an understanding of its trade-offs with both urban sprawl and

sustainability. The paper explores the origins of the concept, the controversies stemming from the relationship between urban compactness and sustainability and the rising up of processual approaches over shape-oriented strategies. The second part is addressed to compact city policies. A survey on standard compact city policy tools and approaches is carried out, as well as on the emerging trends that underpin the need for an integrated policy approach. Discussion includes a review on the increasing importance of urban governance's delivers, as well as a reflection on the role of urban form on the scope of a comprehensive compact city policy.

Compact city: does urban form really matter?

The rise of the compact city concept

Compact urban settlements have long since taken as an immediate response against the problem of urban sprawl. Sprawl has been pointed out as one of the most decisive menaces to sustainable development, broadly recognized as having a huge carbon footprint and a high social, economic and territorial impact. The return to a compact city model arose and grew up as a natural reaction, running counter to urban sprawl.

The compact city concept was first coined by George Dantzig and Thomas Saaty in 1973. Focused on putting forward a more efficient city model on the use of space and resources, the proposal presents a visionary circular city for 250.000 people composed by different levels and platforms where activities are distributed in a vertical way. High-densities developments, clear boundaries, diversity and mixed land use are the main physical and functional characteristics for a city spatial model where an independent government, a clear identity and a self-sufficient daily life economic basis also make a difference.

Some of the principles established by Dantzig and Saaty had already a root on the beginning of the 60s, stemming from Jane Jacobs's theories and writings. In the book *"The death and life of great American cities"* (1961), Jacobs addresses a fierce criticism to the 20th century modern urban planning doctrines and zoning urbanism, fostering diversity as a reference concept on upholding livability and the quality of life in urban areas. Mixed-use neighborhoods and streets, short blocks layouts, building variety and density are given as the crucial features Jacobs considers being at the foundation of vital and diverse cities, alive at different times of the day and with high levels of pedestrian permeability.

It was by the end of the 80s that the concept has conquered a widespread popularity. With the release in 1987 of the Brundtland Report, sustainable development has become part of the mainstream. A first definition of sustainable development came up then, widening the scope of the concept to economic and social issues (far beyond the more restrictive environmental perspective) and putting the emphasis on the principle of intra and intergenerational solidarity: *"sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (Zwart *et al*, 2012).

Other subsequent events such as the Rio Summit in 1992, and some doctrinal papers such as the European Community's "Green Paper on the urban environment" (1990) and the Urban Task Force's final Report "Towards an Urban Renaissance" (1999), also had a decisive role on the rise of the compact city as a sustainable model for urban development.

Since then, much attention has been put into the relationship between urban form and sustainability, being the compact city some sort of sponge-like concept that congregates several divergent perspectives, related either with the physical dimensions of urban form (size, shape, land uses, distribution of open spaces, etc.) or other parallel issues where mobility and transports represent a significant share (Jenks & Jones, 2010). Above all, the purpose has been achieving alternative solutions and adequate planning strategies to contain urban expansion and protect open land and natural resources. Elkin *et al* (1991), Breheny (1992) and Mike Jenks *et al* (1996) are among the literature that have contributed the most to ascertain a close correlation between urban form and sustainability, questioning to which extent the form of cities affects a

sustainable urban development. In Northern America, New Urbanism and Smart Growth movements have also acknowledged the benefits of a compact urban form influencing the adoption, in many states and counties of the United States, of smart urban policies (Dieleman & Wegener, 2004). After that, a range of other reflections and writings have carried out the consolidation of the compact city paradigm. In addition to the containment agenda regarding the efficiency of land use and the clear separation between urban and rural land, other issues have come up such as the protection of the countryside and open land for agriculture and ecological purposes, the reduction of car dependency and the increment of public transportation facilities and multimodal solutions, or the increase of social and economic interactions in intra-urban areas, striving for land uses mixture and proximity (Westerink *et al*, 2012).

The compact city controversy

But the problem is controversial and the compact city concept generates a series of misconceptions. On the one hand there are the pros and cons of compactness as a current urban development strategy. Notwithstanding the positive aspects related to proximity and the preservation of open land and natural resources, it is worth not to lose sight of the negative side effects coming from high densities. Urban concentration and intense land use can easily fall into crowding leading to traffic congestion, air pollution, lack of vegetation in cities, loss of open green space and insufficient affordable housing. Contemporary high density metropolises show that this is still a legitimate concern. At this point the debate raises a sort of paradox (not yet solved, indeed) in a sense that suburban developments and contemporary sprawled urban space, now at the source of centripetal stances (the compact city ideal), stem precisely from responses to overcrowding (Breheny, 1996). On the opposite side of the modern claim – “*nothing gained by overcrowding*” (R. Unwin), the current statement is more likely – “*something lost by overspacing*” (L. Mumford). Notwithstanding, the compact city paradigm is still an open issue, namely due to the inverse relation that exist between the sustainability of cities and their livability. While the first asks for higher densities, the second one suggests lower densities and less concentrated settlements (Wiersinga, 1997 *cited in* Neuman, 2005).

On the other hand there is doubt on the accurateness of the concept itself vis-à-vis the establishment of a causal link between urban form and sustainability. Whether substantial advocacy supports the benefits of higher densities and mixed land uses on reducing travel distances and generating socially vital and economically viable urban spaces, no clear conclusions arise from empirical case studies. Following extensive research, a direct relationship between urban sustainability and compactness can hardly be drawn (Westerling *et al*, 2012; Hofstad, 2012; Echenique *et al*, 2012; Neuman, 2005). Burton, Williams and Jenks are the first to recognize that “*the problem of how the compact city can deliver sustainability is complex; it depends on the relationship between the form and location of intensification, the extent of intensification, and the policy, management and wider socio-political and economic context.*” (Burton *et al*, 1996). For this reason “*caution must be exercised in assigning causal effects from the compact city*” (Burton, 2000).

In 2005 Michael Neuman reasoned that the question whether a compact urban form is sustainable does not hit the nail on the head. According to Neuman, process is more critical than form when it comes to deliver sustainability: “*conceiving the city in terms of form is neither necessary nor sufficient to achieve the goals ascribed to the compact city. Instead, conceiving the city in terms of process holds more promise in attaining the elusive goal of a sustainable city*”.

The compact city is, above all, a morphological concept. The emphasis is placed on density and compactness, and the concept is eminently addressed to the spatial characteristics of urban settlements, namely to the concentration and the intensification degree of both activities and built occupation. But, as Neuman points out by identifying “*the compact city fallacy*”, urban form is not a sufficient condition (Neuman wonders if it will even be necessary) to drive urban sustainability. He also remarks that “*the attempt to make cities more sustainable only by using*

urban form strategies is counterproductive". On the one hand a city is always a complex system to which converge, in an integrated way, a series of functions and urban subsystems, continuously subject to a multitude of interdependent processes (Dieleman & Wegener, 2004). On the other hand, sustainable development is, in itself, an extremely complex issue (Burton *et al*, 1996). According to Neuman, it comes out from five different intellectual traditions (capacity, fitness, resilience, diversity and balance¹¹²), assigning to an ongoing process where our current way of life is conditional upon the perpetuation of species and the prospect of future well-being (which represents a clear paradigm shift against the former stance where present time was solely conditioned by historic past). At this perspective, Michael Neuman advocates the primacy of process over form. It is the urban processes themselves that might be sustainable, not urban form, he says. "*Form is a snapshot of process. It is a fixed condition at any point in time*" (2005: 23), so it is by no means measurable in terms of sustainability.

The primacy of process over form

But, is spatial form a completely negligible issue when it comes to ascertain urban sustainable development? If, on the one hand, Neuman's position is absolutely pertinent and admissible attending on the etymology and the proper understanding of sustainability¹¹³, on the other hand the thoroughness of the compact city concept also depends upon the prism through which urban form is considered.

The text from André Corboz "*The territory as a palimpsest*" might bring us some expertise on the subject. In the face of the multitude of disciplines and interpretations concerning the territory as a physical and mental entity, and reasoning about what might be a fair definition, Corboz establishes that the territory is simultaneously a *process* (in a sense that it is the result of a set of natural and human processes/actions), a *product* (since it is also an artifact, i.e., the physical and spatial expression of the territorialisation of such processes) and a *project* (to the extent that it oversteps its physical existence being placed as an idea, i.e., an imaginary construction concerning the territory's mental collective representation). These three inseparable translations of what the territory is, took Corboz to claim that, besides having a form, the territory is itself a form. As such, it congregates the physical artifact plus the processes and the projects shaping it (Corboz, 1983; Cavaco, 2009). In a certain sense, Neuman also corroborates this understanding when he states "*one cannot overlook the fact that form is both the structure that shapes process and the structure that emerges from process*" (2005: 22).

Yet processual approaches have been strengthened on the planning context, especially when put into perspective and compared with zoning and blueprint planning. The explanation lies in the uncertainty that characterizes contemporary society resulting in a growing inability to predict short-term social and economic trends and therefore establish definitive physical models to accommodate future urbanization outcomes. According to Portas *et al* (2011), the city as a puzzle has come to an end meaning that blueprints - totalized frozen visions - can no longer be the standard approach to urban development. New planning and management mechanisms are needed, considering the upshots of the urbanization process in a less deterministic shape-

¹¹² *Capacity* refers the capacity of a certain habitat or place to accommodate and support a population of living beings, without compromising present living conditions as well as the habitat's future capacity. *Fitness* refers interaction over time between environment and species, attending to their mutual adaptation and evolution, especially attending to the way a given organism fits into a community or an ecosystem. *Resilience* respects the way a certain place or habitat absorb the presence of an organism and the capability it has to respond and react against the effects caused by him. *Diversity* respects the coexistence of a variety of members in a community focusing their ability to interact and adapt each other. *Balance* reflects upon the ability to search for an equilibrium especially focusing on the trade-offs between environment and development. (Neuman, 2005: 17-19)

¹¹³ It derives from *sustain* which means to "keep something going over the long run"; an understanding that is behind the thesis of the Brundtland Report – the most widespread definition of sustainable development.

oriented point of view. The decline of spatial form as the guiding issue of spatial planning coincided with the upsurge of integration purposes within the urban development strategies and policies. Documents such as the Leipzig Charter, the Toledo Declaration and the Territorial Agenda of the European Union (2007, 2011) constituted a major step, fostering the importance of integrated approach in urban development and highlighting the need for searching for close coordination between the different sector-wide approaches heading a specific territory as a target. From the Leipzig Charter “*integrated urban development is a process in which the spatial, sectoral and temporal aspects of key areas of urban policy are coordinated*”.

Notwithstanding the growing primacy of processes over form, it does not mean a space-blinding paradigm has arisen, far from it. Spatial aspects are still a relevant issue (one would say determinant issue), particularly when place-based development policies are concerned, framed by a territorial spatial-aware perspective. Whether the focus of sustainability should be placed on processes rather than on spatial form, every process or strategy with a territorial/urban impact has necessarily a spatial effect on the ground. The same as urban processes and the outcomes of every urban policy or strategy are conditioned upon the spatial and the physical features of a certain territory or urban area.

Hand in hand with integrated approaches, the territorialisation of public policies - place-based development policies - has been gaining ground. The emphasis relies on the aim of tailoring interventions to a specific place regarding place-specificities and mobilizing local actors and resources (Barca, 2009). An integrated approach in urban development is necessarily a place-based and territory-focused approach, stressing for a strategic and operational confluence between the different sector-wide policies and the urban development itself. As such, what might be the role of urban form on current urban policies? What is indeed the very potential and importance of the compact city concept for current urban policies?

Compact city policies: appraising urban processes, urban governance and urban form

Policy approaches and instruments towards the compact city

It is recognized by OECD that the “*compact city is one of the most discussed policy approaches in contemporary urban policies*” (Matsumoto, 2011; OECD, 2012). In recent years, compact city policies have increasingly integrated national urban agendas at a European and International level (OECD, 2012; UN-HABITAT, 2012). A wide sort of strategies, measures and recommendations falling into the basket of compact city policies and covering a range of different types of policy intervention (regulatory, fiscal, strategic, direct investment, partnership, informative) have been adopted by a number of European and OECD countries, confronted themselves with the increasing problem of urban sprawl and with the disadvantages coming from a widespread urban development.

The containment agenda framing both land use efficiency and open land protection stays ahead of the curve. At this level regulatory tools are the standard policy approach, being urban growth boundaries for limiting urban expansion and distinguishing urban areas from the rural land at the top of the list. Concepts vary, going from the “green side of the urban frontier” in which the greenbelts are included (Westerink *et al*, 2012), to a more abstract approach committed to the institution of urban perimeters and containment boundaries. While with greenbelts a zone barrier is physically created around urban settlements usually with a dual-purpose of preventing urban development and providing green amenities and leisure facilities for city-dwellers, in other cases a polygonal boundary is established beyond which no other constructions than agricultural structures are allowed, having the unique intent of controlling the enlargement of the urban footprint. In Europe, the United Kingdom and the Netherlands represent, probably, the primal examples. In England, the establishment of the Green Belt Policy dates back from 1935, first limited to London city and then extended to other areas by the Department for Communities and Local Government, in 1995 and 2001 (Rogers, 1999; OECD,

2012). In the Netherlands, the compact city has also performed a policy issue since the 70s, centered on the preservation of open agricultural areas and natural environments, namely the Green Heart for the Randstad (Geurs *et al.*, 2003; Dieleman & Wegener, 2004). But they are not exclusive. Other similar concepts and situations happen, not only in Europe as is the case of the *Ceinture Verte* in Paris, but also in the United States (e.g. the urban growth boundary of Portland in Oregon) as well as in Asia (e.g. the greenbelt of Hong Kong, China) and Australia (Dieleman & Wegener, 2004; OECD, 2012). In Portugal, the concept of the urban perimeter might be integrated in this type of planning tools, although the resulting delivers in the last decades are not very encouraging; quite the reverse, in fact.

Another regulatory instruments respect the establishment of urban development and urban design strategic guidelines, at a national, regional or even sub-regional/metropolitan scale. The territorial structure framed by the settlement pattern and the network of urban areas (urban network) is, at this point, a major aim and concern. Czech Republic offers an interesting reference. A national urban policy framework was release by the Ministry of the Regional Development: *Principles of Urban Policy* (2010), establishing a conceptual and operational framework for the implementation of urban policy in the country. Polycentric development is drawn as one of the principles and main strategic guideline. In Portugal, polycentrism also figures as a primal spatial development strategy, being one of the six main objectives of the National Spatial Planning Policy Programme, approved in 2007 by the Parliament.

Far beyond the narrow understanding where the compact city model is exclusively addressed to a monocentric urban structure, polycentrism has been advocated has an alternative for a more balanced spatial organization of cities and urban areas. The polycentric development is actually one of the driving policy aims stressed at the European Spatial Development Perspective (approved by EU Member States in 1999). Rooted in Ebenezer Howard's theoretical model of satellite cities, it has been capturing followers within the scope of the compact city debate, arising on a range of different concepts and approaches. Dutch planning is once again among the examples stressing the concept of *clustered deconcentration* since the 70s. The idea was recovered by Thomas & Cousins who have introduced the notion of *decentralized concentration*, envisaging a new possibility for a compact city form. Slightly different from the most popular Peter Calthorpe's approach of Transit Oriented Development (TOD), *decentralized concentration* explores a new conceptual regional city form based on the idea of virtual compactness, where diversity might stem from a flexible dispersed urban structure of decentralized concentrations (1996). *Polycentric compactness* is another flourishing concept, this time committed to the Paris metropolitan planning framework (2008).

Indeed, the polycentric interpretation of the compact city has opened doors to a new focus of attention: accessibility instead of proximity. Westerink *et al* point out that "*travelling time has become more important than distance*" (2012), foster linkages between transport and urban form, i.e., between land use and mobility. In fact, anti-sprawl planning strategies combining both land uses and transport policies represent a significant share of compact city policies. Transit Oriented Development from North American New Urbanism movement (Calthorpe, 1993) is a well-known example. Notwithstanding the critical panorama of urban development in North American, a number of innovative approaches have been carried out, striving for more compact and mixed-used urban forms, as well as for more sustainable urban systems. Portland, Oregon, is a good example, having implemented since the 70s a containment policy, first with the definition of an urban development boundary, secondly following a TOD. A regional public transportation system based on light-rail and a dense bus network was implemented, thereby signaling the hubs where mixed-uses and higher density nucleus are to be developed (Dieleman & Wegener, 2004). In Vancouver, Canada, a similar concept (Frequent Transit Network - FTN) has been introduced, shaping land use in development corridors accordingly to the frequency of public transportation transit (OECD, 2012).

Density and mixed-use requirements lie among the regulatory tools as one of the most popular approaches. Besides establishing maximum densities, zoning codes are also settling for minimum densities to ensure the necessary intensity of uses in specific areas. Accordingly,

mixed uses have become an increasing concern, following a similar approach at zoning ordinances. The French *Code d'Urbanisme* offers good reference on the matter since new regulatory guidance came to allow the municipalities to require minimum densities on greenfield and brownfield developments near public transportations nodes. London planning also comes up with recommendations on density requirements which took several London boroughs to establish threshold limits.

Regulatory tools are sometimes orchestrated with a range of complementary fiscal mechanisms such as: development taxes or development fees, as well as sub-density taxes, not only to charge developers for urbanization costs, but also to capture the capital gains coming from land use changes and thereby fighting against sprawl; split-rate property taxes on behalf of brownfield developments rather than greenfield leapfrog developments; parking and congestion taxes to discourage the use of private cars. Subsidies and other compensatory mechanisms are a common procedure as well, ranging from incentives to developers and households to invest in specific priority areas such as transport nodes and historic centers, to amenity bonus, namely social infrastructures, granted by developers in exchange for higher densities permits (OECD, 2012).

Trends for a comprehensive policy approach: the challenge of integration

Regardless of whether the term *compact city* is a good one to describe the intended goals of urban sustainability and offset the adverse effects of sprawl, it is rather the outcomes of compact city policies that concern the most as a valuable approach for current Green Growth and Sustainable Development debate. Far beyond the focus on urban form, density and compactness, compact city policies are already “*raising the level of the game*” to a more holistic approach where the spatial structure of cities and the patterns of urban settlement are just a piece among others in the multidimensional process of urban development. Figuring as a policy approach rather than a spatial model, compact city policies have gradually incorporated new policy targets and instruments regarding quality of life, livability, urban efficiency, energy savings, risk management and prevention, etc., far beyond the elementary stance of protecting the environment and the natural resources by simply containing urban expansion and controlling growth.

Based on a study launched by the OECD involving several member countries (*Compact City Policies: Comparative Assessment*, 2012), five current urban trends were identified that underpin the accuracy and timeliness of more comprehensive compact city policies: (i) The most evident trend concerning compact city policies is *land consumption*. It regards both the increasing rhythm of land-take and the emerging discrepancies between land-take and demographic growth. More than a half of the world population is already living in cities and it is expected that in 2050 it reaches about 70% (90% in OECD countries). Nevertheless, the critical issue is not simple the increase population in urban areas, but rather the fact that land consumption is exceeding significantly the rhythm of population growth. Between 1950 and 2010, built-up areas expanded by 171%, whereas population growth did not overcome 142%. At the same time, the geographic footprint of cities is also changing radically. The spatial distribution of the population within cities shows that the urbanization dynamics has been followed by an exponential growth of peripheral areas. Statistical data prove that, between 2000 and 2006, urban growth was faster in suburbs than in urban centers, leading to new greenfield developments rather than infill and brownfield developments. At this point, compact city approaches have focused on the establishment of policy instruments specifically driven to endorse sprawl containment and to protect open land from predatory uses; (ii) *Energy prices* is also a traditional issue within the scope of compact city approaches, particularly related with disperse settlement patterns vis-à-vis the general increment of energy prices. According to OECD data, over the last 40 years the increase in world energy consumption has been followed by a general rise of energy prices. A widespread and sectorized urban configuration, particularly in cases where activities and mobility patterns are very much dependent on road infrastructures

and the use of private car, might become especially vulnerable to the variability of energy costs, bringing negative side effects to the economy and competitiveness of such territories. Policy instruments have been specifically driven to endorse urban mixture and efficient location patterns, along with transport policies to encourage public transportation in detriment to automobile; (iii) *Demographic changes* are one emerging issue attending to the expected population dynamics along with the change on demographic patterns. At this point, contrasts arise from demographic trends, posing a risk to social and territorial cohesion. On the one hand, population growth presents variation rates that do not keep up with land take dynamics. A decline is even expected at short-term for some of the OECD countries, Portugal including. Concerning demographic patterns, discrepancies exist, as well, at a regional and metropolitan scale, since positive variation rates in some areas means the shrinkage of others, namely urban cores and historic centers. On the other hand, ageing population coming from birth rates decline and longer average life expectancy, coupled with a change on households size (average has reduced from 2.95 to 2.55 from 1980 to 2008), ask for appropriate house types and a balanced territorial distribution of local services and social infrastructures. Combined policy mechanisms on density and mixed-use requirements have been a common procedure, while urban regeneration policies focused on the conversion of brownfields and existing buildings and sites, associated to other housing policy instruments, might open the door to increasingly inclusive approaches; (iv) Another emerging trend is *global warming* and *climate changes* to which cities are particularly responsible and vulnerable. Two issues are especially meaningful. The first one is the rise in average temperatures across the world (from 1.7°C to 2.4°C up until 2050; from 4°C to 6°C at long-term). To a great extent, they are consequence of the high levels of global greenhouse gas emission, which are expected continuing to raise. Cities are one of the largest producers of CO₂. The second has to do with sea-level rise affecting in particular coastal areas, knowing that it is at coastlines where urbanization has indeed a major incidence. Mitigation measures as well as climate changes adaptation approaches are the two main policy branches that might converge to a comprehensive compact city policy; (v) The challenge of a *sustainable economic growth* stresses the need for combining a proactive environmental safeguard with the imperative of economic growth. In 2008, the outburst of the subprime crisis has pushed traditional economies where Europe is included into an extremely hard condition. The situation is even bad for countries whose national economies, nourished by the promising advent of neoliberal policies and the expectancy of deregulated markets' profits, were largely dependent on the building sector and the real estate market. Urban sprawl cannot be decoupled from that. The negative effects affect not only the private sector, but also the central and the local governments' finances. The problem is not only the dispersion and fragmentation of urban areas *per se*, with obvious losses of efficiency burdening both the environment and the economy. It is also the amount of vacant houses and buildings that result from unregulated real estate markets and easy credit facilities, as well as the extensiveness of road network infrastructures, whose conservation and maintenance costs have huge impacts on the limited budgets of local and central governments. Focus goes to land use policy instruments, regulatory or fiscal, especially driven to endorse a paradigm shift, from expansion to contention and regeneration, namely through the establishment of compensatory mechanisms to regulate and balance land prices and the real estate market provide, at the same time, a rationalized offer of high-quality public goods and services.

The wide spectrum of urban trends and the cross-cutting and interdisciplinary nature of policy measures ask for a comprehensive urban policy approach, necessarily involving a coordinated implementation of the several specific sub-policies. Having as an ultimate goal the achievement of urban sustainability in terms of environmental quality, social equity and economic viability, a comprehensive compact city policy is thereby oriented to a multidimensional process of planning, managing and governing the urban development, rather than staying hung up on a frozen spatial model framed by the reference (and the myth) of the compact traditional European city (Sieverts, 1997).

The master key of urban governance

The transfer of the policy focus from urban form to urban processes has brought another imperative issue: urban governance. Governance arrangements are indeed a fundamental step to endorse the objectives of integration and coordination of a comprehensive urban policy. *“Cities need to break away from compartmentalized approaches and to integrate formerly fragmented policy actions by taking the spatial, economic and social dimensions of urban development; an approach that will help them to integrate all these dynamics, activities and services. Multilevel urban governance has been advanced as the government model that meets most of the requirements imposed. (...) it can be defined as an arrangement for making binding decisions that engages a multiplicity of politically independent but otherwise interdependent actors – private and public – at different levels of territorial aggregation in more-or-less continuous negotiation/deliberation/implementation (...)”* (Tasan-Kok & Vranken, 2011).

Fitted as an integrated territorial approach¹¹⁴, one can say that a compact city policy is therefore a place-based, multi-scaled, multi-level, multi-sector and multi-agent approach: (i) Place-based since it is oriented towards the specificities of each territory and the political framework of each region and country (Barca, 2009). In fact, there is no single comprehensive compact city policy applicable to all cities and metropolitan areas. Depending on the characteristics of each territory and urban area, spatial strategies might differ both in terms of compaction degree and urban structure, either monocentric or polycentric. On the other hand, policy instruments also differ from region to region, requiring the necessary local/regional adjustments; (ii) Multi-scaled since it has into account the broader context of functional urban areas which include urban cores - intra-urban areas, but also urban hinterlands – the city-region, and the links and relationships that are forged between cities and urban centers. The functional metropolitan area is therefore the reporting spatial unit of a compact city policy, recognizing the need for cities/municipalities to collaborate in a same region (OECD, 2012). Spatial strategies concerning an efficient and sustainable urban development cannot be closed in local individual approaches. Municipalities have much to gain from sharing certain collective services and infrastructures and a broader inter-municipal policy of public transportations. A cross-cutting approach between different scales and levels of territorial aggregation is therefore a demanding challenge; (iii) Multi-level since it requires the vertical integration and coordination between the different government levels, local, regional and national. Although it is generally agreed that a compact city policy especially falls into a local/metropolitan level, the fact is that there are several policy measures pursued at a national level that have direct impacts on the spatial structure of urban and metropolitan areas. Land use policies are one the situations requiring the vertical coordination between the different government levels; (iv) Multi-sector since it is a cross-cutting policy requiring the horizontal integration of different policy agendas; a crucial step to maximize synergies, complementarities and policy outputs. The objective is not only to ensure the dialogue of the diverse sectoral policies, but also the ability of working together in order to provide coherence between policies envisaging the achievement of a consistent holistic territorial approach; (v) Multi-agent since it asks for the participation and involvement of the several urban actors. With the fall of the welfare state paradigm, government responsibilities and functions have progressively been transferred from the central state to the local governments and from the public sector to private stakeholders. Urban development has become an activity shared by a multiplicity of different agents, ranging from public agencies and semi-independent public organizations, to private stakeholders and enterprise, non-governmental organizations and the civil society.

¹¹⁴ Integrated approach is defined as *“the incorporation of diverse sectoral policies (such as employment, education, environment, culture, spatial policy, social policy) at diverse organizational levels (local, regional, national, intergovernmental instances) to achieve a holistic territorial policy approach”* (Tasan-Kok & Vranken, 2011).

A comprehensive policy addressed to sustainable urban development is therefore dependent on the implementation of a good governance model able to promote *"an interactive framework in which diverse actors at diverse scales of governance are actively involved in the policy making and implementation"* (Tasan-Kok & Vranken, 2011).

Conclusive remarks: the place of urban form

In the last pages a survey was done on the compact city as a response to urban sprawl, regarded either as a spatial model or as a comprehensive urban policy focused on sustainable urban development. Discussion has showed that the emphasis has been changing from urban form (i.e. cities' spatial model) to urban processes and governance, from shape-oriented blueprint planning approaches to integrated approaches focused on a processual multidimensional planning. Whilst a controversy persists on the accurateness of the compact city concept, especially when it comes to recognize a direct relationship between urban form and sustainability, national urban agendas at a European and international level have been striving for the implementation of a sort of policy measures that meet the goals behind a compact city strategy. Compact city policies are now one of the most popular urban policy approaches in OECD countries. A set of emerging urban trends, ranging from energy to climate and demographic changes, as well as to economic growth, stress and highlight the need for a comprehensive urban policy, where compact city policies also fit.

The question, however, remains on urban form. What is the place of urban form in contemporary urban policies? What about the territory-focus and the spatial-core of public policy approaches? What part do they play within integrated process-oriented approaches? How pertinent might be urban form in contemporary policies for cities?

Compact city policies might help us to better achieve a balanced ground. If one is led to agree that processes, along with governance, shall acquire a prominent position on a context of disseminated government responsibilities and multiple actors' engagements, form is still a relevant issue. According to A. Corboz, the territory is itself a form, being at the same time a physical artifact and the processes and ideas that have shaped it. Urban form, as well as urban space, cannot thereby be left behind on a territory-focused approach.

In fact, the territory-focus has been gaining emphasis on the context of the European Cohesion Policy, especially after the territorial dimension has been introduced in the Treaty of Lisbon (2007), joining economic and social cohesion. The rationale of place-based development policy approaches has been gradually settled down since then, stressing the importance of territorial context and spatial linkages to catalyze the results of policy measures focused on economic growth, social inclusion and environmental quality.

Nevertheless, there is still a long way to achieve. Exploring the crossings between place-based development policy approaches and urban morphology might be an interesting way to go. Compact city policies are well positioned to support such a playground.

In fact, the distinctiveness of compact city policies (among other policies focused on sustainable urban development) is neither the reference to a model of a compact city nor even the aim of looking for urban compactness as an urbanization trend. It is rather the fact that, notwithstanding the emerging primacy of processes over form in contemporary urban policies and planning approaches, spatial form shall still be a reference issue. If, on the one hand, there is no such a thing as a sustainable urban form (evidences show that no conclusions can be taken whether compact urban development is more sustainable than a sprawled urban form), on the other hand spatial criteria shall be determinant on integrated urban approaches.

"Compact city policies offer a comprehensive policy approach that addresses urban sustainability goals by influencing the use of urban space." (OCDE, 2012:51)

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Interpret planning gap caused from accomplished roads by identifying building forms

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Abstract. *In the cities, street system offers the framework of building forms. In macroscopic, streets define the pattern of blocks, and could be identified as building lines of the beginning of “building behaviour” (architecture) in microcosmic. Since lands had been restrained by planning, planned roads are laid and patterns of original settlements had been covered. Therefore, this brings out two layers of urban fabric, the planned and non-planned roads, which are so called “accomplished roads”. Due to the overpopulation post WWII, the accomplished roads conflict to the plan pattern makes blocks far away from the pursuit of satisfying demand of housing through automobile dependent urban planning and zoning. To interpret planning gap caused from accomplished roads, the evolution of building forms follow two perspectives: 1) Building forms follow the management of zoning of the urban plan by the time. 2) The floor area depends on the width of “Face roads” (Oliveira, 2013). According to the investigation, Blocks are heterogeneous of building forms with the accomplished roads exist. The change period of building form follow the rule of the street system by the time building behaviour took place, usually in the term of motionless along accomplished roads while those along planned road reflect the urban plan immediately.*

Key Words: planning gap, accomplished road, building form, Yonghe

Introduction

As the Athens Charter (Charte d’Athènes) manifests the four functions of dwelling, work, recreation and transport, it has become the highest principle of urban planning and development. According to the principle, urban reconstruction after WWII was rational and the overpopulation make the built up area develop rapidly to satisfy the demand of housing (Hall, 1988). In the late 1950s, due to the penetration of vehicles, the automobile oriented planning concept had been developing. Straight and wide geometry pattern became the central idea of road planning. Furthermore, since lands had been restrained by planning, blocks become the basic unit of zoning, no matter whether the goal of urban plan is; the planning based on zoning should be trend to homogeneous. For the perspectives above, the modern urban planning should be rational, geometric and homogeneous.

Nonetheless, such automobile design urban planning shattered the existed urban fabric in built up area. The accomplished roads, which own the characteristic of irregular, bending and heterogeneous, make the vision of blocks somehow different from the expectation and the surface feature will be showed up by building forms.

As street system offers the framework of building forms, the arrangements of buildings have been locked in the frame that the street systems construct. In microcosmic, the street line became building line, which is the beginning of building behaviour. The building line has legal validity and makes the buildings have a corresponding layer of street system. Also, the height of the buildings shall be rendering proportional to the width of streets. Both layers of street systems are thence owns decisive influence on building forms.

Due to the urban built up area will never be blank, the two layers of street system overlap each other make the city face with the fabric neither orderly nor organic (Figure 1). Therefore, according to the evolution of time, how will the forgotten impurities, accomplished roads, give rise to the planning gap from the expectation of urban plan?

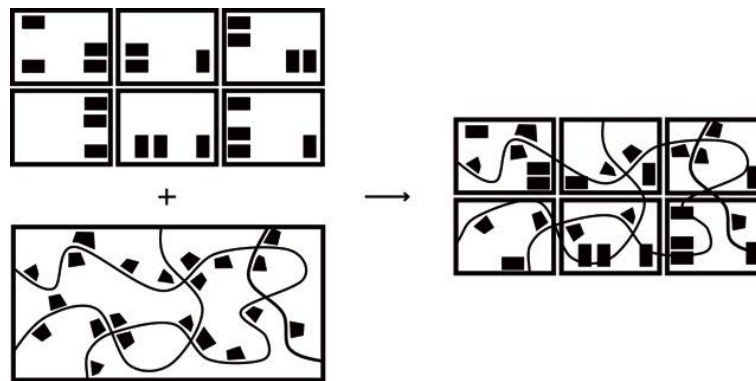


Figure 1.The current pattern generated by the cover of original fabric.

Gap between the ideal and reality

Urban form can be understood at different levels of resolution. Commonly, four are recognized, corresponding to the building/lot, the street/block, the city and the region (Moudon, 1977). To interpret the planning gap, rules and tools pursuing ideal urban plan would be elaborated to express the datum and the difference can be count. According to the planning theory post WWII and the progress in technology, the great demand of housing from the overpopulation was tried to settle efficiently and try to become homogeneous, while Acts manage land and building utilization in strict control. The interaction between urban plans and laws plays the rational development role in the cities.

The beginning of gap

About a century ago, Henry Ford founded the mass production line of Ford Model T, the car then produced in great quantity and the vehicles ownership significantly increased. In Asian cities, private car and motorcycle ownerships were rising quickly by the 1970s, especially in the middle-income cities of Malaysia, Thailand and Taiwan. To match the demanded of rising private vehicles, the influence of Western automobile-oriented ideas was spread all over the world. The prestige of the United States tended publicizes highways and cars as the way of the future. The Western consulting firms also influence or conducted the transport or urban planning studies by the early 1970s, and they used the standard urban transport planning (UTP) process that had been developed in and for American automobile-oriented, suburban-style cities, which implement the idea of wide and straight.

"A city made for speed is made for success." (Le Corbusier, 1929). Based on the automobile design urban planning, the planned roads then become straight and wide, the geometric streamlines then provide security and speed passage for vehicles. The planned roads not only provide the service of transport but also segment the city into grids which are called blocks.

The Post-World War II baby boom and political immigrants make the explosion population crowd into the cities and suburban area. Buildings were rapidly duplicated in the blocks to fulfil the demand of housing comply the arrangements of street systems before the very first urban plan. The overpopulation is uninterruptible in decades and makes the urban planning necessary to control the development. Planning based on zoning is then become the universal principle.

Zoning, the device of land-use planning, separates one set of land uses from another. Early zoning practices were occurred in New York in 1916. In 1930s, Asian cities try to westernization and the zoning method start to restrain the land use of plots, based on the minimum unit, blocks. The management was only on the plane but gradually changing to

control the volume and height of buildings. Hence, the development under the same zoning management should approach to the homogenous (Litman, 2009).

While zoning and planned roads were laid on the original pattern and make complex circumstances in the blocks. The negligence of original pattern become two layers of street system, *planned roads* and *accomplished roads*.

Characteristic of street systems

The ground plan is the component most resistant to change, rejecting a major capital investment, particularly in the case of the street plan (Conzen, 1960). Street systems define the pattern of blocks and offer the framework of building forms. Moreover, street systems offer the beginning of building behaviour (Architecture).

As the beginning of building behaviour, street system offers the building line of building base to make sure the demarcation of land use. In compliance under the provisions, the building behaviour is then allowed to take place. (Talen, 2011) These also strengthen the fixity of street system of the original land use. Ratio of building height to street width is another management from street system in microcosmic. The ratio is positive correlation. The wider the street system is, the higher the buildings can be built up. The height of *Face road* is the element decides the building height by Acts. Buildings along the two layers of street system should be able to predict from the principles above.

At last, when the street system is laid and confirms the use of being public passage, the streets only broaden and increase by the urban plan. The street systems are barely removed that after the first urban plan the accomplished roads are sometimes being broadened and extend and the planned roads are laid on the prime lands.

The impurities and gap

In the ideal state, the result or transition of urban plan should be estimated by street system (planned roads) and the management of zoning.

$Y = \alpha X_1 + \beta X_2$ the ideal state

Y = The result of urban plan

X_1 = Street system

X_2 = Zoning

Actually there are still other factors in the model which output the real urban morphology. The planning gap is cause from the factors that we ignored, and accomplished road is one of kind (Pissourios, 2013). The accomplished roads are not irregular and own the same right as planned roads under the management of Acts. The characteristics of accomplished roads make the actual state unable to achieve the purpose and maximum benefit the urban plans expectation. Therefore, the factor was seen as impurities which interfere in the operation of the ideal state which cause the planning gap.

$Y = \alpha X_1 + \beta X_2 + \gamma X_3 + \varepsilon$ the actual state

X_3 = Accomplished road

ε = Planning gap

The less of cognition of planning gap makes the new urban plans carried out harder and harder. The circle become vicious and causes real estate market failure and development costs were waste.

Accomplished roads are the trace of human activity and exist all over the world. In a highly competitive between cities, the less of planning gap will enhance the competitiveness.

Model

Restriction

From the point of views above, accomplished roads would be certainly discussed and the influence would be confirmed by a model investigate the buildings evolution along different layers of street systems.

In the model of evolution of building based on street systems, there are two restrictions to eliminate the influence of other factors.

First, the zoning of study area must be the same. The construction of land use, building coverage ratio and floor area ratio are equal in a single block, which make the building utilization and the maximum development intensity of each building base under the same construction. The purpose of the restriction is to confirm the homogeneous of blocks from the vision of urban planning.

Second, there was neither major facility in nor near the study area. If there were major facilities around, the service level of public facilities will be evidently different. Due to the gain in benefit of redevelopment, the possibility to bring out the urban renewal will be arising. If the urban renewal occurs, the change period of buildings will not only follow the characteristic of street systems and the development will be implemented by big area beside the regular rule of one by one reconstruction.

In summary, the usage of the following model will be operated in the study area which under the same zoning control and without major facilities. In the situation, the impurities factor from street system will be show of.

The evolution of building form based on street systems

Due to the fact that street systems influence the buildings in both macro and micro scale, there are some components in the model of the evolution rule. According to the advance of time, the factors will evolve through the time line. The three components are street system, building and urban plan: (i) Street system: There are planned road and accomplished road in the street system. Owning the same right on law to construct the development of buildings. The accomplished roads exist from the beginning of the model and the planned roads were laid after the first urban plan.; (ii) Building: The city has always been characterized largely by the individual dwelling (Rossi, 1966). The building form changes from the technology and value of the time, and the floor areas grow because of the demand of housing increase and under the management of urban planning. (iii) Urban plan: The very first urban plan occurred because of the demand of housing reach the standard. When more and more people gathered into the area, the demand change and the new urban plan come to relieve arrange the demand of housing.

The building component depends on the street system because of the framework and the right on law. The street system and building depend on urban plan from its management while the plan is try to fulfill and properly configure the demand of housing. Thus urban plan realize the demand of housing when it reach a standard or become saturation. All the components above alert by time. The relationships between the components are shown below.

Due to the components on the model, there will be accomplished roads and buildings along them, the forms of the building will be low in height and with little floor area.

When the demand of housing rise to reach the standard, the very first urban occurred and the planned roads are then laid. During the period of time, the buildings along accomplished might changes by the time, following the first urban plan's management. Along the planned roads, buildings are higher and the floor area would be larger due to the width of planned roads are much longer.

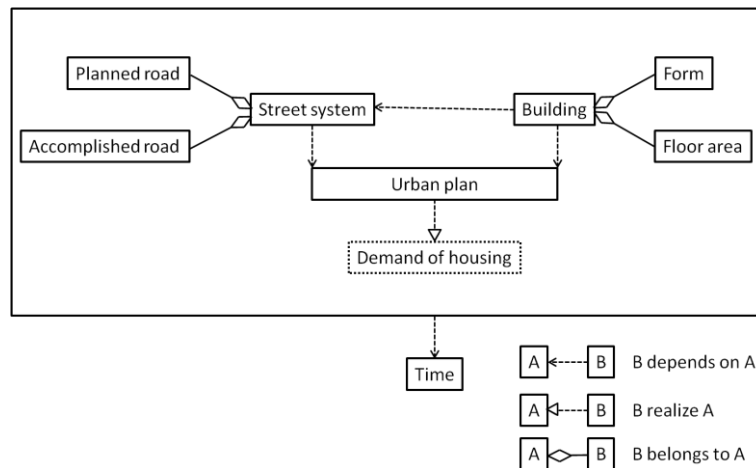


Figure 2. The relationships of the model components.

When the demand of housing are again full and the floor areas are no longer afford it, a new urban plan try to use the land more efficiently and offer more floor area. According to the ordinance of new plan, the buildings along planned roads are getting higher and the floor area would increase. Otherwise, the buildings along the accomplished roads limited to the shape of accomplished roads that are hard to expand and the shorter street width, the capability of offer floor area is low that make the buildings hard to renew then maintain their original form. The buildings between the accomplished roads and planned roads might change the Face road of buildings. When the buildings' change to planned roads from accomplished roads, the benefit makes the buildings higher but the floor areas won't be as much as those along the planned road because of the framework obstruct the expand. Thus, there will be three evolution progresses in the model.

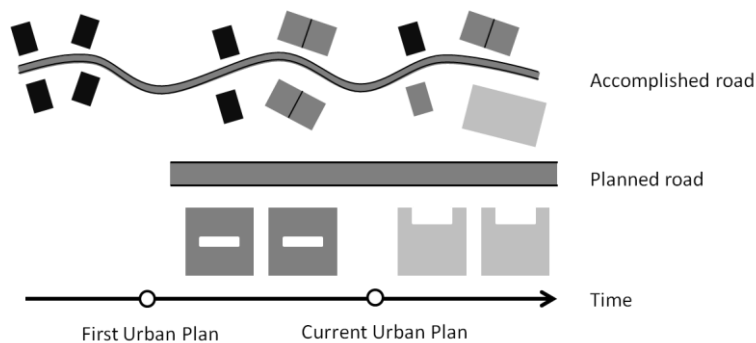


Figure 3. The evolution of building form based on street systems.

The evolutions are shown above and the colour level represent the age of the building. The darker the older. The area of the blocks represents the floor area of the building. There are 3 stages of urban plan evolvement: (i) Buildings along accomplished roads: The accomplished roads exist from the beginning and the change period of building forms are slow due to the framework and restriction of height.; (ii) Buildings along planned roads: The planned roads occur from the very first urban plan and the buildings along comply with the management then the height and floor area have high quantity; (iii) Buildings between accomplished roads and planned roads: At the beginning the buildings are along the accomplished road, when the demand of housing is high enough, some buildings change their Face road to the planned road and the building will be as high as those alone the planned roads but the floor area would be less because of the framework of accomplished road to expand.

Case Study

The study area: Yonghe city

Yonghe, a city little settled before WWII, was the country side out of Taipei and the land use are nearly farm land before 20 centuries. The street system then was close to the rivers. After WWII, Yonghe has a great population explosion after the war. According to the proximal location beside the Capital city, the overpopulation influx into the Yonghe area because of political policies and industrialization. There were more than six hundred thousand military and their family move in to Taipei Basin, and had the highest population density in Taiwan and second in the world (after Manila in the Philippines), with over 41,300 people per square.

In 1957, the first urban plan of zoning management was published. The population rapidly increase and went out of control. The government then uninterruptedly published new plans to satisfy the great demand of housing. The planned roads are then laid from the urban plan of different periods. By that time, the original patterns are ignored and covered by the zoning management which surrounded by the planned roads.

In Taiwan, the very first zoning is started from the act of Taiwan City Planning Order in 1937. The act divided lands into seven kinds of zones. The construction management is loose and only restrict the plane extend of buildings. To maintain the public facility service level, the floor area ratio was controlled in 1980s. The maximum building form has been controlled from urban planning and building control acts. The buildings thus being controlled in 3-dimension way, according building coverage ratio, floor area ratio and land use.

According to the Acts, thousands of accomplished roads are identified in Yonghe. There is a main accomplished road which called "Xiulang Road" near the Xindian River from 19 century. The road was the main route to connect the villages and the land use around are farm lands. Although the plan road are laid in turns, the original pattern of Xiulang Road still maintained even the land use of it should be residential use in the urban plan. The pattern even sometimes becomes the base of the new planned roads.

To understand the accomplished road as the impurities in the blocks, three blocks which cover Xiulang Road are selected. The blocks are in same residential use and without major facilities around. The planned roads around the blocks were laid in the different period of time which represents the management from different urban plan. Thus, the buildings in the blocks and along the planned roads are the main object in the paper to be observed.

Experimental result

On the basis of the evolution model, we observe the building components of the building time and the height. The buildings are along the accomplished roads and three planned roads. The street system here was built in different times and width. (Table 1).

Table1. Characteristics of street system.

	Layers of street system	Width(m)	time
Xiulang Rd	Accomplished road	8	19 century
Dehe Rd	Planned road	18	1974
Houde St	Planned road	8	1990
Chenggong Rd	Planned road	18	1995

The investigation shows the characteristic of the buildings and they are separated into 4 clusters by statistics analysis. Figure 4 shows the samples are mostly distinguished in the first two clusters, which means the development of the study area happened in great majority between 1980s to 1990s (Figure 4).

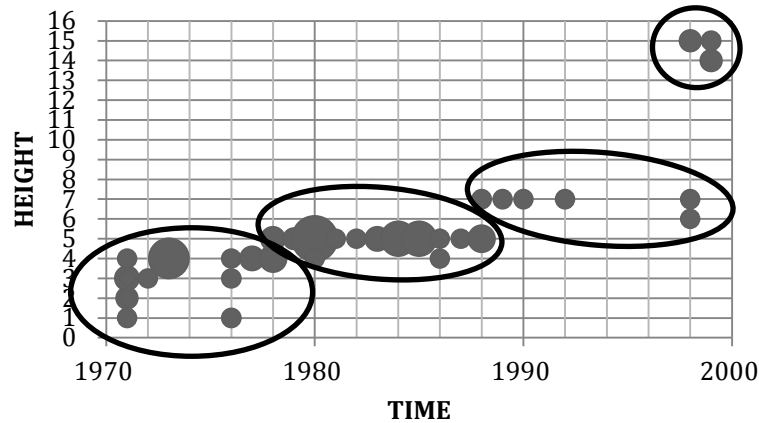


Figure 4. The clusters from the building time and height.

The figure 5 shows the locations of different kinds of clusters. According to the building height and the time, the building forms are similar and try to solve the population problem at that time. (Table 2): Cluster 1: The buildings are before 1978 and the heights are all under 5 floors. Cluster 2: The buildings time is between 1978 and 1989, and the height are 4 to 5 floors. The divergence of cluster 1 and 2 is from the urban plan published in 1976 and the floor management is loosened. The new bridges connect to the Taipei city make the study area having another period of population explosion and 5-floors apartment were commonly use in the solution copy in a huge amount.

Cluster 3: The buildings time is between 1988 and 1999, and the height are 6 to 7 floors. The buildings follow the urban plan published in 1985. After 1988, the floor area ratio was controlled and building behaviours are then shrinking.

Cluster 4: The buildings time is in 1998 and the height are 14 to 15 floors. The buildings follow the urban plan published in 1997. Near the 21 century, it is prevalent to build apartments higher than 10 floors, citizens living in the small residential unit.

Table2. Characteristics of clusters.

Cluster	Building time	Building height(floor)
1	Before 1978	<5
2	Between 1978 to 1989	4~5
3	Between 1988 to 1999	6~7
4	1998	14~15

The composition of building clusters is diverse in a single block. According to the proportional analysis, Cluster1 and 2 accounted for the largest proportion which means buildings in the study are over 30 years and lower than 6 floors. As a densely populated area, new urban plans try to release population pressure but the situation still exists (Table 3).

The figure 6 show the comparison with model of evolution of building based on street systems, the figure shows all kinds of progress in the study area. Buildings along accomplished roads: Before the very first urban plan, build up area is few and scattered in the study area. Lands along Xiulang Rd were little settled and were in agricultural use. Buildings along Xiulang

Rd are almost classified into cluster 1 and 2. Buildings of cluster 1 were settled before the blocks were designated. When overpopulation took place, buildings of cluster 2 were stuffed in the blocks with the period of planned road were laid, and the buildings forms were mostly attached apartments. Buildings along planned roads: Buildings along Chenggong Rd are almost classified into cluster 3 and 4. Buildings of cluster 3 were settled with the period of Chenggong Rd were laid, and the buildings forms were mostly attached apartments with elevators. Buildings of cluster 4 were settled with the new urban plan published and the building forms are apartments more than 10 floors which are in the shape of big area squares. Buildings between accomplished roads and planned roads: there are all 4 clusters of buildings between Xiulang Rd and Chenggong Rd. The buildings were replaced through time and follow the management from urban plan of the time. The different of the buildings from cluster 1 & 2 to 3 & 4 is that the buildings transfer the building line from accomplished road to planned road. The wider the road is the higher the building can build to get more floor area. Hence, the buildings of cluster 4 in the ribbon are narrower or in the shape of column compare with those along Chenggong Rd ascribe to the slender building base.

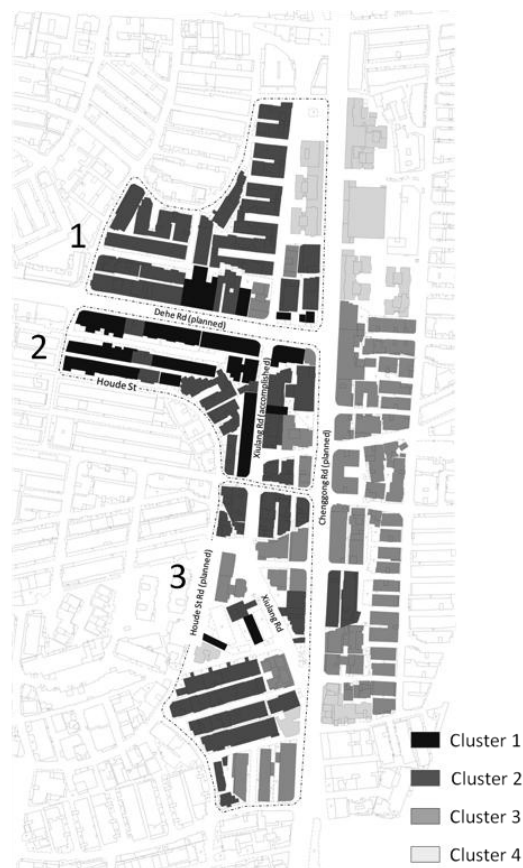


Figure 5. The arrangement of the clusters.

Table 3. Proportion of clusters in a single block

	Cluster1	Cluster2	Cluster3	Cluster4
Block 1	21%	61%	7%	11%
Block 2	41%	48%	7%	0%
Block 3	25%	59%	8%	8%

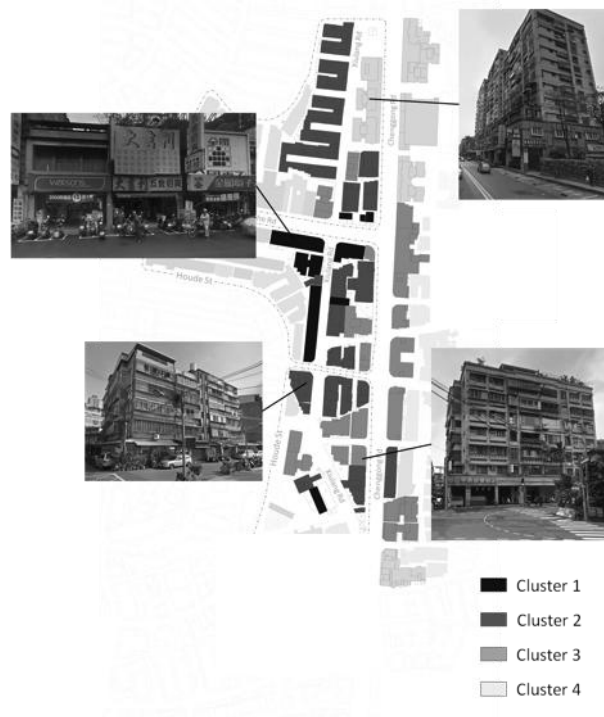


Figure 6. Building forms of each cluster.

According to the clusters distribution, the buildings arrangements are truly following the framework of street systems. In the micro observation, though the building behaviour follows the building line and width of street, there were no obviously relationship between them and nor the cluster characteristic. The R-squared of building line and the clusters is only 0.22, and the R-squared of road width and the clusters is only 0.31. Actually, the effect from street system to building is not isometric. The open up period of road and the process interaction might have more significant influence of the change period of building form.

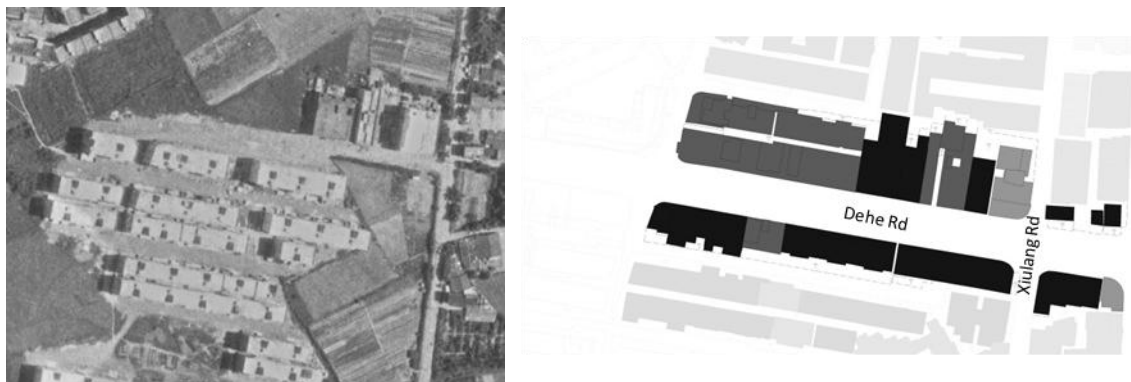


Figure 7. The aerial photograph in 1974 and the cluster arrangement along Dehe Rd.

Towards the investigation and analysis, there were two spatial deformation circumstances. As figure 7 shows, even Dehe Rd is a planned road; there are still many buildings of cluster 1 along it. Before the urban plan, there was an important branch of Xiulang Rd. After being broadened and became the planned road in 1957, the buildings are still root along the road. The buildings here are in the shape of strip and complex in the proprietorship which make them hard

to be renewal. Therefore, we can tell that the attraction of development chance of planned road is hard to resist the fixity of accomplished roads.



Figure 8. The aerial photograph in 1974 and the cluster arrangement along Dehe Rd.

In block 3, there were a building of cluster 4 which strangely surrounded by the narrow alleys. The building base is triangle and the streets are all less than 7 meters. Under the normal circumstances, building start the building behaviour from the building line in front of the building base and the Face road should be the accomplished road or planned road attach the building base. According to Building Technical Regulations, the building can make the Face road become Chengong Rd, due to the narrow streets and no road wide enough attaching the building base, which makes it much higher than other buildings around (Figure 8).

Conclusion

In the pursuit of orderly and efficiently of land utilization, urban planning tries to make the city rational, straight and homogeneous. Zoning and automobile oriented planning are the tool and concept to fulfil the value. The negligence of the original pattern fixity shatter the original pattern then causes gap that is hard to be forecasted. The accomplished road irregularly cutting the blocks and limit not only expand of building base but also change periods of building renewal.

View as the impurities in blocks, the accomplished road effect the homogenous balance and bring out the planning gap. When architecture is viewed as the city, buildings can represent the actual results of operations from urban planning. Building forms and floor area depends on street system from the control of law. Both of components rely on the urban plan when the demand of housing isn't satisfied. The evolution model is then verified by the case study and can be sum up as the following consequences.

- 1) From the distribution of clusters in the study area, buildings in a single block with existence of ancient accomplished roads are obviously diverse and far from homogenous.
- 2) The buildings along accomplished roads maintain the very first building form, while those along planned roads reflect the urban plan in fast change period. Besides, buildings between the two layers of roads are in a great variety of forms which reflect the demand of housing partly.
- 3) As the transformation of the model, planned road which was broadened and extend from accomplished will maintained the building forms before the planned road was laid. The forms were depending on the characteristic of the original accomplished road. We can say that the evolution of building will follow the rule of the street system by the time building behaviour took place.

According to the investigation, Blocks are heterogeneous of building forms with the accomplished roads exist. The change period of building form follow the rule of the street system by the time building behaviour took place, usually in the term of motionless along accomplished roads while those along planned road reflect the urban plan immediately.

Since accomplished roads were sure to be one of the factors bring out the planning gap, the coefficient of the factor can tell the degree of heterogeneous in blocks. In addition, the continual exploration of planning gap can be interpreted the ownerships and real estate market.

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Events-driven morphological process – A case study of Auckland's waterfront

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Abstract. *In order to contribute to international literature concerning the process of morphological change, this paper focuses on a study of the city centre waterfront in Auckland, New Zealand. A Conzenian analysis of the space, with reference to historical economic and cultural contexts, is used to derive a narrative explaining of urban modifications of the waterfront fringe belt. Auckland waterfront has undergone redevelopment across a 200 year period. Beginning with the morphologically invisible culture of aboriginal Māori occupation to the maritime industry of the 20th century and to recent modern regeneration, the waterfront has changed from a low-density fringe belt to one pocketed with commercial and residential intensification. This is particularly true of the western side of the city's waterfront. Our research finds that much of the recent urban regeneration of the last 15-20 years is the result of preparation for the hosting of major international events. These include the America's Cup 2000 and 2003 and the Rugby World Cup 2011. We find that major events have accelerated urban form change on Auckland's waterfront and thus might provide noticeable contrasts between planning units. Such building form and layout might then been seen as a physical expression of a sporting culture and tourism based economic necessity. A discussion of the impact of international events upon urban place-making and planning is included with a view to establishing broad morphological periods of development along the Auckland waterfront as well as informing the manner and typology of urban reconfiguration that major international events require.*

Key Words: *urban morphology, event-led development, Auckland, Māori, waterfront redevelopment*

M.R.G. Conzen fathered the urban morphological analysis in the mid 20th century. Conzen's approach to urban examination consists of a consideration of three elements of urban form: the ground plan, building fabric and land use. For Conzen, an analysis of urban morphological form was coupled to an understanding of the historical development of land areas (Whitehand, 2001). This analysis has led to the identification of plan units within the urban structure of cities. Plan units are defined as land areas with a shared history of development, similar ground plan, building form and land use. As such, plan units represent pockets of historical development and their identification aids in an understanding of the underlying principles of urban development and land use.

The Conzenian principle of morphological regionalization has been under represented in international research outside of Europe (Siksna, 2006; Gu, 2010). However the work of Gu (2010; 2013) has provided valuable insight into the organisation of one city in particular, Auckland, New Zealand, using the Conzenian approach. Gu (2010) describes the present day plan units expressed on the Auckland waterfront. The waterfront itself is identified as a fringe belt, a broad subcategory of urban form first identified by Herbert Louis (Whitehand, 1988). Gu (2013) has investigated the application of this concept to the New Zealand examples of waterfront redevelopment. This paper seeks to add to the analysis presented in Gu (2010) by critiquing the driving force behind the modification of Auckland's waterfront fringe belt area.

Fringe belts are defined as low-density stretches of urban land, which usually contains transport facilities, parks, public utilities, cemeteries, and institutional land uses (Whitehand, 1988). These broad sections of the city are located on the fringe of more dense development, including the CBD, and often constitute public open spaces and include prominent public amenities (Whitehand, 1988). Ports and their surrounding areas are identifiable as expressions

of fringe belt land use in the Conzenian morphological analysis (Whitehand, 2001). Fringe belts are characterised by low density, public or institutional land use with large, irregular lot sizes and building footprints (Whitehand, 2001). As such they can be imagined as a 'breathing space' for the CBD: in that they have the capacity to support the growth of commercial and residential activities within the CBD.

Research objectives

Waterfronts globally are undergoing post-industrial redevelopment (Gordon, 1996; Breen & Rigby, 1994; Oakley & Johnson, 2013). As these spaces are developed and plan units modified, cities face challenges establishing new waterfront identities. Oakley and Johnson (2013) in particular have presented a fascinating post-colonial reading of the Port Adelaide and Melbourne's Docklands; in their paper they find that colonial powers, intent on extracting the economic value of a waterfront via ports and industry, transformed the aboriginal understanding and use of the waterfront space entirely. We find that such a reading, informed by a Conzenian understanding of urban plan units, is valuable in Auckland, New Zealand.

The identification of plan units on the Auckland waterfront has led to the documentation of the fringe belt area around Auckland's CBD by Gu (2010). In recent years development within the waterfront fringe belt zone has been characterised by the reappropriation of land plots for higher density land uses on smaller plots. On the Auckland waterfront the Princes wharf and Viaduct Harbour are such examples where high-density residential and commercial land use has become established in areas previously associated with marine and shipping industries (Gu, 2010; Gu, 2013). This process is known as the alienation of the fringe belt. As fringe belt alienation continues, the historical information held within the built form, land use and urban fabric of a plan unit is similarly modified. To what extent can modification erase cultural histories along Auckland's waterfront? And what is the driver for said alienation upon the Auckland waterfront?

This research paper aims to establish plan units along the Auckland waterfront at three points in time in order to demonstrate the morphological evolution of the space. These are pre-colonial Māori occupation of the area in 1840, the height of port and marine operations in 1940s and the present day waterfront. Progressive shoreline reclamation is also depicted to illustrate the modification of the original pre-European occupation waterfront over time.

This paper has been structured first to include a discussion of colonial appropriation of the Māori occupied Auckland waterfront, which is then analysed using a Conzenian lens of urban morphology to illustrate how modern development is rewriting the colonial waterfront in much the same way. The paper is divided into the three broad morphological periods identified through this research. These are pre-contact Māori occupation, colonial reclamation and modern redevelopment centered on the economic stimulus of international events.

The objective is to understand that tangible changes to the waterfront are expressed as the result of economic, institutional and social forces (Moudon, 1997). These being the economic realities of development and social attitudes towards waterfront use. Each broad period is found to be clearly paired with the economic realities of its era in so far as built structure and land use reflect profitable and realistic uses and sit within commonly held worldviews of that time. In recent years the driver for urban change on the Auckland waterfront, the driver for alienation of the fringe belt, is identified as both the reduction of port activities and subsequent release of port land; and the real and potential economic stimulus of the hosting of international events.

Event-driven urban redevelopment is not an uncommon development strategy (Chalkley and Essex, 1999). Event-led development helps to 'fast-track' urban development/regeneration because of economic stimulus. This is undoubtedly true in New Zealand. Benefits include improving transport, cultural facilities and global recognition and prestige (Chalkley and Essex, 1999). The Olympic games are clear global examples of event-led development and their legacies are clear in the infrastructure and built form of cities such as London, Beijing and

Sydney. These include airport capacity, hotel accommodation, public transport, water and sewage systems and urban landscaping; all are needed to cope with the capacity these events demand (Chalkley and Essex, 1999; Ritchie, 1984). As a city begins to acquire said infrastructure and capacity, the city attains a reputation for holding events, which increases the likelihood of hosting further events in the future (Chalkley and Essex, 1999). This indicates that Auckland could expect to hold more of these events as it begins to gain a reputation and begins to construct the type of infrastructure that is needed to facilitate these events. This has already been shown by the 2011 construction of 'The Cloud' for the Rugby World Cup on Queen's wharf – an events facility for public screenings.

The legacies of event-led development extend far wider than transport infrastructure and stadiums. The Eiffel Tower is a legacy of the Paris Exposition in 1889 and the Royal Festival Hall in London is a legacy of the festival of Britain held in 1951 (Chalkley and Essex, 1999). While these physical legacies are now tourism boons in their own right, event-led development can also lead to social and economic hangovers. A magazine in Canada in 1994 polled locals for their estimation of the legacy of the 1994 Victoria Commonwealth Games; the most common answers were increased taxes, increased real-estate prices, a new pool, debt and increased tourism (McCaw, 1994). These insightful answers clearly speak to the largely short term economic benefits that characterise an international event. How well has Auckland fared following the hosting of the two large international events: America's Cup yachting competition in both 2000 and 2003 and the Rugby World Cup 2011? To what extent does the modification of land use for these events within the fringe belt erase the history of colonial maritime waterfront use? How does this echo the impact of colonial modification of the pre-colonial Māori occupied waterfront?

From a morphological perspective, the short and long term economic benefits of event-led development must be weighed against the lasting urban form that such events create. In Auckland, events such as the America's Cup 2000 and 2003 and the Rugby World Cup 2011 have produced dramatic urban fringe development along the waterfront – will their legacies prove beneficial to Auckland? The reality is that event-led development has the potential to produce poorly distributed outcomes, chiefly because of the spatial specificity of the events themselves and the potential lack of valuable public participation due to the speed at which the project is implemented (Coakley and Souza, 2013).

It is argued that such development is beginning to overwrite the history of the waterfront space in the same manner as European occupation and development was stamped on top of aboriginal Māori history in the study area. It is argued that a detailed morphological reading of the space, concerned only with the building form, fabric and ground plan, has the potential to dismiss the erased history of a site and render it invisible. To this end a consideration of colonial modification to the unmodified waterfront is included. As redevelopment takes place, particularly in locations where societies do not have a built form legacy, what is the effect on the history of that space?

Methodology

A morphological analysis of the evolving and existing Auckland waterfront study area is undertaken. Historical land use maps, photographs and newspapers have been consulted alongside literature and the authors' own observations of the present day Auckland waterfront to produce an analysis of plan units on the Auckland waterfront. Plan units are mapped spatially in order to group land use and built form along the waterfront. Plan unit diagrams have been constructed which show the Auckland waterfront at three intervals: 1840 (none due to the nature of Māori occupation); 1939 (eight); and 2014 (twelve).

Auckland

Auckland is a city of 1.4 million in a country of 4 million. Auckland's economic prosperity has been linked both publically and in reality to recent investment in the waterfront area. After unifying district and regional councils in 2010, Auckland Council created the Auckland Waterfront Agency to oversee the further development of the space, recognising the economic importance of waterfront redevelopment.

Initial colonial development (including vast reclamation schemes in the Waitemata harbour) was driven by the economic stimulus of the marine and shipping industries. In contrast, present development on the waterfront is conceived as primarily driven by the economic stimulus of international events hosted in Auckland. Just as the colonial reclamation of the 19th and 20th centuries ousted Māori land use patterns, modern redevelopment is alienating the morphological patterns of marine and shipping industry. As a result, Auckland is experiencing redevelopment aimed at creating a consumer waterfront for international tourism and the elite residential market that is in the process of erasing the morphological history of the study site.

Pre-European contact Māori occupation

Pre-European contact tribal occupation within the Auckland isthmus has been fluid since the Māori people first landed in New Zealand some 1000 years ago. Most recent rights of *ahi ka* (traditional occupation) are held by the Ngati Whatua iwi (tribe). Ngati Whatua operated farming, horticulture and fishing operations about the entire isthmus pre-European contact (Ngati Whatua o Orakei Maori Trust Board 2003). The tribe was denied access to the land and so cut off from their cultural practices. This had profound impacts on the people of Ngati Whatua as their culture derived *mana* (respect and authority) from their role as *kaitiakitanga* (resource guardians). The ensuing reclamations in the Waitemata harbour engulfed landmarks of cultural importance to the Māori people such as Te Ngahuwera Pa (a military fortification) at the foot of present day Queen Street and Te Rerenga Ora Iti at the site of present day Britomart, where a great military victory was won over rival tribes (Auckland City Council 2004).

In 1840 Te Kawau of Ngati Whatua made 3,000 acres available to Governor Hobson in order to strengthen ties between the government and his people following the signing of the Treaty of Waitangi (New Zealand's founding document) (Ward 1999). He believed the two peoples would live together in this land. The area contained the 1840 waterfront and central business district, upon which the reclaimed present-day waterfront situated. Upon securing a new location for his capital, Governor Hobson immediately began development of the waterfront so that it be made fit for European occupation.

Figure 1 shows the shoreline as at 1840, prior to modification. The modern waterfront ground plan is also shown. The difference between the two is striking. Colonial occupation and modification of the Auckland waterfront, Auckland treaty settlements, is a matter for others (see Durie, 1998; Ward 1999). From a morphological perspective, as at 1840, there were no plan units recognisable by the Conzenian analysis of built form, urban fabric or plot size. This is precisely because the Māori culture did not build in this manner nor recognise an individual ownership model. For these reasons, the Conzenian morphological regionalisation approach is an incomplete method of capturing a comprehensive understanding of the history of urban form development. This is an important caveat to the method and is all the more noticeable in a location such as Auckland with such a limited history of European occupation as opposed to the long urban histories of England where Conzen developed his thinking (Conzen, M.R.G. & Conzen M.P. eds, 2004).

The development of natural and physical effect can have a deleterious effect on the link between cultural heritage and living cultural expressions of status and authority. Colonial industry development on the Auckland waterfront established new expressions of the authority of a new culture in place of the existing aboriginal Māori occupation. Land uses (fishing and

port activity), as well as landmarks, were erased by colonial modification. For instance, the mining of Point Britomart demolished the significance of the place for Māori. The British flag was first raised on this landmass on 16 September 1840 after a preliminary agreement for the sale of Auckland had been signed (McClure, 2012). It represented an important landmark in Maori history and geography, by the turn of the 20th century it was gone. The colonial experience dominated indigenous culture both socially and physically through how they built their city. It is likely that an invisible indigenous culture in the city morphology is an unconscious by-product of the way colonisation occurs through active oppression of that culture.

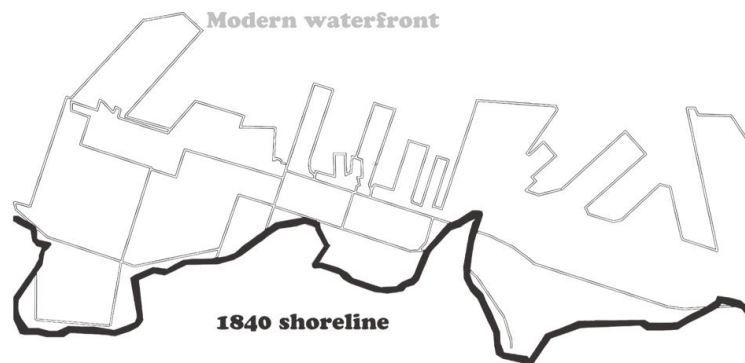


Figure 1. pre-1840 Auckland Waterfront Plan Units (zero).

The reading presented here contributes to the invisibility of the Māori population to a modern audience. Colonial powers have successfully rewritten the history of the space by inscribing new meaning through urban form. This inscription can be primarily expressed through a modification of the waterfront edge itself via reclamation for new land use. Colonial occupation through modification of the shoreline and private land titles represents the original privatisation of the waterfront. Recent residential and commercial development is arguably having the same effect by replacing the presence of the Auckland Harbour Board and POAL on the waterfront with elitist apartments and hotels.

Colonial reclamation and waterfront modification

Extensive reclamations began almost immediately following Hobson's decision to move the capital from the Bay of Islands (to the Auckland site Te Kawau made available) (Ward, 1999). The move yielded positive economic results for the new city. The deep Auckland harbour was an ideal port location and successive dredge and fill techniques both deepened the harbour and brought the wharves and associated land to the deeper waters.

Reclamations began with provincial government land tips pre 1859 and continued in force throughout the 20th century (Engineer's Department Auckland Harbour Board 1973). The most active period of reclamation was 1910-1916 in accordance with the Hamer scheme (Engineer's Department Auckland Harbour Board 1973). The waterfront still contains many examples of wharf buildings constructed in the Edwardian and classical revival styles including the ferry terminal, wharf police, post office. Each are examples of reclaimed land that has been vested in public ownership for public works, characteristic of fringe belts.

The reclamations from 1840 onwards dramatically altered the shoreline of the Auckland isthmus. Figure 2 shows the progressive reclamations from 1859-1972. The original shoreline and its associated activities were erased by this new morphology in just 170 years. Landfill cut

off headlands and filled in gullies to create a flat waterfront conducive to port and transport activities, thus fulfilling the role of CBD support common of fringe belts: the Māori occupation of this land left no trace that could endure the colonial reclamation modifications.



Figure 2. Reclamation on Auckland's waterfront 1840-1972 (Constructed by author from Auckland City Council, 2014).

Plan units have been identified using a 1939 land use map in Auckland City Archives. These are shown in figure 3. Attention should be focused on the large port (8) and Wynyard Quarter (1) units at the East and West ends of the waterfront as well as the viaduct harbour unit (3). All three locations are dramatically different in modern times. In 1939 they were examples of vast expanses of marine and shipping industry land use; today these activities are dramatically smaller, with new higher density developments on surplus land.

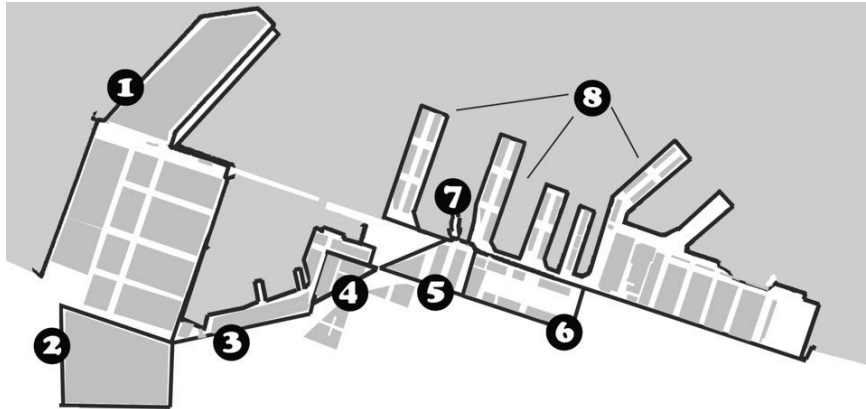


Figure 3. Planning units on Auckland's waterfront 1939.

Table 1. Plan units

Plan Unit	Unifying characteristics
1. Wynyard marine industry unit	Marine industrial land use: large plots on reclaimed land. High impervious surface percentage and an absence of vegetation. Vast clusters of chemical tanks dominate the land use.
2. Victoria Park unit	Large singular plot: reclaimed public open space, bordered by streets on all sides.
3. Viaduct Harbour unit	Dilapidated marine industry site.
4. Viaduct public facilities unit	Community pools and City market; large, public buildings.
5. Central area unit	Medium-rise commercial buildings forming the waterfront border of the CBD.
6. Transport unit	Auckland station; Edwardian terminal.
7. Ferry transport unit	Edwardian-baroque ferry terminal, nestled inside port land use.
8. Port unit	Extremely large plot size accommodating many storage sheds for port use.

Colonial occupation established new land uses across the isthmus and in particular along the waterfront. Headlands and gullies became shipping yards fit for port activities. Not only was the physical landscape changing but the political as well. A colonial governmentality was imposed a “colonial-based articulation of power” in New Zealand (Certoma 2013, 9). Maori lost the opportunity to engage in power relationships, to resist and to have real impact on planning matters. British Parliament passed the New Zealand Constitution Act (1852) which conceded administration of all matter relating to land to European settlers. New Zealand parliament was established without iwi representation because only men with claim to land with a single title could vote and participate. Iwi power was revoked and Maori were removed from the planning sphere in one clean stroke. The New Zealand parliament defined a new planning reality that permitted no meaningful opposition.

The newly established New Zealand parliament recognised individual title only: land sales were transfers of the right to exclusive possession. Prior to European occupation land ownership was tribal and ongoing (Blair 2002). This is an expression of Flyvberg’s proposition that power defines reality (1998). In real terms, the *definition* of land ownership asserted and defended by the British-based legal system facilitated a grave asymmetry between the settlers and Maori. Backed by the power of knowledge creation and the ability to legitimise their definition, the settlers created a new planning reality for Maori in New Zealand that they could not engage in

effectively. As a result, Ngati Whatua iwi experienced a 82,000 acre land loss. Without their turangawaewae (home place) the cultural, spiritual, economic, social and environmental wellbeing of the tribe was destroyed.

Modern Auckland

The Auckland waterfront stands in contrast to the geometric uniformity of the central business area and clearly encloses the expansion of the central city. It is an area of low-lying reclaimed land protruding into the Waitemata harbour, characterised by sweeping roads which previously followed the coastline and jutting finger wharves built for the shipping industry.

Alienation occurs within the fringe belt as redevelopment of land constitutes a move from historic land use towards smaller, privatised uses. In Auckland the Viaduct Harbour, developed for the 2000 defence of the America's Cup, and the Princes Wharf are examples of fringe belt alienation. Previously sites of marine industry, both sites have been transformed into high-density residential and commercial properties. These conversions largely ignore historical land use characteristics, and therefore epitomise alienation.

On the Auckland waterfront the authors find the following plan units shown in figure 4. The delineation used is largely based on the analysis found in Gu 2013 however some plan units have been added. These are the division of Wynyard point into two units (Wynyard marine industry and Wynyard quarter units) so as to reflect recent developments of the Wynyard quarter including North Wharf restaurant area and innovation centre. The Viaduct Harbour unit presented in Gu 2013 has also been redefined as two units (Viaduct harbour and Viaduct commercial). The multitude of plan units present on the modern Auckland waterfront speaks to the difficulty in presenting a coherent whole.

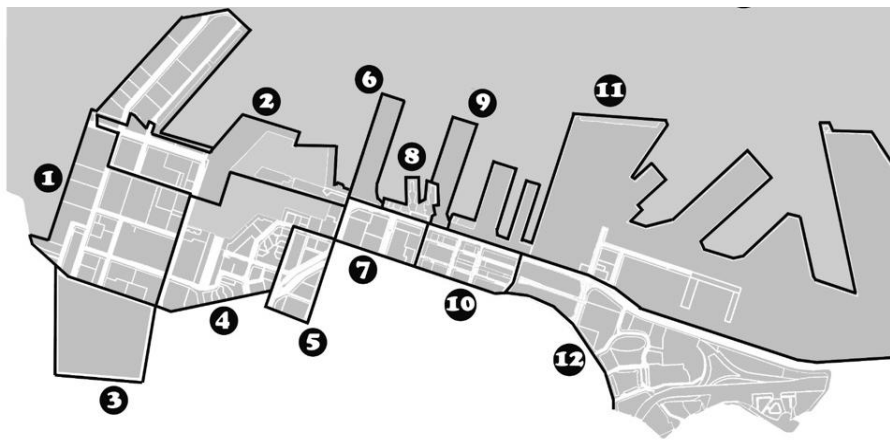


Figure 4. Planning units on Auckland's waterfront 2014.

Upon comparing the plan units of 2014 in figure 4 with those in figures 3 and 1, it is immediately clear that the number of units along the waterfront has increased over time. This speaks to the fragmentation and alienation of the space in that there are many planning units and this hinders cohesive development. In recent years units 2, 4, 6 and 10 have been heavily invested in and have undergone substantial redevelopment. Units 4 and 6 (Viaduct Harbour and Princes wharf) have done so as a direct result of international events preparation. In particular contrast to the 1939 image shown, the open space near viaduct has been built up into elitist apartment dwellings.

Table 2. Plan units

Plan Unit	Unifying characteristics
1. Wynyard marine industry unit	Marine industrial land use: large plots on reclaimed land. High impervious surface percentage and an absence of vegetation. Low-rise commercial buildings organised in a through street pattern.
2. Wynyard quarter unit	Auckland's recently successful public waterfront space. Low-rise commercial buildings and medium-sized public open space connected along a pedestrian route.
3. Victoria Park unit	Large singular plot: reclaimed public open space, bordered by streets on all sides.
4. Viaduct Harbour unit	Heavily redeveloped in the 1990s, this residential area consists of much smaller parcels than the historic marine land use previously located here. Irregular through streets. There is a strong coherence of built form across the space, which consists of mid-rise modern residential buildings.
5. Viaduct commercial unit	Prominent mid-rise commercial land use around a major regional transport route. Poor pedestrian infrastructure.
6. Princes Wharf unit	A high-density hotel development privatises the wharf space and alienates it from the fringe belt. Built form resembles a cruise ship, which references the maritime legacy of the harbour.
7. Central area unit	Large lot sizes occupied by high-density, high-rise structures. A six-lane street dominates the street level.
8. Ferry transport unit	Edwardian-baroque ferry terminal (restored in the 1980s) alongside modern additions to the capacity of the transport terminal.
9. Queens wharf unit	Currently occupied by temporary structures, the land is now surplus to port requirements. The space is still fronted by the historic (and protected) red wharf fence, deterring public use.
10. Britomart transport unit	Grid street layout: The area is a commercial and transport hub developed in response to regional transport strategy. Northern edge fronted by historic wharf buildings including the wharf police, northern steamship and union fish company buildings.
11. Port unit	Large singular plot: expansive private open space, used exclusively for port activities. The area is fenced off to the public but offers a glimpse into the working waterfront of Auckland. This large area bordered by a major regional transport corridor.
12. Quay park unit	Medium sized irregular plots: this area is largely of mixed modern design, including both residential and commercial land use. Irregular, curving streets throughout.

The Modern Auckland waterfront is undeniably the result of land release by Ports of Auckland. Most notably, the focus of port operations have shifted Eastwards in the last 20 years and have made the Viaduct harbour and surrounding land as well as Princes wharf available. Between 1989 and 2013 72 hectares of waterfront land has been released from the Port of Auckland, allowing space for future event-led development (Ports of Auckland, 2013a). Present day port operations now occupy approximately half the land area of the waterfront.

Princes wharf, now the site of the Hilton Hotel, is one example of land release and subsequent fringe belt alienation along the waterfront. Princes wharf sold for NZ\$25.75 million in 1997 and the Hilton Hotel built on it promptly to take advantage of the international tourists associated with large events. The development is a controversial one in light of private appropriation of the prominent waterfront location. The public street that previously ran the length of the wharf now operates as a car park for hotel guests and taxis.

The poor planning outcomes on Princes wharf were the direct result of the fragmentation of District and Regional councils in Auckland. In 1988 the Auckland Regional Council dealt with the application since it was on water, not land. This meant that the Auckland District Council isthmus plan had no jurisdiction, despite the building clearly having urban design and traffic implications (Cayford, 2009). Because district planning issues did not need to be addressed, the development proceeded without public consultation in 1998. The result was a poor planning outcome for the public and a privatised, alienated section of the fringe belt without opposition from the public.

The reduction of port operations as a stimuli for redevelopment is a common reality for many urban waterfronts such as London, Melbourne and Boston (Gordon, 1996). In Auckland another element was in the mix: international events were coming to Auckland like never before.

The history of event-led development in Auckland began as early as the late 1980s when New Zealand's yacht team 'Team New Zealand' seemed poised to bring the America's Cup home in 1989. The event had real impact on the political climate of planning process in New Zealand. At this time Mike Moore, a newly created Minister for America's Cup, pushed for an America's Cup planning bill that would speed planning applications. The position and planning reform was deemed appropriate in light of the potential for international tourists coming to a future America's Cup defence. The 1992-93 Whitbread round the world ocean race was also recognised as a stimulus for tourists; the event would bring 800,000 people to the Viaduct (Basset, 2014).

However the new planning bill and Minister were not needed as the Team NZ did not come away with the 1989 win. And so, apart from some dredging for the Whitbread race, the Viaduct remained unchanged when Team NZ did eventually lift the America's Cup in San Diego in May 1995. By August Auckland Council had authorised a development committee following submissions by eager developers. Pacific Development Investment Corporation suggested commercial and residential space and further dredging in the Viaduct harbour (Basset, 2014). The fringe belt was poised for the alienation process.

As noted in the introduction, event-led development has the capacity to produce poor planning outcomes chiefly because those outcomes are geographically concentrated expressions of public investment. Investment that is derived from the wider rates base both locally and nationally. In New Zealand, sport events have become synonymous with national pride and with notions of healthy communities, making plans for their propagation extremely difficult to argue against. Public opinion can so easily swayed when plans are justified by national sporting pride (Hall, 2006). This reality allows politicians to capitalise on planning contributions that will make their city more globally competitive, despite the fact that these outcomes are concentrated spatially and economically as was the case with the Viaduct development (Hall, 2006). The uneven spatial distribution of development within a city and can further entrench the power of the elites (Jones, 2001).

The Viaduct harbour is one example of spatial concentration of planning outcomes as a result of event-led development in Auckland. In 1996 Viaduct Harbour Holdings Ltd. bought the Viaduct and its surrounds from POAL for NZ\$75 million. The land had been for sale since 1995 as POAL shifted East. In 1998 stormwater and wastewater were realigned and the harbour widened and deepened so as to improve the water quality. It's important here to note that the port activities, the fringe belt, restricted the growth of the CBD up until its removal. As sections such as the Viaduct were sold, residential and commercial land uses encroached upon the fringe belt and alienated the Viaduct Harbour from their historical uses. Figure 5 and 6 show the

viaduct harbour in 1940 and today. The comparison is a dramatic example of waterfront redevelopment, with cast harbour land reclamation occupied by medium-rise residential and commercial buildings eliminating the historic marine industry land uses of the area.



Figure 5. Auckland's Viaduct Harbour 1939.



Figure 6. Auckland's Viaduct Harbour 2014.

In 1999 Auckland hosted the successful defence of the America's Cup. This was an economic benefit to Auckland like none before it and signalled enormous economic activity, injected into waterfront redevelopment. The net expenditure of the America's Cup 2000, according to Market economics, was \$474 million with a total value of \$640 million added to the New Zealand economy. This event created the equivalent of 10,620 full time jobs.

In 2003 Auckland hosted the America's Cup again and generated, according to Market Economics, a total of \$523 million net expenditure and the equivalent of 9,320 full time jobs between 2000-2003 (Market economic Ltd, 2003). Most of the impact was in the 2002-2003 year. The majority (70-85%) of the economic impacts of both yachting events were concentrated in the Auckland region due to the restricted spatiality of the event. The legacy of America's Cup is its boost to the New Zealand's marine industry, which is now worth NZD\$1.7 billion; the sector NZD\$642 million had worth of exports in the year 2012 (Forbes, 2013).

In 2005 New Zealand was selected to host the 2011 RWC. In 2008 Auckland Council pledged NZ\$211 million to the redevelopment of the Wynyard quarter and a further NZ\$88 million by 2010 in preparation for the event (IRB.com 2011). The Queens wharf sheds were

redeveloped and the 'Cloud' installed to allow the public screenings of the games and host events on the waterfront. The RWC2011 resulted in \$512 million additional expenditure in Auckland across the period between 2006 and 2012, split amongst property, construction, manufacturing, transport, storage, finance and communications (IRB.com 2011). The New Zealand Economy grew by \$573 million as a result of additional expenditure during the Rugby World Cup, and the tournament sustained 22,890 jobs for the duration of one year (Ministry of Business, Innovation and Employment, 2012).

These figures show that international events represent large injections of overseas capital to the country and are thus desired by local and national authorities. The economic stimulus has become the driving force of urban renewal just as port activity once served as a driver for modification to the pre-European occupation shoreline. Investments in international events during this period reflect council philosophy. Auckland Mayor Len Brown is quoted as claiming that "events should be the drivers of economic growth and they have certainly delivered for Auckland" (RWC 2015, 2012). Events-led development has strong positive connotations in Auckland as a result: "it has only been a few months since Auckland was the hub of Rugby World Cup 2011, but our region has been transformed forever" – Doug McKay (Auckland Council, 2011, pg i). Ultimately Auckland's City Council and tourism agencies are trying to achieve economic growth through these events. This pursuit of growth through events shapes the pattern of urban development as they become integrated into the strategies of urban renewal (Hall 2006).

These events illustrate the optimism for new development that international events can stimulate. Particularly in areas of public space such as waterfronts. We saw this excitement again in 2013 when Team NZ seemed assured of victory in San Francisco, spending much of the regatta with only one point needed for victory. Planners and politicians alike were teeming with excitement for new developments in Auckland. As the nation watched the victory slowly slip from Team NZ's grasp, planners felt the very real blow to future development.

Conclusion

Historical land use maps, photographs and newspapers and the authors' own observations have produced an analysis of plan units on the Auckland waterfront. Plan unit diagrams have been constructed which show the Auckland waterfront at three intervals: 1840 (none due to the nature of Māori occupation); 1939 (eight); and 2014 (twelve).

This research paper demonstrates that Auckland's pre-European occupation shoreline has undergone two broad eras of modification. The first being the colonial reclamation of the waterfront to accommodate port activities. This resulted in the filling and levelling of valleys and streams outside the heart of the newly establish Auckland CBD. Plot sizes were large and housed public and industrial land use, which is common for fringe belt zones in the city (Whitehand, 1988; Gu, 2010). The second era of waterfront modification began with the reduction of port activity along the industrial waterfront in the 1990s. This period signalled the densification of the working waterfront recognisable as a process termed alienation. This most recent period of modification, which has brought residential and commercial land use to the fringe belt, has been driven in part by an eagerness to make Auckland ready for international events including the America's Cup 2000 and 2003, Whitbread round the world ocean race and Rugby World Cup 2011.

It is postulated that the first broad period of development, that being the colonial modification of the waterfront driven by the economic reality of port orientated city. Urban form constructed during this time has left visible marks on the urban landscape that may be read by an analysis using the Conzenian morphological regionalisation. These are the built form (where it survives), plot sizes and street layouts. Contrastingly, this visible legacy is not found for the Māori occupation of this area prior to 1840. Māori used the waterfront and indeed the wider isthmus to practice fishing, horticulture and farming. The landscape was inscribed with a cultural history

that was retained orally and not in the edifices of urban form. Thus, once the landscape itself was completely modified beyond recognition and a completely new ownership model established, Māori history was erased.

The second period of urban development within the study site has been shown to be in part driven by the economic stimulus of international events held in Auckland. This period of development is really one of *redevelopment* in that the existing legacy of colonial modification, as we have termed it, is present. This fringe belt legacy informs modern construction of urban form along the waterfront. Primarily through the release of port land for residential and commercial densification. Land that is of a large plot size and open space.

Event-led development itself has its positive and negative implications. Event-led urban development has a focus on infrastructure for people with improvements around public transport and public space. It can be a serious driver of short to medium term economic improvements with increases in jobs and tourist expenditure. Events-led development can provide certainty for urban development, through local and national investment programs, allowing significant investment in infrastructure. This was demonstrated in the case of the NZ\$211 million investment in infrastructure for the Rugby World Cup in 2008 from the Auckland Council. This investment is less likely to occur if there is no event to leverage against financial costs.

Due to spatiality of events infrastructure, event-led development has the potential to eliminate connections between planning units and fragment existing units as select areas are developed. For example, in response to the America's Cup 2000 and 2003 and the Rugby World Cup, only select areas of Auckland's waterfront underwent development. These were the Viaduct and Princes wharves. As was the case in Auckland, when development is staged over time in correlation with numerous events, there can be a lack of continuity and cohesion between planning outcomes, which make up the modern plan units on the waterfront. In Auckland this is best expressed by the low pedestrian permeability of the waterfront space as a whole; and the lack of cohesion between plan units 4, 7 and 2 in particular. The resulting waterfront is a difficult one to navigate for a pedestrian. The task is made all the more imposing because the public space is bordered by the exclusive Viaduct and Princes wharf developments which encroach onto the public pathway and contribute to a feeling that the public user does not belong. A better understanding of the existing plan units could contribute to a more holistic conceptualisation of the space and the connections between units. The Royal Commission on Auckland Governance 2009 expresses this view and bemoans the lack of coherent management and development of the waterfront space. The report recommends a master plan approach to the waterfront and city centre areas to enhance public and private investment in the area (Report of the Royal Commission, 2009).

Considerations for development in the future should consider the alienation process as a reinscribing of meaning onto the urban landscape. This definition has been proven apt in the example of Auckland's waterfront as 'Māori history' was replaced through waterfront modification to become 'colonial port history.' That history is now slowly succumbing to the new economic reality of event-led development, which brings with it new plot sizes, street layouts, urban form and levels of density.

To summarise, this paper has examined the Auckland waterfront using the lens of an urban morphological analysis grounded in an understanding of the fringe belt concept. Modern redevelopment along the waterfront is found to be erasing the 170-year history of colonial occupation and port reclamation in much the same way that the reclamation erased Māori land use in the area. However in contrast to the modifications of the 19th and early 20th centuries, modern redevelopment is intensifying land use within the layouts of the historical industrial waterfront and in doing contributing to the alienation of the fringe belt through private appropriation of public open space. Consequently, recent developments are establishing a new cultural authority over the space: that of international tourism associated with sporting events hosted in Auckland city. This raises questions of equity as to the land uses permitted and supported using public resources in the waterfront space.

If future planning and urban redevelopment takes place ignorant of the plan unit concept, there is potential for future development to overwrite the history of the waterfront, create disconnected plan units and dominate potentially important public spaces without a recognition of its past land use. However this paper has shown that there are limitations to this solely morphological understanding of urban space in that the history contained within a plan unit analysis can omit invisible cultures such as Māori occupation in this example.

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Assessing the effects of governing thoughts on the form of cities; a comparison of Damascus, Cairo and Tehran from the emergence of Islam to the contemporary period

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Abstract. *The evolution of the urban form has always been affected by numerous factors. This article aims to discern to what extent the governing schools of thought have determined the form of the cities. From the emergence of Islam to the contemporary period and before the start of information age, we have categorized three distinctive systems of thought: Islamic approach, the colonial period often with a modernist essence and the contemporary period (mainly after the independence of the country and bearing upon modernist and post-modernist views). Each of these systems has affected the form of the city in general and also its components. Studies in Tehran, Damascus and Cairo indicate that in the Islamic period the changes made to the form are mostly limited to single buildings contributing to emphasizing the presence of Islam in the city or as a manifest to the power of the caliph, however the general form of the city has mainly stayed untouched in compliance with the local social and environmental requirements. In contrast, the colonial period is coupled with vast changes and modification to both the general form and its components due to the technological advances and the mass production trends. The changes in the contemporary period are however built upon the challenges that the modernist approach brought about and therefore take a more moderate route.*

Key Words: *Urban form, governing schools of thought, Islam, colonial period, modernism, post-modernism*

Introduction

For most researchers in urban morphology urban form mean the form of urban fabrics (Levy, 1999). However urban morphology is also used as a source of ideas about spatial elements which can be used in the construction of proximal spatial models of cities (O'Sullivan, 2000).

This article aims to assess the effect of one dimension of the socio-political aspect of the city on its form, namely the governing thoughts. In order to avoid generalization three cities were chosen for this purpose; Damascus, Cairo and Tehran based on the similarities of their history. There is of course much to be discussed about what the term governing thoughts entails and how it can be categorized, however the authors have discerned four main periods in the history of the mentioned cities: emergence, Islamic period, colonial period and contemporary period. These periods sometime overlap as for instance the emergence takes place in the Islamic period and sometimes a city does not go through all the periods as is the case of Tehran which does not have a clearly defined colonial period, although its form has been influenced by its allies at the time.

As this article seeks to compare the form of city and its elements in the mentioned periods, it does not research the cause of the events of each period in depth and focuses more on the differences and similarities of the changes in different eras in target cities. In order to so first a brief description of what aspects of urban form is being studied and the different periods is given. Then the changes the cities go through in each period are introduced and finally there is a concluding comparison between the effects of each governing thought on the form of these three cities.

Urban form

The definitions of urban form vary to a great extent in the literature. While some authors solely rely on land use/land cover to measure urban form in terms of the physical structure of a city, others also include socioeconomic aspects such as population number or density. Furthermore, the question of whether the sheer size of a city is one aspect of urban form or an independent indicator is still open. However, urban form itself is mainly referred to as a property of a city and therefore static for a given point in time, while urban growth is a dynamic process that alters urban form. (Schwarz, 2010)

Urban form, or urban structure, refers to the land use patterns, transport infrastructure, water and energy infrastructure, and physical form of developments that facilitate human activities and their interactions. It is a product of the social and economic activity patterns of the city, its culture and its technology and is the outcome of physical planning practices, both in infrastructure development and in regulation.

Urban form reveals the relationship between a single city and its rural hinterland as well as the impact of human actions on the environment within and around a city. This also relates to transportation patterns (Schwarz, 2010).

Considering what was mentioned this article mainly focuses on two aspect of urban form in its research; the urban fabric, also referred to general form consisting of streets, infrastructure structure and etc, and also architectural elements and components.

Certain periods of time can be discerned in target cities regarding the governing thoughts. Regardless of how Cairo, Damascus and Tehran emerged, they have gone through different periods such as Islamic, colonial and modern periods. Like any other macro-scale change in the socio-political dynamics of a place, Islam also sought to announce its presence through various means in cities. Since Islam is considered to be an “Urban Religion which favors communal practice...it is widely accepted that most of Islam’s teachings are best practiced in an urban setting. It is not surprising that Islam made particular emphasis on the form and design of the city ... (Saoud, 2002)”

Besides the Islamic period most of the cities have also gone through a colonial phase which has vastly affected them, not only in terms of physical conditions but also cultural, social and etc. This period can be a somewhat clear example of how far an outsider system of thought would go to dictate changes in the context it is now governing.

There is also a time period in which the cities have declared independence or are being governed with a more modernistic school of thought which “was evident in the city’s physical appearance through what is called standardization of urban systems, as the width of roads, heights of buildings, zoning and segregation of use and etc (Abou El-Ela, 2003)”.

Currently the new communication system and the use of (ICTs) have increased the capacity to absorb all kinds of cultural, social and political articulation, in a digital globe that is electronically communicated and managed. They are modifying all aspects of the life of cities, political, economic and cultural and consequently affect the urban form as well (Abou El-Ela, 2003). Although these changes can be categorized as another period of a governing thought in cities, this research does not focus on this era.

Survey

Damascus - Emergence

The history of the Damascus is defined by usage of water. The original oasis was a central meeting point and a sustainable settlement which through time became the longest permanently inhabited city. The initial structure of the city as one of Aramaneans governing centers was formed in 11 century BC and had a western feel to it. In the year 46 BC Romans occupied the city and an orthogonal settlement was formed near the Aramanean city with straight streets,

forum, stadium and Hellenistic residential areas. Romans built a fort around the Aramanean and Hellenistic neighborhoods. After the Byzantine empire, Arabs entered the city in 635 AD (Coeno, 2003), (Chang & Lienert, The Oasis City, 2009)



Figure 1. Hellenistic Damascus (Burns, 2011).

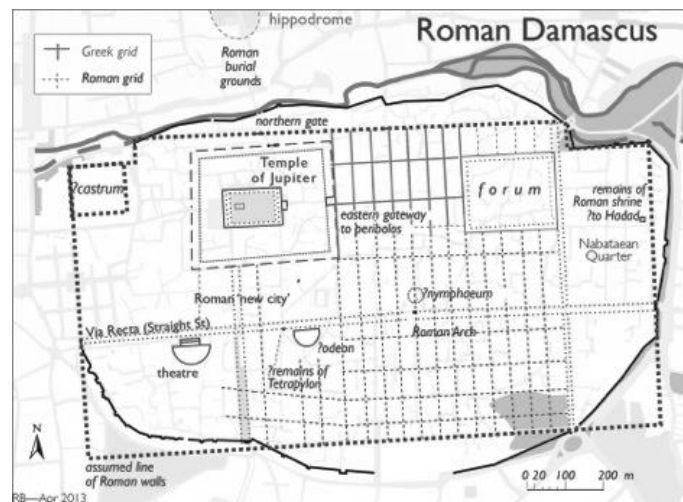


Figure 2. Roman Damascus (Burns, 2011).

Islamic period

Damascus had become mainly a settlement for the wealthy Arabs and the Umayyad Caliphate decided to build a mosque for all the Muslims of the world. Such a building required significant financial power along with exceptional design and organization so the Caliphate invited architects from Syria, Byzantine, Iran and Constantinople. The walls of the mosque illustrated utopian cities and gardens (Coeno, 2003) In the “Everyday life of Damascenes” the neighbors are described to have close relations and shared interests and ceremonies in the Islamic period. The shop owners would control the presence of strangers in the neighborhood. The narrow and winding alleys would preserve women from the eyes of strangers (Ghazaf, 1988).

But how did the Arabs, who were converted to Islam, apply the concepts in establishing new settlements and in adapting existing towns and cities, such as the case of Damascus. The organic

Islamic city began in the Byzantine Empire. The Greek and Roman city followed strong geometric patterns and straight lines (Wifstrand, 2009). Therefore the street network in the older parts of the city is based on the canals built by Aramaneans, Semitic nomads from Mesopotamia, and also based on later orthogonal network of Romans and Umayyads.



Figure 3. Street network in the old part of Damascus (Wild & Stokhammer, 2009).

The strong ritualized living patterns of Islam made formal institutions unnecessary and so open spaces like forum disappeared over time. This transformation from straight Roman street grid with large open spaces into Islamic narrow street-cities happened slowly taking many centuries to form.

The entrance of Arabs is not associated with drastic changes in the form of the city and the changes are limited to the construction of a mosque and a palace for the Caliphate. However after the city became the capital of the Umayyads, gradually other public centers were formed near the primary establishments: Judiciary building, entertainment center, stables, numerous bazaars and indoor trade complex for valuable goods. But the growth of the city took place in accordance with the historic water distribution system (Coeno, 2003).

Colonial period

With the introduction of pipelines through The French, the old system of the canals and sabils was not needed anymore therefore the streets which were formed based on the placement of canals could also be changed. The result of these changes in one of the western neighborhoods of the city can be seen in figure 4.

The last 60 years of the Ottoman Empire was a time of administrated reform and modernization, influenced by Europe. The new urbanism and this was before any French mandate master plan, that developed was based on three principles. (i) Widening of streets and roads. (ii) The design of new suburbs with geometric patterns. (iii) Construct in stone instead of wood (Wifstrand, 2009).

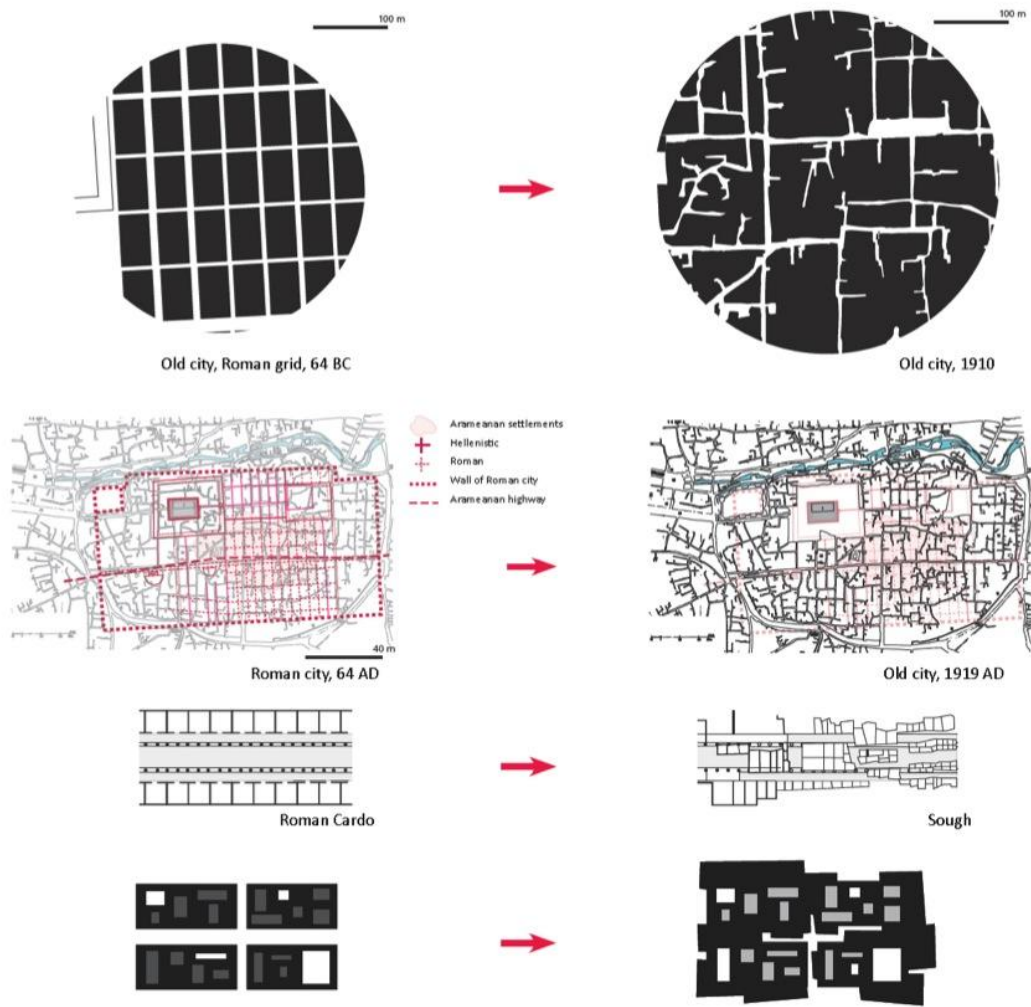


Figure 4. Morphological evolution from the Roman city to Islamic city in Damascus (Wifstrand, 2009).



Figure 5. Area of Baghdad Street in Damascus, Designed by the French (Wild & Stokhammer, 2009).

Another point which affected the form of the cities especially in the old city was the outward movement of wealthier population to modern suburbs and abandonment of old city. This exodus from the old city left it to be inhabited by the poor and in neglect (Wifstrand, 2009).

French Mandate continued the urban development which the Ottomans started in the 19th century. The first master plan for Damascus totally ignoring the local tradition and neglecting the old city, faced a lot of resistance from a city which has grown organically for a thousand years. Danger and Ecochard presented a new road system, creating a ring road around the old town to ease congestion but also to “show off” the cultural heritage of the old city (Wifstrand, 2009).



Figure 6. First French master plan for Damascus and surroundings: the Danger plan developed between 1925 and 1937. A recognizable grid shows the first French urban interventions (Wild & Stokhammer, 2009).

Architectural components of form

One of the important monuments of the city is the Umayyad mosque. The French proposed a plan to separate this mosque from the urban fabric in 1984 in which there is a road for vehicles around the mosque.

All architectural interfaces as the smallest piece of an urban fabric are very much part of the development of Middle Eastern city, especially Damascus. The smallest elements like the fountain, the tale' or the canals are influencing and determining the whole city structure. From the roman orthogonal canal grid to the hamams as urban nodes, the sabils as public meeting points and representative architectural elements to the courtyard fountain as the end of a whole chain of division and separation processes. The fountain again is defining the size of a courtyard and so also the proportion of a house, which is part of the urban fabric of a neighborhood and the whole city. All these elements formed urban fabric and are only working by a system of ancient pipelines and the natural gravity. The symbolic meaning of water is also given, because there is a strong bonding between architecture and infrastructure which is not separable because none of it is possible to exist without the other one (Chang & Lienert, The Oasis City, 2009). Although sabils have now lost their original function with the use of a modern water distribution system, there has been attempts in some parts to preserve them from an urban heritage viewpoint.

It can be assumed that most of the city parts developed out of a canal grid. So at the urban fabric of the city the history is still visible. The agricultural field which is strongly connected to traditions and heritage could also use the water of these canals. The original field was probably a square or rectangle and was in possession of one farmer. The ownership allowed him to use the canal with a certain amount of water for a specific time during the week. In every village or

city-neighborhood was a person in charge of the time schedule (Chang & Lienert, *The Oasis City*, 2009).

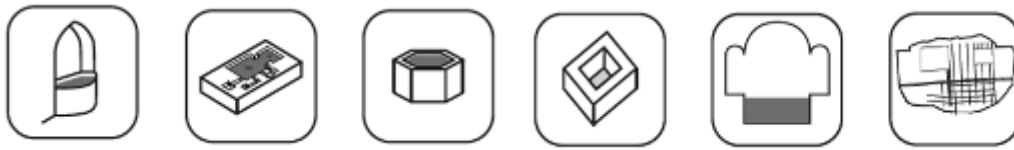


Figure 7. Water-related architectural components in old Damascus (Sabils, Fountains, Water reserves, orthogonal grids, etc).

Often buildings were built along main street, which was built along the main canal. So the canal had to be redirected around the building areas to the fields. Over time the fields got less important and the canals dried out or got abandoned and streets were built on top of it. A block structure evolved. The third step is that a total urbanization of the agricultural area happened. Most parts of the city were at a status of change. Only the main city and its areas around are completely evolved. Midan is an example for a perfect change from agriculture to a central urban neighborhood. Therefore between the 1870s and 1920s, it is assumed that irrigation system heavily influenced the urban morphology of Damascus (Chang & Lienert, *The Oasis City*, 2009). The following pictures illustrate this influence.



Figure 8. Water canals (simple line: Canals for the city, dotted line: canals for agricultural lands) (Chang & Lienert, *The Oasis City*, 2009).

Housing

Visible in the buildings of the French Mandate era is that the courtyard disappeared completely. The first time that it was possible to create apartments on one level, stacked onto each other. The building became a closed volume and the private exteriors changed from courtyard to balconies. The private exterior got minimized but there started to be a collective exterior in the form of public parks (Chang & Lienert, *The Oasis City*, 2009).

Gardens

A second step after decoupling of water from architecture was introducing a different understanding of gardens, coming along with the French mandate. The garden became something collective and shared a social meeting pot. It is something totally new in the understanding of public space in city, since the garden or also a “private exterior” used to always be clearly defined in terms of who it belonged to (Chang & Lienert, *The Oasis City*, 2009).

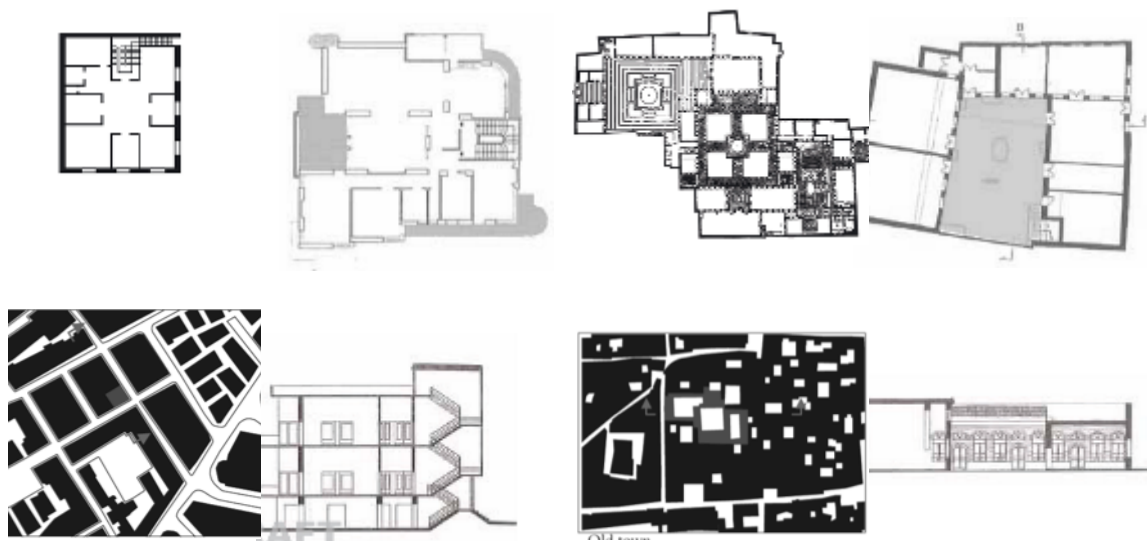


Figure 9. Pattern of modern (left) and traditional (right) houses in Damascus (Chang & Lienert, The Oasis City, 2009) (wifstrand & Jila, 2009).

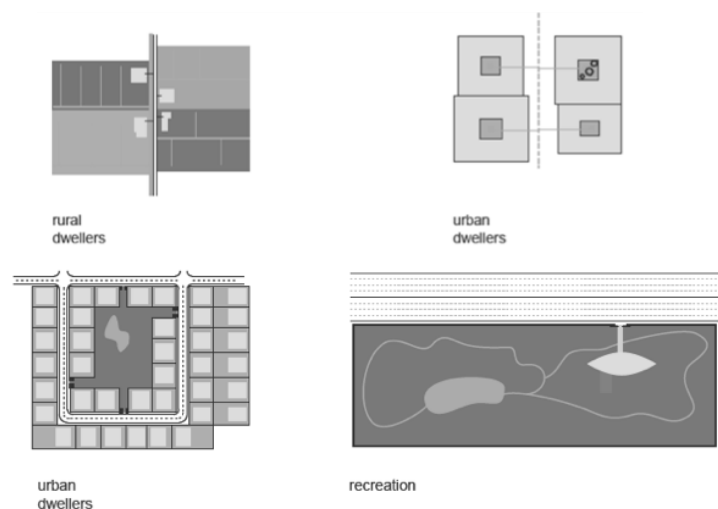


Figure 10. Evolution of Gardens in Damascus (Chang & Lienert, The Oasis City, 2009).

In summary after the French came into the city, there was a change in the structure of the social and architectural life in the city. The main inventions and developments of the city which made Damascus the longest permanently inhabited city were made since the Neolithic era until 1920s. This period is of course very wide-spread but the infrastructure system did not change much in it. Canalization happened at the beginning of this period and then Romans connected the city with a pipe system to the spring water. Later on the Sabils were built in the city and generally there was a coupling of water and architecture. However after the installation of modern pipe system the decoupling of water from architecture started and continued by the French master plan by Ecochard which changed the cityscape from Damascus totally (Chang & Lienert, The Oasis City, 2009).

The main characteristics of this period can be categorized as follows: master plans, immigrations, socialism and neglect of the old city

Contemporary Period

In the contemporary period there is a selection of ideas which is mainly affecting the form of the city. Some of which include: garden city as a new take on the idea of an oasis set up in the desert, socialist city which targets mass housing as a strategy to move out the surplus inhabitants of Damascus, and gated communities which have mostly been formed for the more wealthy citizens but are changing the form of the city nonetheless.

Cairo

Islamic period

The emergence of Cairo occurs mainly with the entrance of Islam to the area which was consisted of disprsd settlements. The city of Fustat near the remains of Babylonian fortress was the first Muslim settlement. After that settlements as Al-Askar of the Abbasids and later Al Qatai of Ahmed and Tulun were built further north. In 969 the Shii'te Fatimid Caliphate conquered Egypt and developed a first plan (rectangular grid) for their city on a new site (Al-Qahira) (Mélanie & Nathalie , 2011).

In the early years Fatimid city was only a royal and military refuge city which had two palaces in its center. The main street was called Bayn al Qasrayn which means between the palaces. There was also a north to south corridor (Mélanie & Nathalie , 2011) & (Coeno, 2003).

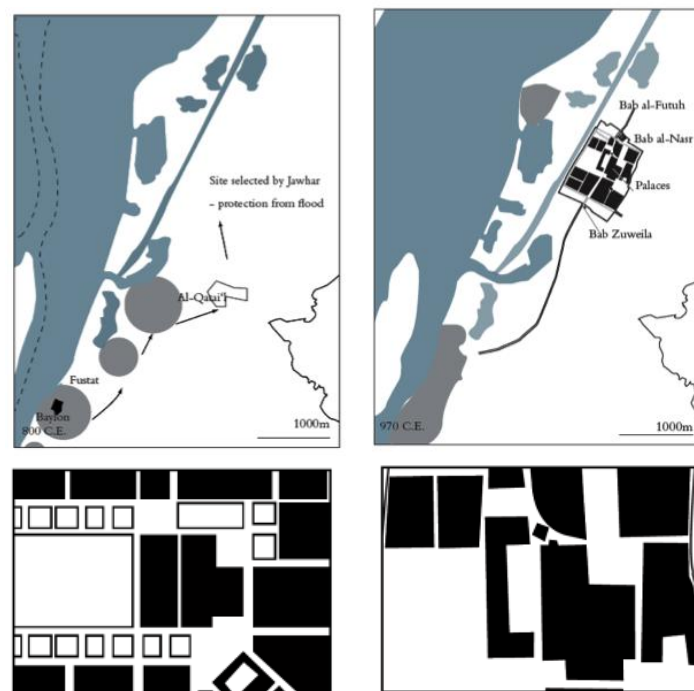


Figure 11. First Muslim Settlements (left), Fatimid Dynasty (right) (Mélanie & Nathalie , 2011).

As the Ayyubids came to power Salah-al-Din, principle ruler, built a gigantic wall encircling Fustat and Al-Qahira. He opened the former princely city to the public who began to build in its spaces and gardens, changing the function and structure of the Fatimid's city. The city then was consisted of very dense pattern of houses that formed narrow streets. Cairo developed from a military camp to a religious place. During the period of the Mamluks Cairo experienced a great growth. It was during al Nasir's reign that Cairo experienced its greatest

change and the western development was encouraged. Mamluks were famous for their wealth and ambitious building activity of madrasas, mosques, sabils etc (Mélanie & Nathalie , 2011).

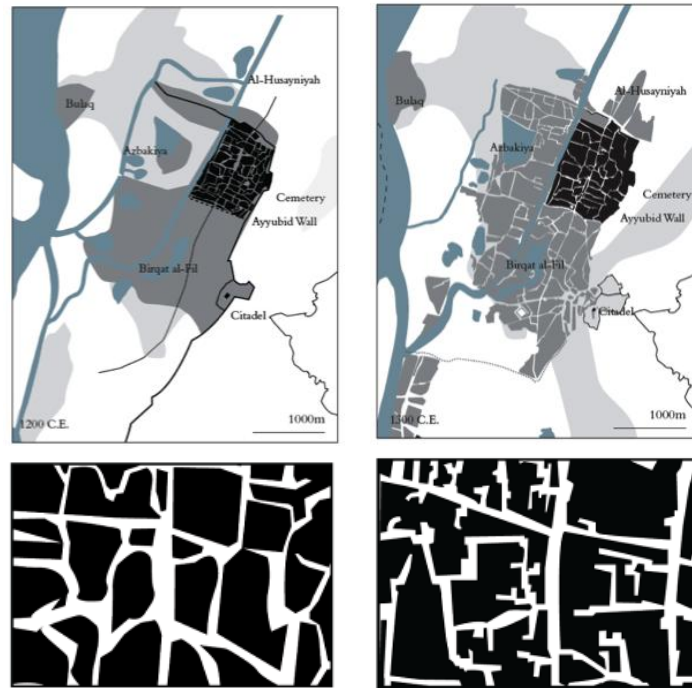


Figure 12. Ayyubid Dynasty (left) Mamluk Dynasty (right) (Mélanie & Nathalie , 2011).

Although there was many constructions in Ottoman period, the constructions were not very organized, monuments and open spaces were built in close proximity and densely especially in the old part of city, corridors were occupied by retailers who would block the traffic, and winding streets and unrelated and abnormal buildings cleared out the wide streets of the Fatimid (Coeno, 2003).

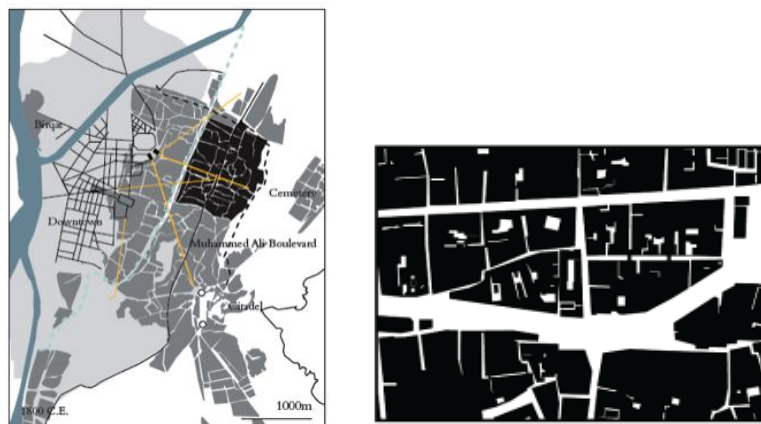


Figure 13. Ottoman Cairo (Mélanie & Nathalie , 2011).

Considering the changes in this period, the desire to integrate the architectural elements resulted from the local traditions with the capabilities and potential of a new context, is quite interesting. The loyalty to the local traditions which is manifested in the official buildings is evident (Raymond, 2002).

Colonial period

The modernization of Egypt and its capital began under Mehemet 'Ali (c. 1769–1849), often called the "father of modern Egypt," who ruled the country for nearly half a century beginning in 1805, modernizing and strengthening it, and expanding its borders. Modernization of Cairo began in 1830, but the period of greatest progress occurred during the reign of Ismail Pasha (r. 1863-79). Pasha undertook a major modernization of the city modeled on the renovation of Paris under Napoleon III (1808–1873). To the west of the older, medieval part of Cairo (now called Islamic Cairo); a newer section of the city boasted wide avenues laid out around circular plazas in the style of a European city. The development of this area was also influenced by the growth of French and British colonial power in Egypt (Cairo, 2008). The interventions went so far that the term “Paris along the Nile” is sometimes used to describe Cairo in those years.

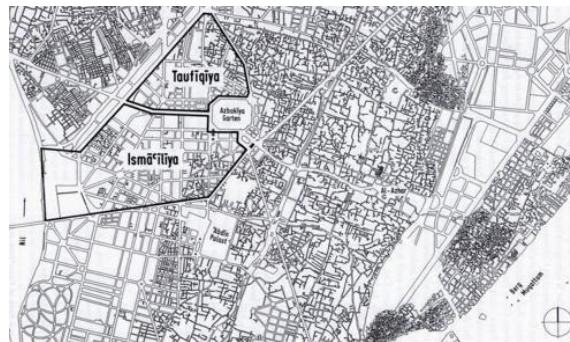


Figure 14. Map of Cairo in colonial period (Elshahed, 2011).

Contemporary Period

Considering the significant growth of Cairo in recent years, new neighborhoods have formed and are being formed. Since the implementation of decentralization policies, the Islamic part of the city is declining. Although there are plans for conservation of heritage, the surrounding residential areas are mainly neglected. However there are bright planning spots as well, like the Al-Azhar Park.

During the 20th century the trend of restoring single monuments was converted into a new ideology. Many heritage and conservations plans were set for the city. But one can summarize that all the plans intended to create a monument corridor with touristic infrastructure that has the character of an open-air museum. There is no clear and specific building law for city parts which makes the development even more unpredictable and confusing.

Tehran

Emergence

Decline of Rey was the advent point of Tehran development. Rhythm of development of this city became faster in Saffavid Dynasty. When Ghazvin was chosen as capital, Tehran became subject of attention for authorities due to its good location and weather.



Figure 15. Current Cairo and the location of old city (Mélania & Nathalie , 2011).

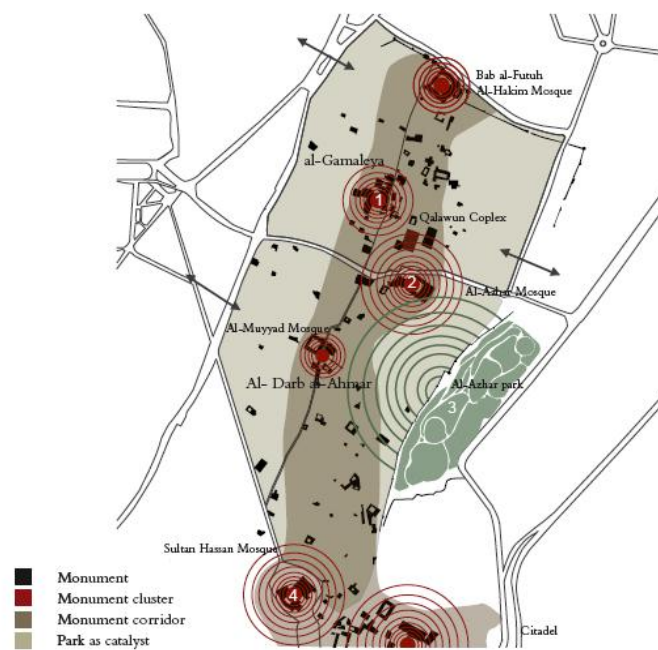


Figure 16. A sample of heritage and conservation plans (Mélania & Nathalie , 2011)

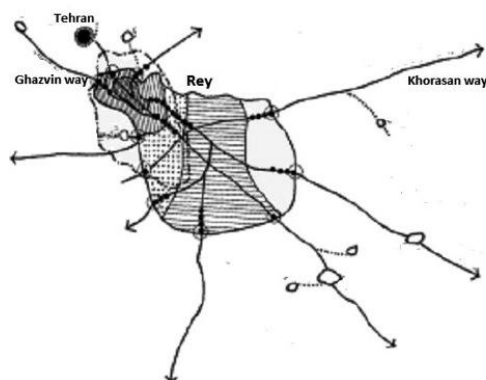


Figure 17. Rey and Tehran (Hamidi, 1997).

Islamic period (beginning of Ghajar dynasty to Nasereddin Shah)

In 1200 Mohammad Khan, king of Ghajar chose Tehran as capital of Iran. This new role of the city changed its form and landscape. However the changes in this period were limited to establishment of new buildings and walls and later on development of new communities and inner growth of market (Hamidi, 1997:19). Indeed, evolution of urban structure was the main change in the city during Mohammad Khan's reign.

The king after him, led the growth of city outwards by building mosques, markets, communities, palaces and gardens out of the city boundaries (Hamidi,1997:20). This approach was modeled after the changes in Paris regarding Versailles. Generally, at this stage development of the main structure adhered to linear-branch and linear- central patterns (Hamidi,1997:22).

Architectural elements of urban form including mosques, schools and formal and official buildings especially in new urban centers; have bigger lots and open spaces at this stage, but still adhere to introvert pattern. The texture is still continuous and integrated which conforms to the existing linear-branch pattern (Hamidi,1997:22).

Introduction of Modernism (from Naserddin Shah Ghajar to Islamic Revolution)

Vast urban growth occurred in Naserddin Shah Ghajar reign which was the second stage of development in Ghajar dynasty. In this period many new buildings and gardens were built in Tehran and the city expanded significantly. However main elements of urban form remained untouched.

Amirkabir was one of the men who had a major role in the development of Tehran. In this period compact and dense texture of the city, and narrow non-geometrical streets were regenerated (Hamidi, 1997: 24-28).

Although the city development occurred in all directions, the quality and quantity was not the same. The growth was more concentrated in the north of the city because of the location of king's palace.

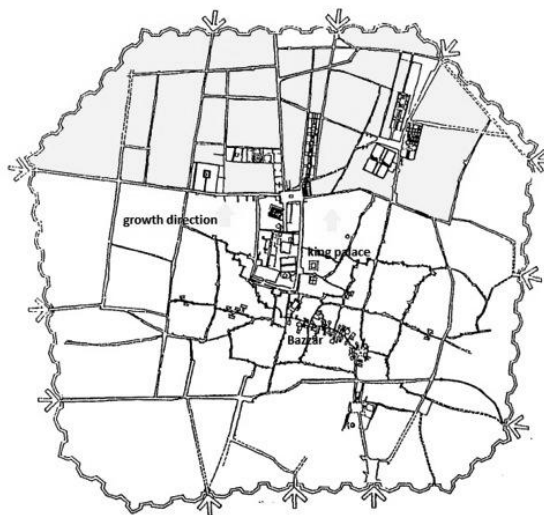


Figure 18. Emergence of wide and semi-orthogonal streets in Tehran and concentration of growth in north (Hamidi,1997).

This period is characterized by gradual and integrated growth of the previous pattern which also in some places is starting to show the first steps towards the fundamental changes in the next period (Hamidi,1997:31).

The changes to the structure were mainly the result of the construction of new streets, squares and buildings which changes the nature of the structure from linear-central to a grid pattern. This new grid pattern could also accommodate new urban elements which subsequently further changed the form of the city.

Architectural and urban elements which were built in big plots were surrounded by great open spaces as well. Therefore the space-mass ratio shows a significant increase (Hamidi,1997:32). The wide streets and squares subsequently led the development of the structure towards the outer regions.

Another major change in this stage was the pattern of urban façades and monuments. For the first time great attention was paid to the design of exterior facades of the buildings and also the placement of monuments and signs. Shamsolmareh is a good example of this change.

Another indicator of visual characteristic of this period is the construction of important buildings specially Ghajar palaces in strategic topographical points outside the city. One of these examples was Doshan Tappeh palace. (Hamidi,1997:34-372).

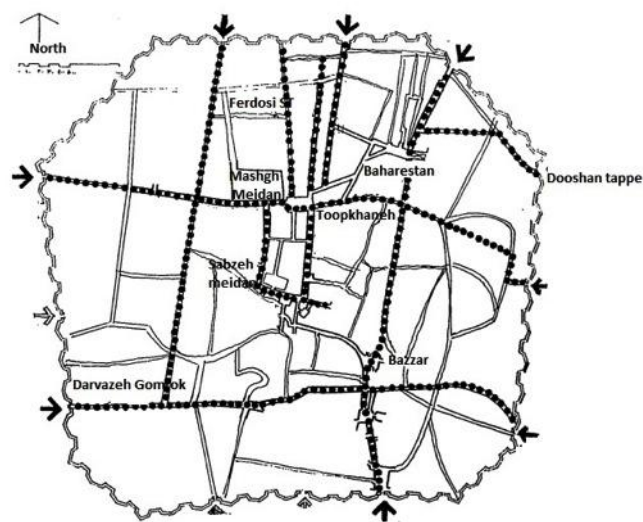


Figure 19. Great open urban spaces and Ghajar palaces in strategic topographical points outside the city (Hamidi,1997).

Two sets of internal and external factors contributed to neoclassic or neo-traditional styles in Ghajar dynasty. The most important internal reason was Ghajar's tendency to associate themselves with the powerful Safavid dynasty. And one of the major external agents was the attempt to define a new identity for country in relation to the new world which was very important for the Ghajar government. This definition of identity led to total and fundamental change in urbanism and architecture. In this approach city was considered as a new interpretation of the old city with different time- space concepts (Habibi, 2004). The emergence of Tehran style occurred in this era but achieving the real concept of this style needed two historical event; 1-reformal practices of Amirkabir in creating new official systems and 2- presence of European teachers and engineers in Darolfonoon school as the first professional school in Iran (Habibi, 2004). Tehran style in general avoided interfering with the old parts of city but tried to changes some functions and elements which in some cases resulted in social movements, for example moving the city center from Sabzeh Meidan to Toopkhaneh square.

Pahlavi

This period was accompanied by changes of the main structure of the city in the official and legal frame of Baladiye (municipality). In which one of the first action was demolition and renewal of traditional old neighborhoods of city center. In addition construction of wide streets, new governmental and cultural buildings were other actions occurred in regard to this official frame, these changes formed the basis for further development of main the structure (Hamidi,1997:42-43).

The orthogonal grid pattern of streets directed the growth of the city to the north- south and east-west directions. New elements and functions were shaped in the north and south of the city. Indeed, this period can be considered as a start for the separation of main component of city structure or change of continual pattern of structure growth to the disconnected pattern. Tehran University and The Central Train station are some of the examples. Therefore streets role as linear elements strengthened in this era (Habibi, 2004).

Introvert growth of Tehran occurred through changing the function of gardens and palaces into public functions or through construction in open spaces. In contrast, the construction of new street network and formation of functional centers along them along with architectural elements built separately in other parts of the city resulted in a simultaneous extrovert growth (Figure 20).

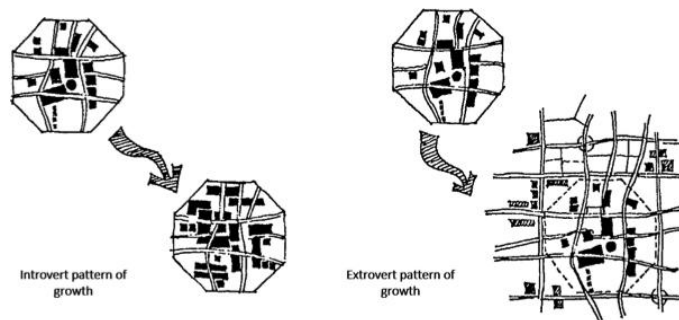


Figure 20. Extrovert and introvert growth pattern of Tehran (Hamidi,1997).

In summary physical structure of the city changed in this period and the city has hybrid structure: A center which is shaped after the traditional structure of the city and an orthogonal street network branching out from this center in all direction with small dispersed centers around them.

Architectural elements

In the Tehran style squares had a different organization in terms of concept, function and structure in comparison with the traditional midans. Toopkhaneh square and Baharestan were formal and symbolic representations of this change. In these squares instead of school, mosque, bazaar and palace, new components were located such as banks, municipality and post office. Bazaar was confronted with strong rivals such as cinemas and hotels which changed the form of the city with their new functions. Streets had nor the traditional role of recreation neither the contemporary role of traffic, but they found a new role as livable urban spaces.

In this style confrontation of old and new, contemporary and traditional, vernacular and foreign exhibits their first spatial and formal effects on the city. As a result streets and squares, with their new components, became places of gathering for “modern” people and Bazaar became a place for general public who still lived based on traditional lifestyle (Habibi, 2004).

Evolution of the city in Pahlavy dynasty was under the influence of modernism international movement. Haussmann inspired spatial and physical organization of cities occurred in Tehran as

well. The straight and wide streets of the 19th century Europe formed the foundation of future developments of Tehran.



Figure 21. Expansion of the city –Hamidi (1997).

Summary

The changes the form of Damascus, Cairo and Tehran went through are summarized in the following table.

Table 1. Summary of the changes in form in Damascus, Cairo and Tehran

City	Emergence	Islamic Period	Colonial/ Modernism period	Contemporary Period
Damascus	<ul style="list-style-type: none"> • Water distribution systems/ Canals • Infrastructure • Greek and Roman orthogonal grid 	<ul style="list-style-type: none"> • Formation of single buildings • Decline of orthogonal grid • Decline of public arenas • Formation of organic grid through time • Private gardens 	<ul style="list-style-type: none"> • Straight and wide streets • Disregard of the canals and existing infrastructure • Geometric patterns in new developments • Material change (from wood to stone) • Disregard of context and traditions 	<ul style="list-style-type: none"> • Using development ideas such as garden city, socialist city and gated communities • Public and shared gardens • Decline of old parts
Cairo	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Rectangular grid • Royal and military use • Construction of walls around the city • Conversion of rectangular grid to organic pattern through time 	<ul style="list-style-type: none"> • Modernization modeled on renovation of Paris • Wide avenues around circular plazas • Paris along the Nile 	<ul style="list-style-type: none"> • Decentralization policies • Decline and Abandonment of old parts • Conservation and preservation plans for specific sites disregarding the surroundings
Tehran	<ul style="list-style-type: none"> • Good location and weather • Small existing settlement 	<ul style="list-style-type: none"> • Establishment of new buildings and walls • Organic grid/ narrow streets • Linear pattern of structure with important buildings surrounding it • Outward orientation of development though construction of mosques, bazaars and communities outside of the city boundaries 	<ul style="list-style-type: none"> • Construction of new buildings and gardens • Regeneration of texture and streets • Orthogonal street network in new developments • Continuation of organic grid in older parts • Formation of squares • Construction of new buildings in bigger plots with large open spaces surrounding them • Attention to the design of facades • Use of urban buildings to demonstrate power and create identity • Demolition and renewal of old parts • Dominant official buildings 	

Conclusion

Indeed, there are many factors contributing to the form of urban fabric and its elements, such as geographical, social and economic factors, this article attempted to single out one contributing

factor and tried to illustrate to what extent the governing thoughts of a city can influence the form and process of change in the city. For this purpose the form of the city, consisted of the urban fabric and architectural elements, was assessed in different periods: Islamic, Colonial, Modernism and contemporary.

Cases in this article demonstrated despite the similarities between each period in the cities, there is a great difference between the changes the form goes through in Islamic, modernism or colonial periods. The main point in the Cairo and Damascus was that the governing Islamic thought has changed the face of the city gradually and with respect to vernacular factors. Whereas in Colonial period the modernist approach has changed the form totally and rapidly through vast interventions.

Studies also indicate that in the Islamic period the changes made to the form are mostly limited to single buildings contributing to emphasizing the presence of Islam in the city or as a manifest to the power of the caliph; however the general form of the city has mainly stayed untouched in compliance with the local social and environmental requirements. In contrast, the colonial period is coupled with vast changes and modification to both the general form and its components due to the technological advances and the mass production trends. The changes in the contemporary period are however built upon the challenges that the modernist approach brought about and therefore take a more moderate route.

It is also noticeable that the scale of changes in each case in all three periods is different due to their unique situation. Definitely Tehran is somehow different because it has never officially been a colony. However it does not mean that the governing thought was not affected with international dominant trends. This led to new hybrid styles of traditional and new ones.

Finally, it should be considered that this research barely scratched the surface and there should be more extensive research on how the governing thoughts can and will influence the form of cities.

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The evolution of neighborhood models as a manifestation of political regime shift: a case study of Cairo - Egypt

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Abstract. *Through history, Cairo witnessed different political regimes that caused consequential different neighborhoods models with varying socio-spatial characteristics. The research is to tackle the effect of Political regime on cities first in terms of their impacts on development manifesto, the role of development actors, and planning theory, then their impacts on the Evolving and declining neighborhood models. The paper will track Cairo development through history by Linking between the adopted political regime with development policy and their analogous impacts on Evolving and Declining patterns of urban development. This will pave the way to predict the future of neighborhood model form as manifestation of current and future political regime paradigm shift, especially after 25 Jan. revolution. In Order to achieve this goal, the paper based on a case study of 5 different neighborhood models at different chronological ages, an empirical analysis based on three steps: First, to document aspects of political regime and their impacts on development actors and planning method. Secondly, to measure the common socio-spatial patterns of evolving neighborhood model in three level analysis micro community, adjacent community, and macro community. Thirdly, to examine the correlation between the socio-spatial patterns of neighborhood models and the Political regime aspects.*

Key Words: Political regime, Islamic, Imperial, Socialism, Capitalism, Post-Capitalism, neighborhood

Theorizing the impacts of political regime on neighborhood models

This part of the research intends to theorize the impact of political regime on neighborhood models. Through three interlocking parts, the political regime, the impact of political regime on design and planning method, and finally tracing neighborhood models as a manifestation of planning method on political regime. This analysis method is used later on to test different political regimes and their impacts on evolving and declining neighborhood models.

Political regime

The political regime is a set of political structures that make up a state and determine who has access to political power. And it ranges from single to public involvement in decision making Fishman, R. (1990). Political regime can be classified under different headings based on democratic versus authoritarian, Van den Bosch defined three types of political regimes based on type of government; the single, aristocratic, and democratic (Van den Bosch, J. - 2013):

i) Autocracy (Dictator-Single) Regime

In this regime, government is carried by an absolute ruler, in which a supreme power is concentrated in the hands of one person, whose decisions are subject to neither external legal restraints nor regularized mechanisms of popular control when other states call the head of state dictator, that state is called dictatorship (Gordon 1987).

ii) Anocracy (Aristocratic-Elite) Regime

In this regime, government is carried by a group or class considered superior to others. is a regime-type where power is not vested in public institutions but spread amongst elite groups who are constantly competing with each other for power .

iii) Democracy (Public) Regime

In this regime, government is carried by representative are elected by citizens to make political decision for the people, a doctrine of or belief in social equality or the right of all people to participate equally in politics.

The relation between politics and urban form always exist, but it was much clear in large political paradigm shifts. There are different causes of politics paradigm shift. It could be based on religion shift, just like the shift from Aton religion into Ekhnaton religion, and the shift from the sunny into shea. It could be based on an economic shift, just like the political shift from communism into capitalism (Fatma, 2013). On the other hand the political paradigm shift should have consequences on the society structure and methods of production, and of course on architecture and urbanism.

The impact of political regime on urban planning method

The type of political regime could impacts urban planning methods; it also impacts the role that different development actors play in the political decision making and design methodology. It also impacts the degree and power of intervention of each group. For example in the dictator governance, the emperor is the only one who can take the decision. On the other hand, in the aristocratic governance, the elite benefit group even they were politically, socially, politically elites or they were ethnic groups. On the other hand, in the democratic governance, the public have great impacts on decision making.

Role of development actors

Authority, developer, planner, community and interest groups are actors that are sharing with varying values in decision making in urban development. According to the type of political regime, the type and degree of the role that each of these actors play in urban development are defined, and consequently impact the process and methodology of producing urbanism. This role ranges between complete controls, partial involvement, and complete neglecting in decision making. Beside, defining the primary and secondary role in urban development represented in regulator, developer, and builder:

- (i) State Role, represent the state political manifesto. According to political regime, its primary and secondary role ranges between being regulator, developer, and builder.
- (ii) Private sector Role, that works to achieve money capital benefits. According to political regime, its primary and secondary role ranges between being developer or reduced to be builder.
- (iii) Planner Role represents the technical role; According to the political regime, the planner works for the state to achieve public benefits, or work for the developer to achieve private
- (iv) Community member, who benefit of architecture and urbanism, and the only affected with the political decisions.

According to the political regime, the Regulation role ranges between Common regulations that carried by the people themselves, or intended written regulations that carried by the state with strong governmental legislation framework, or unwritten regulations that carried by the developer with New-private legislation framework instead of the weakness of the authorities legislation framework.

Planning methodology

According to the role of development actors involved in planning and decision making, three types of planning method are used:

- i) Central/comprehensive/holistic Model: A central planning method is used for the complete control on decision making, take place in dectator governments. Planning is considered as a scientific-technical process without any involvement of the public (Kinyashi 2000). Where the planner work for the dictator to achieve their trends, and develop a master plan.

ii) Incremental/advocacy/ participatory Model: An involvement of the public in planning methods, the planner work for the public in planning method, the planner obeys strategic plan, where all interest groups should permit the plan.

iii) Market oriented planning model: It is used with incremental strategy to meet market needs, most commonly used in capitalist communities, where the market controls the incremental modification of the plan. Depending on the regulation role of government, It can operate in two ways, the first with weak legislation role of the government, the monopoly take place and the customer (private sector) controls with monopoly all development aspects to achieve his benefits, the second, with strong legislation framework, the incremental modification take place for the benefits of the consumer.

Tracing the impacts of political shift on urban form

Neighborhood Models have witnessed a large shift as a result of the Political shift. To test this hypothesis, a previously developed spatial analysis tools are used to trace the ways in which political regime impacts the social and spatial fabric of cities (Ghonimi et.al, 2011).

In order to achieve this aim, the research depends on three levels analysis. First, the way political regime impacts spatial and social fabric of micro community is traced. Second, the ways in which these socio-spatial features change the continuity and relationship with adjacent community and consequently impact the social and spatial fabric of adjacent community is deduced. Third, the way in which these communities collectively impact the social and spatial fabric of macro community is deduced (Ghonimi et al, 2011).

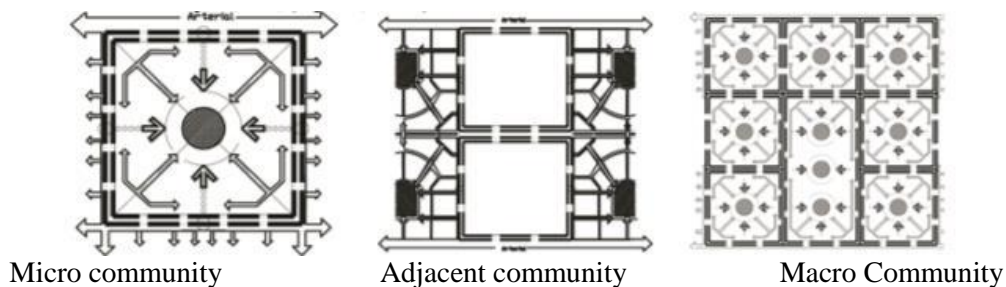


Figure 1. Three level analyses.

Neighbourhood socio-spatial characteristics

Street network pattern, land use pattern, and housing pattern are socio-spatial characteristics of neighborhood model, that are used to manifest political regime (Ghonimi et.al, 2011).

Street network pattern ranges between grid, loop, and tree patterns their spatial structure can be classified under heading of type of street, Linear feet of streets, number of blocks, number of intersections, number of access point, number of cul-de-sacs, percentage of streets area.

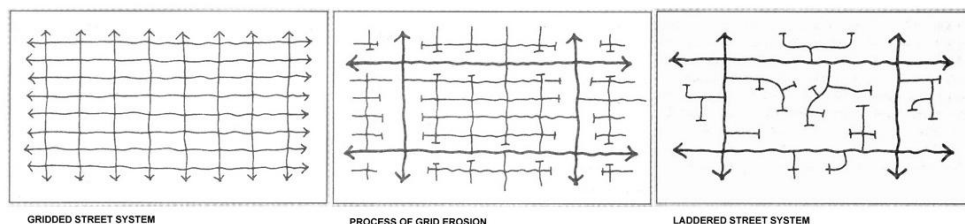


Figure 2. Alternative street network pattern (Carmona, 2003: 73).

Land use pattern can be classified under heading of landuse type, variation and density. The (dividing vs. connecting) line between different landuses represent the mixed vs. separation of landuse as a manifestation of political regime (Ghonimi et al, 2011).

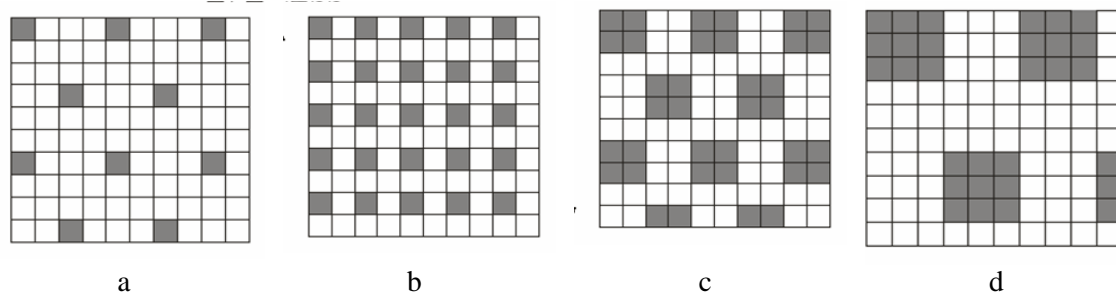


Figure 3. Alternative land use patterns (Ghonimi, 2011).

Housing pattern can be classified under heading of landuse type, variation and density, they can be measured using the (dividing vs. connecting) line between housing types. It represents the exclusion vs. segregation of housing types as a manifestation of political regime (Ghonimi et.al, 2010).

For the social governments this line is called connecting line (not dividing) it increases social benfits through creating a relation between different social groups, according to Butman it creates much more social capital. For the post capitalist governments this line is called dividing line (not connecting) it reduces capital benfits through creating a relation between different social groups, it reduces the mony capital of the developers (Ghonimi et.al, 2010).

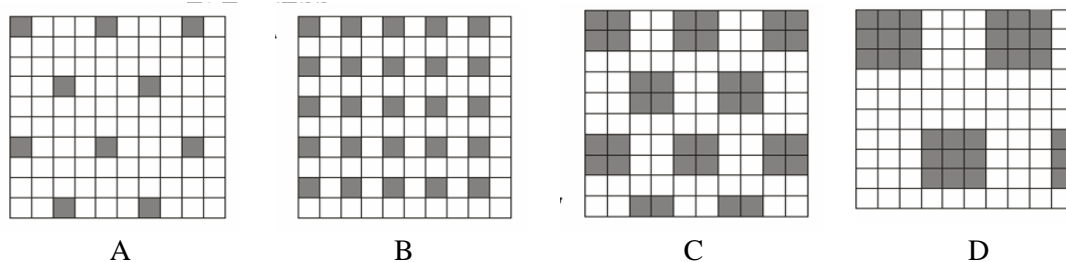


Figure 4. Alternative housing patterns (Ghonimi, 2011).

Adjacent Community socio-spatial characteristics

Micro Community socio-spatial pattern constitute the way neighborhood models create it's relation with external social-spatial fabric, and determine how to encourage or discourage connectivity, accessibility and interaction with its adjacent neighbors and with its boarder city. The relation between the new development and its existing context determines its way of social, economic, political, and functional interaction.

Spatial Fabric: The (dividing vs. connecting) line neighbourhood and adjacent community, represent the type and degree of inclusion vs exclusion of the neighbourhood model. It can be measured through No. of egress, No. of continued streets, Parameter, type of parameter, Length of parameter.

Social fabric: The (dividing vs. connecting) line between neighbourhood housing type and adjacent community housing type, represent the type and degree of social inclusion vs social exclusion of the neighbourhood model. It can be measured through length of line between Micro to macro housing type, variation, and difference.

City socio-spatial characteristics

The type of the relation between micro community with adjacent community constitute the pattern of the city, which Visualizes the ways in which these socio-spatial features are collectively reshaped the socio-spatial fabric of public and private realms of the city.

The case study of Cairo

The following part will examine the impact of political regime in term of (development actors, development methodology) on the evolution of neighborhood models. The field study will go through four stages to achieve these goals. First: Case study selection: 5 case study areas are selected. Second: Data Gathering with defining methods, and tools, of collecting. Third: Data Classification including the documentation and measurements of the variables. Finally: Data analysis: undertaken to test the hypotheses of the research to reach the results.

Cairo is exposed to different changes of political regime starting from the origin islamic, Impiral, Socialism, Capitalism, and post Capitalism. Thus undergoing a dramatic shift on neighbourhood models and city form. The case study of Cairo will be investigated through describing the effect of changing political regime on urban legislation, planning proceeds and role of development actors. Then describing the resulted changes on the urban form. The data related to socio-spatial characteristics were measured using different measurement tools and their scores are presented in table (1,2).

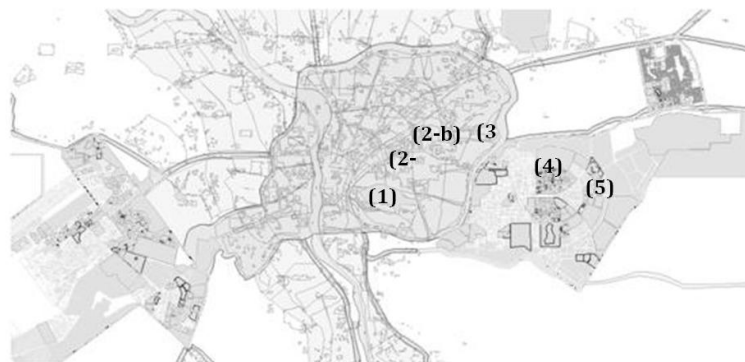


Figure 5. The case study of Cairo.

1	Islamic Cairo	3	Cairo under Socialism (Nasr city)
2-a	Imperial Cairo (Khedive Cairo)	5	Cairo under Capitalism (New Settlements wave)
2-b	Imperial Cairo (Masr El Gdeda)	6	Cairo under Post- Capitalism (compounds)

Cairo's political changes and the urban form

To understand the changes that took place in Cairo, first a portrait will be drawn of the original political and urban form of the traditional city followed by its steps towards current states.

The Islamic Cairo (the impacts of Basic principles of Islam on urban form)

Cairo under Islamic governance, passed through different political regimes, with different government types, it ranges between the public and the aristocratic governance depending on different factors:

- i) The religion versus mundane tendency;

ii) The type and degree of dependency as an Emara depend on the Caliphate, or independency as in Tolon and Fatimid;

iii) The fundamentalism versus multi-nationality and the degree of foreign intervention.

Starting with Rightly Guided Caliphs, Muslim authority were adheres with the religious tendency. Fustat was established by Arab military commander 'Amr ibn al-'As to be the first Islamic capital of Egypt. The Doctrinal base of No damage or harm in Arabic "La Darar nor drar", was a guiding role in shaping urban form. This was reflected on the city form (Fostat):

i) street network pattern: A Central and radial street network pattern is used to link all city with the mosque as the central element of the city.

ii) land use pattern: Land use are characterized by variety of deferent types of uses, Starting from the mosque as the center of the city, and to be the authority place at the same time, it was partially surrounding the central mosque by different layers of interconnected markets (suqs), Ending with residential and commercial uses, all land uses were mixed with each other, except the crafts that cause harm to residents, is excluded out the city, respecting the Doctrinal of "La Darar wala drar".

iii) housing type: Fustat was mainly characterized by its intermixture where the poor and the rich inhabit the same alley (hara). This caused homogeneity in social fabric; there was no social division between the rich and the poor.

Moving Egypt to Abbasid Caliphate, Al-Askr was established as the new Abbasid capital of Egypt. Abbasid Caliphs used foreign Persian elements, they shift the governance from public democratic into aristocratic governance that bring with them the luxury life style and bring the stratigraphic trend, also this caused a reduction of religious tendency and instead increased mundane tendency. This was reflected on the city form (Asker) with following patterns:

i) street network pattern: A Central and radial street network pattern still used to link all city with the mosque as the central element of the city, with filling the spaces between the fingers.

ii) land use pattern: The mosque was removed from the city center and replaced with governmental palace and princes palaces attached to the center.

iii) housing pattern: Fundamentalism to multiple nationalities, a social division between the aristocratic foreigner governors and the public poor exist. The city become composed of consecutive rings the center is the authority palace, the mosque and commercial areas, the next ring locate princes houses and the next ring high level governmental employees, and the outer ring the public poor residents.

Moving Egypt to Tulunid Emara. The Turkish Ahmed Ibn Tolon, accounted for the authority for himself. He shifts the governance from aristocratic into single governance. Ahmad ibn Tulun established Al-Qatta'i as the new Tulunid capital of Egypt. It was founded with a change in the governance from emara depend to the khelafa into an independent entity. This was reflected on the city form (Al-Qatta'i) with following patterns:

i) street network pattern: A Central and radial street network pattern still used to link all city with the mosque as the central element of the city, with filling the spaces between the fingers.

ii) land use pattern: The role of the mosque is reduced and replaced with the governing palace, mosque, commercial area that are placed at the center of the city.

iii) housing type: Apartheid regime is growing where a layer of who is closer to the governor, were dwelling near the central layer and excluding the poor in the outer layer. So a social division exists between the rich and the poor.

Moving Egypt to Fatimid Caliphate. It was a Shia caliphate, They originated Fatimid Cairo, al-Qāhira (Cairo), to the north of Fustat, When Al-Mu'izz ordered Jawhar Al Sikilli (the Sicilian) in 973 to build the Fatimid new capital in Egypt. They worked to encourage Egyptians to turn from sunni to shai, in order to achieve this goal they built the city with following patterns:

i) street network pattern: A linear street network pattern started to be used to accommodate a multifunctional core connecting the city two mosques.

ii) land use patterns: a multifunctional mixed land use core connecting structure enveloping between the two mosques Al-Azhar and Al-Hakim to publish the shai doctrine, they built two palaces at the middle of the core, for the caliph and for his heir, opposite and facing each other, to practice different celebrations in order to extract Egyptians to Shia. The two mosques, in addition of being the place of prayer, their courtyards serve as the primary public open space of the city.

iii) housing type: the turn from Fundamentalism to multiple nationalities caused a social division between the aristocratic foreigner governors and the public poor. The city become composed of consecutive rings the center is the authority palace, the mosque and commercial areas, the next ring locate prince's houses and the next ring high level governmental employees, and the outer ring the public poor residents.

Moving Egypt to Aube Caliphate. It was combined with two political shifts, the first is to eliminate the impacts of Shea doctrine and to encourage the shift from Shea to Sunni Doctrine, and the other is to face the external potentialities of the crusade and Tatar invasion. In order to achieve this aim they made some political strategies that are reflected on urban form:

i) street network pattern: A multifunctional core still exists, with increasing development areas and controls the development with fences and walls.

ii) land use pattern: They incorporated new building types inside urban fabric named schools, to fight the Shea doctrine and publish the Sunni four Doctrines. They moved the government palace from the center of the city in to a place far to the east over a higher hill and built fences and gates around Cairo, they build a defensible urbanism.

iii) housing pattern: Due to moving the governmental palace from city center to the castle, the house of the governor and his lords and mukluks are moved to the citadel, the matter that caused a separation between governor's elites and the public. Accordingly, the city become much more homogeneous and the streets still contain different housing types in the same alley.

Moving Egypt to Mamluk political regime aimed to two shifts; a repeated shift from Fundamentalism to multiple nationalities, and the insertion of feudal system, where the lords give ownership of lands to the senior statesmen. In order to achieve this aim they made some political strategies that are reflected on urban form:

i) street network pattern: Keeping the linear street network with increasing extension areas.

ii) land use pattern: new patterns of multiuse buildings that contain schools, hospitals and shrine.

iii) housing pattern: Multi-nationality and Feudalism become tools that caused an extreme social gap between the rich and the poor and caused a social division and segregation. It was reflected on the housing pattern variation, and separation of housing types.

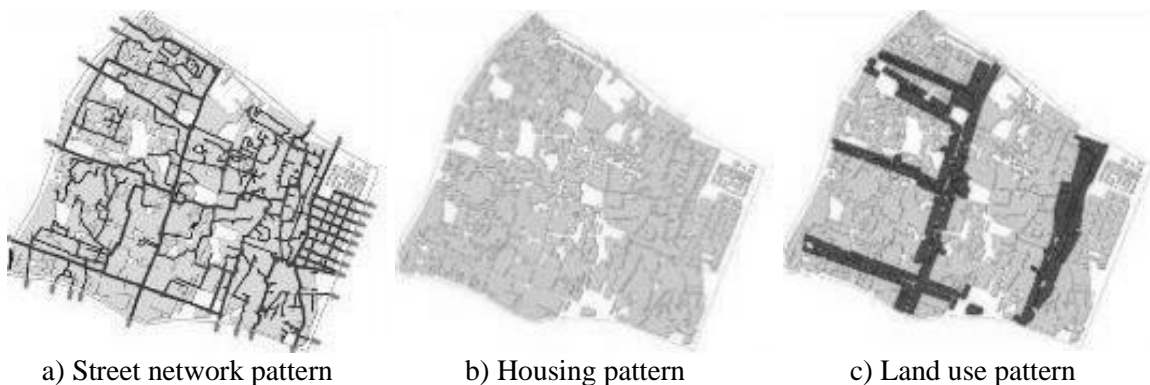


Figure 6. Spatial analysis of Islamic Cairo neighbourhood model.

Neighborhood manifestation of Islamic political regime

Micro community socio-spatial patterns:

i) street network pattern: At that era movement system was still depending on pedestrian, so an organic and spontaneous street network was used, their form was a reflection of the inhabitant's beliefs and neighbourhood right. Street is called (SHAREA) where the place that manage the social relation between community members, the Doctrinal base of No damage or harm in Arabic "La Darar Wala drar", was a guiding role in shaping their form. And this doctrine created the unique Islamic regime with homogeneous urban form.

ii) land use pattern: the Land use pattern was focused on mixed and multifunctional land use core structure enveloping, at least partially surrounding the central mosque by different layers of interconnected markets. Specialization of neighborhoods of the city which housed workers, craftsmen, religious and governmental officials sprung up around the centralized structures. Commonly the land use pattern were ranges between residential and other service uses, mosque, governmental palace; but mostly they were mixed with long connecting line between different land use, unless a hard factories or harm crafts that are excluded out the residential area. Beside it is mostly based on high density development.

iii) housing pattern: Housing pattern was focused on variation, diversity and intermix of housing types, Except some foreign Persian elements that are brought by Abbasid Caliphs, Created some elites' residences were located around lakes e.g. Birkat Al Fil or on the borders of the Birkat Azbakya, make social segregation between aristocratic foreigner governors and the public Egyptian residents. Cairo residents most commonly are distributed in a wide range of housing types, but it was mainly characterized by its intermixture (social mix) where the poor and the rich inhabit the same alley (hara) (Abo El Ela, M., 2003). A long connecting line between different housing groups was enough to create social inclusion based on common appropriation and transformation of public space by the various social groups.

Macro socio-spatial fabric:

i) relation between neighborhood and the city: In this period, micro urban forms of cities were seen as integrated urban settlements with neighborhoods as divisions of the city, integrated and linked organically and structurally to its existing city structure, its center, and the main civic functions. It showed a connection to the city, the large urban environment, and the community life surrounding it. It does not miss the basic function and nature of being an entity of a larger urban area; it cannot lose its role in the life of the city. In addition, it was not a standalone cell rather it was an interconnected reality. Neighborhoods were permeable communities that regularly interact both communally and on an individual basis with the whole urban community and larger sociopolitical structures.

ii) social fabric: The long connecting line between different housing groups in micro scale creates homogeneity on macro social fabric, and the social fabric of old Cairo gives a feeling of socio-spatial continuity (Bianca, 2000).

iii) community life: The civic life of the city was its focal point and was usually organized along a central point the mosque and sometimes along a linear scheme commercial axes. This relationship between the neighborhood and the town by means of its principle streets. Neighborhood activities stretched out from the crossroad intersection along the main street in either direction (Lott, 2004), and were connected to the center of the city that resemble the link to city life (Duggan, 2007: p.24).

iv) loyalties: It tends to create public loyalties between the neighborhood and town. It seems to create a large integrated society within a large community context.

The Imperial Cairo

Imperial Cairo was ruled under governance of French expedition (1798- 1801), Muhammad Ali and his successors (1801-1882), and British Colonialism (1882-1956), passed through different

political regimes, with the same target of the process of Cairo's westernization, and not modernisation¹. Westernization as apolitical orientation creates the role of development actors and accordingly development method:

The westernization of Cairo was not truly under way until the reigns of Muhammad Ali's successors during the second half of the century, (Abu Lughod, (1971) and Bianca, (2000)). The westernization of Cairo was catalyzed in Khedive Isma'il reign. The British colonial occupied Egypt for about 70 years, they continued the line of westernization (Stewart, J. 1999).

Wide Westernization steps took place through, the construction of European-style urban form, in addition to a proliferation of private foreign communities; Ismael depended on foreign architects and planners to build Cairo according to European plans, and the British colonial brought foreigner private developers, who started to contribute in the urban development, different new settlements in different locations, just like Heliopolis, Maadi, Garden city, Zamalek, and Roda.

The role of Development Actors

The aristocratic governance of Cairo due to the process of westernization and private sector intervention in development, a new change in the role of development actors, where the state lost its role in development, in the other hand the foreign developer's role is increased to be the developer and the regulator. The urban planner works for the developer, and private domain.

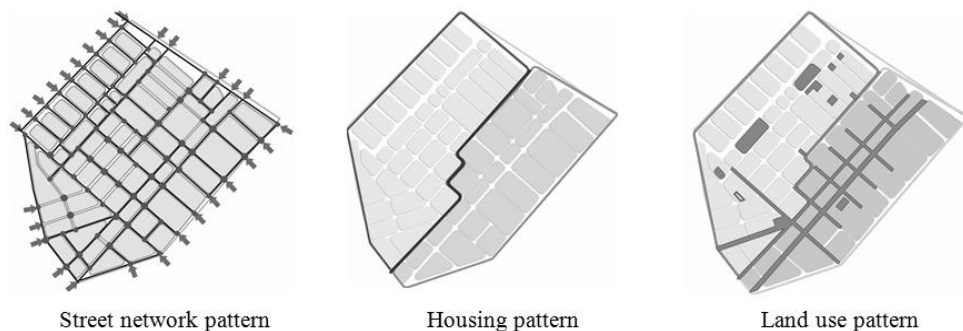


Figure 7. Spatial Analysis of Imperial Cairo neighbourhood Model.

Neighborhood manifestation of Imperial political regime

Micro community Pattern

ii) street network pattern: the applied European style in the urban form and buildings of the new part of Cairo was characterized with transition to radial patterns of development which caused the wide spread of urban form. This impact the intensive connectivity, where the paths and nodes are combined to create the common visual image of the city (Abo El Ela, M., 2003).

ii) social pattern: a low quantity of dividing lines between different housing types exist, that reflects a continuous homogeneity of foreigners and elite Egyptians with exclusion of others public poor Egyptians.

iii) land use pattern: a high quantity of connecting lines between residential and other commercial uses, that reflects expanded transit commercial axis which combines different vertical mixed uses, residential with commercial in ground floor.

Micro to Macro Relationship

i) spatial fabric: in this period the city was designed as connected neighborhoods which are connected in an organic way that resemble neo-traditional developments in their modified radial connected street networks, high density, moderate accessibility to bus stops, and ample

multi-family residential uses. Also, encourage of commercial uses and the neighborhoods engagement from the rest of the region. , and the public life was an important aspects with its radial streets and nodes. , and the public life was an important aspects with its radial streets and nodes.

ii) social fabric: a high quantity of connecting lines indicates social exclusion, were designed according to the European plans, especially on the model of British Garden city, which started to show a process of socio-spatial segregation, foreigners and upper-class Egyptian share the same life style. Their planning was mainly based on having separate residential districts, with their services clustered on main corridors. The colonialism introduced an alien cultural system and did not favor a smooth integration.

Macro community socio-spatial model

i) spatial fabric: in this period, micro urban forms of cities based on TOD, were seen as integrated urban settlements with neighborhoods as integrated and linked organically and structurally to each other, its center, and the main civic functions. It showed a connection to the city, the large urban environment, and the community life surrounding it. It was an entity of a larger urban area; it revealed its role in the life of the city. In addition, it was an interconnected reality. Neighborhoods were permeable communities that regularly interact both communally and on an individual basis with the whole urban community and larger sociopolitical structures.

ii) social fabric: the wide range in social structure of Egypt starting from the king family, authorities,, and foreigners that constitute the high economic level social group, to the mid economic level Egyptian residents, to the low economic level of the public residents of workers and farmers. This variation composes a wide range of housing types, but they were commonly excluded from each other, creating a wide gap between the rich and the poor exist.

iii) community life: the civic life of the city was its focal point and was usually organized along a central point the mosque and sometimes along a linear scheme commercial axes. This relationship between the neighborhood and the town by means of its principle streets. Neighborhood activities stretched out from the crossroad intersection along the main street in either direction (Lott, 2004), and were connected to the center of the city that resemble the link to city life (Duggan, 2007: p.24).

iv) loyalties: it tends to create public loyalties between the neighborhood and town. It seems to create a large integrated society within a large community context.

Cairo under socialism (Revolution and Republic) (1952-70)

Moving Egypt to Socialism, Egypt has been ruled by Abdel Nasr. In this time, Egypt, through revolutionary action, managed to establish its independence. This period had witnessed an accelerating move towards Egytianisation, Revivalism, and Socialism in various aspects, that put the poor and the rich in the same interst, the state take the role of development e.g. Nasr City.. Under Socialism, A public governance is used, where a doctrine of social equality to participate in politics. The Political shift from Imperial to Socialism has narrowed the gap between the rich and the poor and settled the doctrine of social justice, equity, equality.

The role of Development Actors

The shift to socialism is reflected on the role that public sector, developers, and planner play in urban development. The authority put the poor and the rich in the same interest, the state take the role of development, in search for social justice and equity. The authorities take public responsibilities. The private real estate developer, Authority role means the existence of little or no private sector intervention upon economic issues, their role was reduced to be builders. The urban planner works for the state, and public domain.

Planning Method

A central planning method take place, Central/comprehensive/holistic Model: it concerned the complete control on decision making, there is no right solution as time, money, information and mental capabilities of the planners are not sufficient (Kinyashi 2006; Mitchell 2002). Planning is considered as a scientific-technical process without any involvement of the public (Kinyashi 2000).

Neighborhood manifestation of Socialism political regime

A new trend toward process of Egyptianization, Revivalism, and Socialism; that put the poor and the rich in the same interest, the state take the role of development e.g. Nasr City.

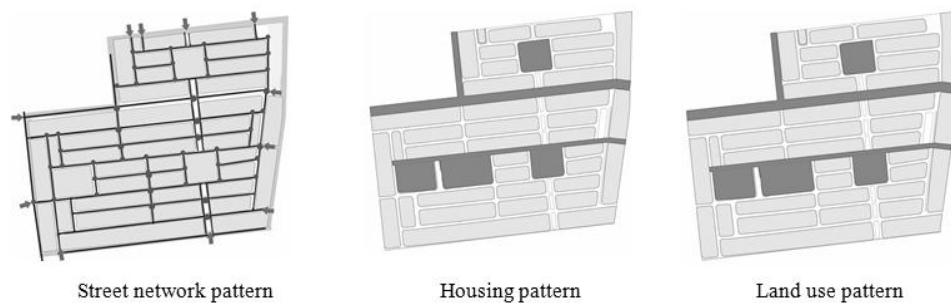


Figure 8. Spatial Analysis of Socialist Cairo neighbourhood Model

Under a political orientation, western neighborhood unit is adopted, and used in Egypt development. Socialism political regime based on a Neighborhood patterns, that are drawn from western, but until now and according to the socialism Philosophy it encourage the social justice, social equity, equal distribution of resources and benefits, and inclusion, on the other hand it encourages inclusion of others, all have wright to benefit urban life, services, urban spaces, and all facilities. In order to achieve this aim it takes different patterns as follow:

Micro community pattern

i) street network pattern: Socialism search for social equity of accessibility so it centered plan on Grid network plan connected to each other and enable continuous connected outward oriented growth to enable the connection between different parts of the city and facilitate accessible bus services and alternative transportation options.

ii) land use pattern: the authority responsibility to provide services make it use different types of land use as services area for education, medical, administrative, cultural, entertainment and sport, commercial services, with respecting to make all these services and facilities accessible for all community residents.

iii) housing pattern: in dealing with a number of demographic problems due to the rising population and the migration of residents of the canal cities, And according to socialism it tends to narrow the gap between social groups, so it aims to standardize housing types with little variation between housing groups. A standardized cooperative housing residential building were constructed (Nasr City, muhandseen). So it is characterized with little variation, High social mix, High density,

iv) community life: centering the plan on public domain, make it compatible with the character of urban life, mobility, diversity, the desire for choices, and the need for larger areas for social interaction, which are aims of socialism.

v) loyalties: it tends to create public loyalties between the neighborhood and town. It seems to create a large integrated society within a large community context.

Macro community pattern

i) spatial fabric: The micro community pattern is spatially connected to each other, they are part of a continuous fine-grained pattern. They encourage community, connectedness and integration, focusing on public realm. Whereas, in macro level enable accessibility, permeability and continuity in the overall urban fabric.

ii) social fabric: The narrow gap between community residents eliminate the social exclusion, and achieved social homogeneity in social fabric.

Cairo under Capitalism (The adoption of the open door policy) (1971-1980)

Moving Egypt to capitalism, Egypt has been ruled by Sadat. In this time, Egypt like many other countries in the world has been drawn in to a dramatic economic and social change, a change in the adopted Egyptian socio-political regime from the societal ideology to the capitalism ideology, it is followed by the economic restructuring and the transition towards open door policy (Bayoumi, 2009). The first legislative step towards the open door policy appeared with the Law 65 of foreign investment, which paved the way for a vast market for investment and commercial banking, (Yousry, Abu-Zekry and Yousry, (1998)). Its chief purpose was to attract Arab and foreign investment capital under highly favorable conditions.

Open door policy make two shifts in development policy and social structure of the community. The shift in system of organization and governance and consequently adopted policies that have reshaped development tools and methodologies and directed the trend of development toward the market privatization, and development through private sector developers. The socio-economic gap has widened between the fixed-income earners and a new capitalist class who gained from the new economic dependency.

Large personal investments took place to serve the upper and high-middle class of Cairenes through the establishment of non-governmental private uses. On the other hand, the government was more directed to solve the pressing problem of the boorst and concentration of population through the creation of new urban centres with new economic activities and better facilities in an attempt to attract people to a better life. Under Capitalism strength of the state regulating role still exists, that is required in a market economy. The strong governmental legislation framework, enable the state to regulate urban form in a suitable manner.

The role of Development Actors

The change from social economy into free economy leads to a change in the role of development actors: The state role is reduced to be just the regulator of development. A strong governmental legislation framework, the state can control and regulate urban development in a suitable manner, with an explicit written known regulation. The developer role has transformed from being the builder to be the developer and impact regulation. The planner role also has been transformed; he does not work for the state hopefully to take part in the state development for the public, rather the planner works for developers that make earn more money at the top of their priorities.

Planning Method

An Incremental planning method take place, market oriented model: it concerned the market controls the incremental modification of the plan. It operated with strong legislation framework, the incremental modification take place for the benefits of the consumer.

Neighborhood manifestation of Capitalist political regime

Under a political orientation, western neighborhood unit is still adopted and used in new town wave of Egypt development. Capitalism political regime based on Neighborhood patterns that are drawn from western, it started using strong legislative framework to encourage the social justice, social equity, equal distribution of resources and benefits, and inclusion, on the other hand it encourages exclusion of other. In order to achieve this aim it takes different patterns as follow:



Figure 9. Spatial Analysis of Capitalist Cairo neighbourhood Model

Micro community Pattern:

i) street network pattern: capitalism under strong legislative framework can still achieve social equity of accessibility so it centered plan on the use of loop systems, to achieve safety and reduce car penetration without losing benefits of Grid network plan that is connected to each other and enable continuous connected outward oriented growth to enable the connection between different parts of the city and facilitate accessible bus services and alternative transportation options.

ii) land use pattern: The authority responsibility to provide services make it use different types of land use as services area for educational, medical, administrative, cultural, entertainment and sport, commercial services, with respecting to make all these services and facilities accessible for all community residents and at equal distance from community members.

iii) housing pattern: To face the wide gap between the rich and the poor and according to capitalism tends, so it aims to provide housing for different housing types with wide range. New community wave were constructed (as in first community and fifth community at East Cairo and second and third community at West Cairo) to inhabit wide range of social groups. But still the state intervention and strong governmental legislation framework used to achieve social justice and intermix between different social groups. It is characterized with little variation, High social mix, High density.

iv) community life: Starting to shift centering the plan from public domain to private domain, make it in compatible with the character of urban life, mobility, diversity, the desire for choices, and the need for larger areas for social interaction.

v) loyalties: it tends to create public loyalties between the neighborhood and town. It seems to create a large integrated society within a large community context.

Macro community Pattern:

i) spatial fabric: The micro community pattern is spatially semi connected to each other and to context hence, they are part of a continuous fine-grained pattern. They discourage

connectedness and integration, focusing on private realm. It reduces accessibility, permeability and continuity in the overall urban fabric.

ii) social fabric: A high quantity of connecting lines indicates social inclusion, and mostly heterogeneous housing type. They are connected to their context, so they are socio-spatial inclusionary pattern, which strive for gathering different housing types, and different parts of the city.

Cairo under Post-Capitalism (1980-2011)

Moving Egypt to post-capitalism, Egypt has been ruled by Mubarak, his policy worked to achieve the liberalization of Egypt's economy. From 1991, Mubarak undertook an ambitious domestic economic reform program to reduce the size of the public sector and expand the role of the private sector. In order to achieve this goal the state regulating role is changed. A shift in the nature of contemporary "Economic-Political Ideology" reflects a shift from capitalism to post-capitalism, a shift from free market economy to monopoly of market, a shift from keynzian policy that assume that the developers need control and strict strong legislations in to liberal policy that freed private sector of any control and follow the deregulation policy. In other words, it reflects the change from Fordism that depends on written explicit known regulation to Post-Fordism that depends on oral implicit unknown regulations (Csfalvay, 2009). The government may not yet play the strong regulatory role as before, so the weakness of the authorities legislation framework cause the emergence of New-private legislation framework with new standards, (Abdel Khalek, 2009).

An Extreme economic-Political Shift cause a social shift, that widen the gap between the rich and the poor, the laissez - faire deregulation public legislations, and the new private legislations all are factors influenced the process of development. These factors are reflected on various development actors which can be explained as following: the first actor is wide gap between the rich and the poor. As a result the rich seek for exclusivity, protection and lifestyle inside Gated Communities. Besides, the public sector bureaucratic make the state fail to provide better environment that is suitable for the high class residents, the matter that make them search for enhanced built environment, this is exactly what the private developer succeeded in achieving inside a gated privatized area. The private real-estate developers have more efficiency than the public sector, therefore private developers gained large acceptance in real estate development especially from high class residents. One should argue that private sector is not completely new, but its role to impact and shape urban fabric and hence shape their role in development, was always related to what the authorities permit and regulates to them through development control. The third actor is the state; the shift to open door policy is reflected in the role that private sector developers play in urban development. The authorities aimed to evade public responsibilities, even its role in regulation, reduced with adopted laissez faire deregulation policy.

The role of Development Actors

Bayoumi (2009) argued that the doctrine of the laissez faire ideology is based on three concepts. First, developers see regulations as an infringement of their freedom, even when regulations are about issues such as preserving or at least slowing down the rate of environmental destruction (Henry 2008). Second, it is wise to protect the property and privilege of the wealthy and powerful assets for the benefits of the whole national economy (Waller, 2006). Third, it relies on enabling the well-specified property rights and the activities of the free market enterprise to reflect the beneficiaries' real interests (Aune, 2001).

The state adopted laissez - faire deregulation policy, that means the existence of little or no state intervention and controls upon economic issues (Holmes 1976 & Waller 2007), on the form of free markets, minimal taxes, minimal regulations, and assuring the private ownership of property. The role that private sector developers play in development has changed where the

developers put forward their new-private legislation framework and design principles (Abd el khalek, 2009), and begin to contribute to the production of urban form and space.

The role of state under the adopted *laissez-faire* deregulation policy started to diminish and restrict to just being an observer of development. It became weak enough to leave the arena of development in the hands of private sector developers permitting them to take decisions according to their commercial interests. The state obeyed developers requests, letting them act and make changes in the spatial development of urban form.

The case of GCR shows how decisions taken by municipal public sector, in most cases, permit developers to take decisions according to their commercial interests. Municipal urban legislation, in most cases, has been changing all the time in order to meet private interests, without consideration about effects over these local boundaries, it is easier to accept developer's decisions. The state in most cases fulfills developers' requests, letting them act and make changes in the spatial development of urban form. The government produced private oriented legislation because of a political decision and the developers' stresses. The state role is blind in not taking in mind the macro public responsibility.

In the meantime the privatization theory revolves around the argument contend with its ability to save money and seeks for fast sales, benefiting a small group of people who have the affordability to pay, with detriment of the majority of the population and consequently affecting public actions.

Indeed, high class residents seek for exclusivity, homogeneity and protection; private actors contribute to the production of space (social selection of residents, control management of total gated area); local public authorities have key strategies (*Laissez-faire* policy, development without bearing public responsibility, deregulation policy); and publicly-owned and managed areas tend to disappear, yielding to a private-owned and managed Gated Communities. The consequences and systemic impacts of these strategies, that built or restrict the public space, produce social selection of residents, impose externalities over the neighbors (implications on property values, on fiscal equalization, on segregation...). These strategies contribute to define the ability of public authorities to regulate the allocation of public space and to control urban planning processes.

Planning Method

An Incremental planning method take place, market oriented model: it concerned the market controls the incremental modification of the plan. It operated with weak legislation role of the government, the monopoly take place and the customer (private sector) controls with monopoly all development aspects to achieve his benefits.

Neighborhood Manifestation of post-Capitalist political regime

Urban form manifests the political shift it manifest the emergence of new patterns of private urban governance (Gated Communities). Gated Communities reflect the state adopted *laissez-faire* economic policy that reduces any state intervention against private sector control on urban development. The Egyptian context of post-modernism, revealed a continuation in the process of globalized, American westernization, new Gated Communities model become the dominant pattern for development in Egypt which relatively borrowed from the westernized, American model (Denis, 2003).

The expansion of Gated Communities in GCR began since the mid-1990s, become a mass trend in new town urban developments on the outskirts of the Greater Cairo Region when the government started to sell land in The new satellite cities around Greater Cairo, for developers to construct Gated Communities. They contribute to reshape the suburban landscape of GCR's new towns (Meyer 2000).

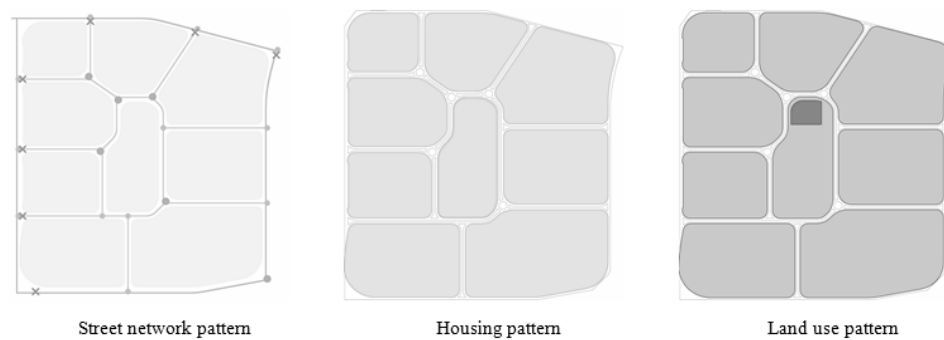


Figure 10. Spatial Analysis of Post-Capitalist Cairo neighbourhood Model.

Post-Capitalism manifested a Postmodern neighborhood models, an important change in the concept of neighborhood to be a more independent and self-contained unit that are characterized by:

Micro community socio-spatial characteristics(Ghonimi et al, 2011):

- i) street network pattern: Centering to be cellular model with inward oriented, intently and totally separated from the city, make it depends mainly on its own resources, and exclude others who are not engaged.
- ii) land use pattern: Centering the plan on a single facility and use, mostly residential, no mixed or varied or compact use.
- iii) housing pattern: Capitalism enhances micro social exclusion and macro social segregation. Centering the plan on single housing type, seems to be designed only for high class families, no mixed interconnected or varied diverse or compact social group.
- iv) community life: Centering the plan on private domain and neglecting the public domain, make it incompatible with the character of urban life, mobility, diversity, the desire for choices, and the need for larger areas for social interaction.
- v) loyalties: Gated Communities tends to create a division of loyalties between the neighborhood and town. It seems to create a small somewhat separated society within a large community context.

Micro to Macro Relationship

i) spatial fabric: Gated Communities are inward oriented Street network, with physical barriers that blend with adjacent network, and splintering them out from their context, hence they are physically excluding their adjacent area and segregating themselves from each other and from the overall image of the city, they creates inaccessible bockets, super blocks and islands inside urban fabric, that cut the continuity of urban fabric.

ii) social fabric: Gated Communities are closed area with homogenous social group that are closed of the entire spatial and social fabric of the city. This impact social fabric in two ways, firstly, it breaks the connection with adjacent Gated and Non-Gated areas even they were of different or the same housing type, secondly, it widens the gap between different social groups, which could weekend the socio-spatial fabric of the city. The spatial and socio-spatial exclusion of Gated Communities for its external urban fabric caused a dramatic impact on the social fabric of the city. The process of social exclusion and segregation exist, this could have its relevant impact on both micro restricted private community and macro excluded and segregated adjacent public community, which will be discussed and criticized in the next section.

Macro community socio-spatial characteristics

This shift cause many subdivisions to be built without reference or link to the city. Community life become much more limited to this subdivisions, and moved from totally focused on city public life to be totally focused on private domain. Gated Communities become the main development pattern in contemporary Egyptian city, which extends the concept of separation between micro and macro urban form in the city.

This process of privatization and orientation to private urban governance has begun to contribute to the production of urban form making its permanent impacts on the urban form and structure of greater Cairo region, that have been affected by the emergence and proliferation of gated residential developments.

A process of change on patterns of urban development from public spaces and open patterns to post public space and gated privatized pattern; this has cause the emergence of newly urbanized areas, an important change relating to these spatial outcomes is the construction of physical barriers that constrict connections within and between community members, via the deployment of gates and other design barriers around units of accommodation.

Splintering large public areas of micro urban form and isolating them out from macro urban form of the city, cause that publicly-owned and managed areas tend to disappear, yielding to a private urbanism in which planned unit developments (and Gated Communities and other forms of private urban governance) are key features. A housing consumption patterns can result in segregated areas a new phenomenon in micro scale known as enclaves, and in macro scale known as a Divided City.

This phenomenon has reshaped the face of urban life and has a great influence on the evolution of metropolitan area in term of its form and structure, which necessitates revisionist view for its impacts on urban development. Soja (1989) in "post-metropolis: critical studies of cities and regions", argued that these trends in urban development signify a major transformation in the physical characteristics of cities. Low (1996) in "Imaging and theorizing the city", conceptualized the impact of these patterns on the emergence of "Divided city", and "Fortressed city". Graham and Marvin (2002) in "splintering urbanism" argued that these trends impact the physical fabric of many cities across the world starting to fragment into giant cellular clusters (Ghonimi et al, 2011).

Conclusion

An analysis of Cairo neighborhood models, gives a great understanding of the impact of political regime shift on the evolution of neighborhood models, as follow:

The political regime impacts planning method and role of development actors as follow:

In single governance, a central comprehensive planning is used and the state primary role as the regulator, the developer and the builder, their regulatory role based on a written intended regulation with strong regulation framework. In aristocratic governance, an incremental, pecimal method is used, the state role is restricted to be the regulator as in capitalism with written strong regulations framework, and sometimes it loses its regulatory role as in post-capitalism based on unwritten regulations that carried by the developer with New-private legislation framework, and the developer role become much more stronger. In public governance, a spontaneous method is used, the people put common regulation framework.

The impacts of political regime are reflected on urban form as follow:

Street network pattern: Single and Aristocratic Governance tends to have division of loyalties, so it mostly use treed street network, in the other hand public governance tends to create equal access to urbanism so it mostly use grid street network pattern.

Table 1. Neighborhood model as a manifestation of political regime


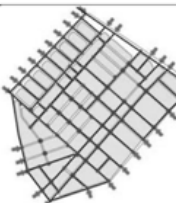
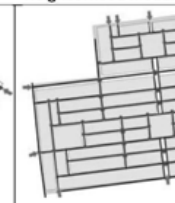

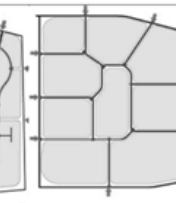


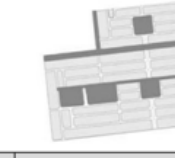


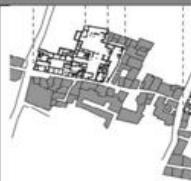














	ISLAMIC CAIRO FATIMID CAIRO	KHEDIVE CAIRO MASR EL GEDIDA	SOCIALISM CAIRO NASR CITY	CAPITALISM CAIRO NEW CAIRO	POST CAPITALISM CAIRO COMPOUNDS
Governance	Public Governance	Aristocratic Governance	Public Governance	Public Governance	Aristocratic Governance
Regulation	Common regulation	Intended regulation	Intended regulation	written regulation	Unwritten regulation
methodology	Advocacy	Incremental	Comprehensive	Comprehensive	Market Oriented
State	Developer and Regulator	Proactive-Regulator	Developer and Regulator	Proactive - Regulator	Reactive – Simulator -with laissez-faire deregulation
Actors					
Developer	Builder	Impact Regulation developer	Builder	developer- Builder	Impact Regulation developer
planner	Work for the public	Work for privatedeveloper	Work for the state	Work for the state	Work for private developer
Neighborhood models					
Street network pattern					
Street Pattern	Entrances	27	11	12	10
	No. of Intersections	85	62	49	39
	No. of blocks	High	Mid	Mid	Low
	Length. of grid	16166.5529	14736.7059	58309.2754	613.5728
	Length. of loops	Low	Mid	High	High
	Length. of cul-de-sacs	Low	Low	High	High
	Length. of cul-de-sacs	Low	Low	High	High
	Total Length	12344.9434	11467.1854	57610.8395	13623.6725
	Street network	Connected fine grained street network with public urban form	Connected fine grained street network with public urban form	Connected fine grained street network with public urban form	Disconnected Super block with private urban form
	Street network	Grid Transit outward oriented	Grid Transit outward oriented	Grid Transit outward oriented	Treed (cul-de-sac) inward oriented
Land use Pattern					
Landuse Pattern	Commercial	--	--	--	1631.870824
	Educational	8360.4342	21615.28	4757.5949	127547.2271
	Religion	--	--	--	462.94270
	Recreational	--	921.8996	4509.6962	3112.95189
	Other	63908.4068	44437.313	13284.1014	3797.910548
	Total	72268.34	66974.49	22551.3925	136552.9031
	Land use mix	Varied	Varied	Varied	Varied
	Land use mix	Length of (connecting – dividing line) between different land use types.	Length of (connecting – dividing line) between different land use types.	Length of (connecting – dividing line) between different land use types.	Length of (connecting – dividing line) between different land use types.
	Dividing Line	12091.3	3951.489	2627.31	561.9468
	Land use density	Mixed landuse	Mixed landuse	Separate landuse	Separate landuse
Housing Pattern	Density	Mid	Low	Low	Low
	Services	Complete	Complete	Complete	Complete
	Amenities	Incomplete	Incomplete	Incomplete	Incomplete
	Housing Variation	High, Mid, Low	high	high	high
	high	--	--	--	98873.8365
	mid	339406.6684	615792.35	385299.019	219299.1089
	low	287631.7351	--	--	5630568.1559
	Total	627038.4035	615792.35	385299.019	960694.3429
	Housing mix	Varied	single	single	Single
	Housing mix	Length of (connecting – dividing line) between different social groups.	Length of (connecting – dividing line) between different social groups.	Length of (connecting – dividing line) between different social groups.	Length of (connecting – dividing line) between different social groups.
Housing Pattern	High,low	--	--	--	2096.4617
	Mid,high	--	--	--	765.6718
	Low,mid	1073.9376	--	--	570.7747
	Housing density	Mixed - Inclusion	Separate – Exclusion - Segregation	separate	Mixed - Inclusion
	Density	High	High	Mid	Low
	Diverse and mixed community	Diverse and mixed community	Single housing type predominant detached single-family homes	Single housing type	Single housing type mostly high class

Table 2. Micro community, adjacent community and macro community as a manifestation of political regime

	ISLAMIC CAIRO FATIMID CAIRO	KHEDIVE CAIRO MASR EL GEDIDA	SOCIALISM CAIRO NASR CITY	CAPITALISM CAIRO NEW CAIRO	POST CAPITALISM CAIRO COMPOUNDS
Governance	Public Governance	Aristocratic Governance	Public Governance	Public Governance	Aristocratic Governance
Regulation	Common regulation	Intended regulation	Intended regulation	written regulation	Unwritten regulation
methodology	Advocacy	Incremental	Comprehensive	Comprehensive	Market Oriented
Actors	State	Developer and Regulator	Proactive -Regulator	Developer and Regulator	Proactive - Regulator
	Developer	Builder	Impact Regulation developer	Builder	developer- Builder
	planner	Work for the public	Work for private developer	Work for the state	Work for the state
	Micro Community				
					
	Al-Darb EL Ahmar	Talat Harb	Nasr City, Cairo	Al-Hal- ElMotamiz	Lyan, New Cairo
Street network pattern	Grid outward oriented: design patterns such as grid (or modified rectilinear grid) street networks, small lots, high density housing development, moderate accessibility to bus stops services. Connected fine grained street network with public urban form Grid Transit outward oriented		Loops with Relatively large lots of a uniform size and shape, curvilinear. Disconnected Super block with Semipublic urban form, Treed inward oriented.		Cul-de-sac inward Oriented to private domain, break large residential area into small inward looking units.
Housing pattern	Diverse and mixed community		Single housing type predominant detached single-family homes.		Single housing type mostly high class
Land use pattern	Diverse land use community: Abundant mixed land uses such as commercial and multifamily residential uses, but deficient open spaces. The general existence of commercial uses		Single land use (residential): The general Lack of non-residential land uses and transit services.		Single mostly residential The general absence of mixed land uses commercial uses and transit services
neighboring	Important integrated organic part of the city	Important integrated organic part of the city	Semi: internally focused, separated cellular cell	Semi: internally focused, separated cellular cell	Ignored: internally focused, separated cellular cell
Edge of micro urban form	Not defined boundary Connected, fractal city	Not defined boundary Connected, fractal city	Semi defined with arterial streets	Semi defined with arterial streets	Defined by walls Divided city
	Adjacent Community				
					
	Sakiya	Cen	Sakiya	Cen	Sakiya
Street Network pattern	Proposed public fine grain street network and public urban fabric. Fine grained: Free large number of entrances, No borders, continuous fabric, Overlapping and interweaving. The pedestrian transportation web. The predominantly pedestrian city was built over time -- with continuous incremental additions.		Implicitly Proposed public fine grain road network. Implicitly controlled Restricted Limited low number of Entrances, Arterial roads, Arterial roads as borders modern car city which cannot turn into a pedestrian city, that it is anti-fractal city.		Private super block road network and private urban fabric. Intentionally explicitly controlled restricted limited low number of Entrances, walls and Barriers as borders postmodern car city which cannot turn into a pedestrian city, that it is anti-fractal city.
Boundaries	Blurring boundaries: the neighborhoods' engagement with the rest of the region.		Outer Ring neighborhoods are distinct in Arterial streets. The neighborhoods' disengagement from the rest of the region.		Outer Ring neighborhoods are distinct in their physical barriers. The neighborhoods' disengagement from the rest of the region.
Housing pattern	Inclusionary of others, oriented toward the public domain and human dimension. Heterogeneity and ample multi-family residential uses.		Exclusionary of other, Socially restricted. Homogeneity in housing fabric		Exclusionary of other, Socially restricted. Homogeneity in housing fabric
Land use type	Public domain		Private -public domain		Private domain
	Macro Community				
					
	Al-Darb EL Ahmar	Talat Harb	Nasr City, Cairo	Al-Hal- ElMotamiz	Lyan, New Cairo
Street network	Connected fine grained public City Fine grained Transit oriented street network		Connected fine grained public urban form Fine grained Transit oriented street network	Divided Super block public urban form Super block Inward oriented street network	(B): Divided Super block public urban form Super block Treed inward oriented Development
Land use Pattern	A mathematical semi lattice model. Fractal, connected, regional city model. A series of interlinked compact nodes or neighborhoods		Anti-fractal, tree, divided model. A series of Super block divided cells		Spatially Segregated. Eliminate uses from public life
Housing Pattern	Socially inclusionary of connected between different housing types		Discontinuity through housing		Socially Segregation of diverse housing types
urban form	Public	Public	Private -public		Post public

Housing Pattern: Single governance tends to create homogeneity on micro scale and social exclusion and segregation macro scale, as in Mamluks, post-capitalism, and imperial governance, so it tends to create low quantity or no dividing lines between different social groups.

Democratic Public governance seek contact, social justice and democracy, so they work to involve different social groups in the same neighborhood; to be inclusionary of different social groups and macro social homogeneity, so it commonly tends to increase the connection line between different social groups.

Aristocratic governance tends to create division, segregation, and neglect public space aiming for post public space the matter that reduce residents opportunities for democratic participation. Aristocratic governance depends on replacing public spaces with post public spaces, in which diversity and freedom are lost, where segregation, social inequality, and disintegration of society are promoted, and ethics of deconstruction, exclusivity and individualism. A shift from space that reflects democratic participation and social resistance, into a space that is controlled without any permitted public response.

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Power, ideology and space re-generation: Istanbul case

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Abstract. *The role and desire of Power in shaping the urban space has always been existent throughout history. The urban space is a plane that is generated parallel to the ideology of Power. It is also a tool that transmits the existence and the ideology of Power to the society, and legitimizes the Governments. Power realizes this via reconstruction activities. Urban space is a kind of stage where these activities take place. Governments offer their ideology to the society in different ways so that the society is forced to live in an urban space that is shaped by Power's wishes and its rules. The situation in Turkey also is not different. During the urbanization process from the Ottoman Empire to the present, what shapes the urban space is largely the Power and its ideologies. Urban space has been regenerated with the symbols of Power, with the references to the past or with the rejecting spatial policies the past. In this study, the relationship between Power, ideology and space will be analyzed based on periods of Istanbul's urbanization process. Especially in the process after 2000's, the background of the increasing capability of Power and how it is constructed with through the European Court of Human Rights judgments, lawsuits, council decisions will be discussed.*

Key Words: power, ideology, capability, urban space, regeneration

Introduction

Throughout history, the power, the ideology and capability of State have always been the primary factor in space regeneration. State is the power that shapes, develops and regenerates the space, and the ideology behind this regeneration is its flag. The equipments that the State utilizes in the regeneration of space have become versatile through time. Spatial policies, and legal and institutional regulations are known as the essential tools used in the regeneration of space. The State has applied its ideologic goals firstly on Ankara with its spatial decisions. In Istanbul, this process has not been different. Space in Istanbul, with the turning points in each decade, has been produced over and over again with the ideology of the State.

The process of legal or institutional reconstruction that supports this process has gone through a difficult path. This study aims to analyse the influence of the State ideology on space through Istanbul experience, since the foundation of Republic of Turkey.

The role of power ideology at the space regeneration: theoretical perspective

One of the fields where the technological-economical and political ideologic process that started with capitalism and became clear with the Industrial Revolution was the city. (Ökmen, Parlak, 2008). The city and its spaces was the stage for the ideologic transfers.

Space is where the State strengthened and produced its physical and symbolic sovereignty. Foucault (1997) consolidated this claim by saying the space was also an area of the authority struggle. Dicle (2012) defines space as a tool that naturalizes and justifies the State and transfers the State's existence to the society. According to Castells (1997), the planned structure of city space was the tool of the political control, whereas the monumental buildings, monuments and squares transferred the ideologic structure.

Tuncer (2013) defines space as the combat area of those who regulate and discipline, those who live and coexist. In his opinion, the power that has the State tools determine the actions and

thoughts of the society. So, it makes its hegemony over social and spacial areas. Just like the State's plot of space with castles and churches, today there are different dynamics who shape the organization of the State in space. This organization, as Öztürk (2012) says, is the "political language of space". Lefebvre (1973) supports this idea as well. To him, "Space is not an ideology nor a substance cleaned from politics, it has always been political and strategic. The space is indeed shaped by the natural and historical dynamics, however this process itself was a political process."

At this point, the State gains importance. Uzbek and Dinçer (2009) summarize this process as the following table (table 1).

In this study, while the process in Istanbul experience will be separated into periods, the situation of the State will be discussed as well.

Table 1. Situation of the State According to Paradigms

	Pluralist- paradigm	Governing paradigm	Class-centered paradigm
Situation of the State	The State is not a power nor a verdict maker by itself, it stays equidistant to every group, it arbitrates. Policies are determined by the negotiations in groups.	The State is a power and a verdict center all by itself, In this context, it liberates itself from all the external social powers.	The State is under the determination of the sovereign class, Approaches why the State is capitalist: materialistic ve structuralist görüşler

Istanbul case

Throughout history, Istanbul, with its tangible and intangible values, has undertaken a mission of a world city. The ideology of the State has always been a great influence on the regeneration of this important city. Parallel to the change of the State, space has also kept this pace and transformed. This transformation can be analysed in many dimensions of different time periods of Istanbul. The process of spatial development of the city will be analysed starting from the frame of the study, Republic period, and then will be separated into periodical sections.

From the early Republic to 1980's

The regeneration of space parallel to the ideology started in 1920's with the Ankara experience. New Republic had to be the symbol of a modern and a western society. Without a doubt, it is not a coincidence that Ankara was selected to be the capital, with the foundation of the Republic. For the first time, the continuous "only big city" role of Istanbul, which had the experience of being a capital, has been shared with Ankara for one time only in the early years of the Republic. Besides the goal of security and easy access from all over the country, this small village in the middle of Anatolia both symbolized a victory against Bizantian and Ottoman, and also created an opportunity to render a city that symbolized the modern, new Republic. Space was the essential tool to construct a new society by regenerating it. Thus, it was necessary for the space to regenerate quickly.

This radical modernity project was put in progress by the hands of the State itself.

The way to socialization was possible by creating spaces to let them interact. This goal was aimed to reach with three urban dynamics: train stations, squares and public buildings.¹¹⁵ Relate to the conservative structure of the society, there was very limited squares in the Ottoman Empire.

Ankara was assigned to foreign masters, and the planning studies were started rapidly. Big boulevards and large and geometric squares for ceremonies were necessary not only for socialization and involvement of women in public spaces, but also for announcing the voice and the power of new Turkey. (Figure 1, Figure 2).



Figure 1. Ankara Güvenpark Kızılay Square 1942 (source:<http://v3.arkitera.com/h56692-gecmisin-modern-mimarligi-10-ankara---3.htm>).



Figure 2. Ankara Train Station.

The majestic public buildings that filled Ankara created a strong city image, and symbolized the city as a Capital and a officer city.

Planning was the most important tool in the urban regeneration. The first plan made in 1924 was the Lörchr Plan. Parallel to this plan, there was 198 houses made in 1925 as the first attempt to solve the housing problems of the officers.

In 1927, the municipality of Ankara brought three planners by sending a comitee to Europe, and assigned the planners to make a city plan, framed by the municipality. Harmen Jansen and two

¹¹⁵ In Istanbul, the entertainment areas will be tools as well; in fact, in the last periods of Ottoman Empire, some big steps were made to become a western society. The number of these western spaces that were founded in Ottoman augmented in the Republic times. Theatres, opera buildings, ball saloons of hotels started to take place in the city. Ankara followed this process more slowly because it was designed more like a city of officers.

names that he suggested commenced the planning studies. The plan also designed a “workers neighborhood” in the Northwestern city, in a partially muddy area, close to industry. (Figure 3).

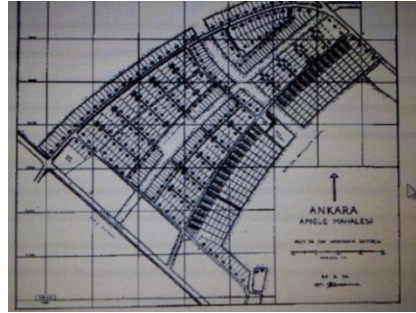


Figure 3. Ankara Workers District (source: Yavuz F., Başkent Ankara ve Jansen, *O.D.T.Ü. Mimarlık Fakültesi Dergisi* , Cilt 7, Sayı 1, Bahar 1981, 25-33).

Although Ankara was transformed essentially into an officer city with Lörcher and Jansen plans, the worker and the officer spaces were the proof of the social class difference in this regeneration.

Modernist project also aimed to create a systematic development plan by praising the villager and the rusticity, and by focusing on education in the rustic areas. In this context, Ideal Republic Village project took place in the modern village space and the village life was plotted. Adorned with the necessities of modern life such as conference room, hotel, reading room etc., a modern village area was designed. Public houses and village institutes were important areas of the rural development.

Starting from 1930's, Istanbul has taken its role back from Ankara. Prost plans were made and applied between 1930's and 1950's. Space created a new Istanbul by transforming quickly. It is possible to classify this big regeneration in Istanbul under several titles:

Large scaled destructions, evacuation of history and disappearance of symbols

Destructions were the most important activities that regenerated the urban space. To modernize the city, particularly historical sections of the city were destroyed. The head of the Municipality and former governor Lütfi Kırdar, who established his housing policies with the statement: “The way to reconstruct Istanbul goes through mattock.”, demolished many historic buildings such as mosques, hamams and military barracks according to the plans of the famous urban planner Henri Prost. The great regeneration has started in the city in these years. In the same location as Gezi Park in today's Taksim Square, Topçu Kışlası (a military barrack) who is known for uprisings in history, was demolished according to the Prost's plan in order to build a park. In this way, a military symbol was also abolished. (Figure.4, Figure 5).

Prost plans created a high devastation on Istanbul and removed many historical values. Destructions abolished many artifacts that were proofs of the past. (Figure 6, Figure 7, Figure 8).



Figure 4. Topçu Barracks.



Figure 5 After the destruction.



Figure 6. 1941-1944: Karaköy (source: İAM Archieve).



Figure 7. Anterior of the Historical Valens Arch (source: İAM Archieve).



Figure 8. Destruction of Dolmabahçe Palace Barns (source: İAM Archieve).

In 1956-1957, Istanbul Governor Fahrettin Kerim Gökay played a huge role in the transformation of Istanbul in the destructions, particularly in Zeytinburnu and Kazlıçeşme in terms of industry-dependent urbanization process.

In 1967, the first shopping mall of the Republic of Turkey, Manifaturacılar Bazaar, was opened after the expropriation of hundreds of parcels. The area of the Bazaar, in front of historical Valens arch, possessed many examples of civil architecture. (Figure 9).



Figure 9. Construction of İstanbul Drapers Bazaar (source: İAM Archive).

In the early periods of the Republic, it can be said that the ideologies of the new and the old States have observable differences, in terms of the regeneration of urban space. The buildings that symbolized the history were started to be utilized for cultural or administrative purposes.

When Sultanahmet Mosque was turned into an art gallery, Hagiasofia was turned into a museum and the Street names who carried the names of the Ottoman Sultans were changed, this separation between two ideologies were clear.

Looking for a New and Unique Architecture

While the buildings and the functions that represent history regenerated, public and cultural buildings, public houses, large and geometric formed square shaped the new cities of new Turkey. The rational, pozitivist ideology of the Republic guided the regeneration of space.

A search for a nationalist formed architecture was apparent, which the masters strongly supported. Behçet and Bedrettin (1933) stated this approach as the following: "...Turkish territory now expects to have masterpieces of itself. We are not thrilled by the foreign and decieving buildings that do not fit in our territory. They seem artificial. If it is possible to differentiate a German from a Turk today, it is necessary to separate a Vienna architecture from an Istanbul architecture, from a France architecture, and even a Istanbul building from an Ankara building... Turkish reform architecture will be something different than the old Ottoman architecture. The dome, the angled window of that architecture are now a history with all its shape. There is no turning back in the road to progress. With the experience of the past, old elements, Seljuk and Ottoman motives are seemed to be inconvenient for today.

Similarly, Abdullah Ziya (1932) says: "The real artifact is not the immitation of the past nor obeying it. The real artist is that who sees the tastes of the society and creates them. The immitated 19th century architecture is dead."

Industry-dependent urbanization and squatting

Since the beginning, industry has been a tool that promotes urbanization and that transforms urban space, in the hands of the statist policies. As a regional policy, especially in small and medium sized cities, the factories opened by the government triggered population accumulation. However none of these cities was able to compete with the magnetizing power of Istanbul. Particularly in 1950's, two basic aspects were effective on the regeneration of space: One was the industry-dependent immigration to Istanbul and that the strengthening of highways. The other one was the squatter's houses of the working class. These aspects chose their places in space by following the Industry Plans, which were applied after Second World War. All of the masters who participated in the process of the planning of Istanbul marked Haliç as an industrial area. In this way, Haliç, which was started to be industrialized since Ottoman times, transformed into an industrial area in the Republic times with the influence of Prost plan.

The special zoning relief for Ankara, which was issued in 1947, spreaded to the country after a year. Populist policies expedited the transformation of cities to shanty-towns. This arbitrary policy of the State is told by Saran (1972) in his article as the following:

“Here (Zeytinburnu), the first shanties were constructed on the side of the roads. At first, the gendarme was a little bit confused towards this issue, but later on, as the number of these buildings augmented, they had to interfere. First, the prefect and then the governor was informed. Although the governor had an attempt to demolish the constructions, he was not successful. Still, the shanty neighborhood was surrounded with the order of the governor and there was not even left water to drink. 1947 was full of fights between the gendarmes and the crowd. In 1948, it was announced to the crowd both in text and in audio, that all the shanties would be demolished on Sunday. The crowd was terrified. While the crowd was looking for a consult, administration of a newspaper advised them to go to Büyük Millet Meclisi Reisi (The Head of the Council of Nation, which was then in Istanbul. A council consisted by the preeminent figures of the shanties went to the Head’s house to convince him to visit the area. The crowd welcomed the Head of the council who went to Zeytinburnu, crying and miserable. The car of the Head did not go into the area really, because it was very muddy then. The Head promised the crowd to not destruct the houses, and a couple of days later the news were official and announced on the radio.”

In Turkey, one of the main problems about shanties is the ignorance of public institutions when approaching the problems thoroughly. In 1964, The National Council of Turkey Republic was proposed a law, regarding the development of shanties under the control of public. In this proposal, it was foreseen that on the lands belong to municipalities, immigrants in the city would build shanties under the control of the technical staff of municipality. In this way, they hoped that the housing problems of people with low income would be solved, and the State would be prevented from losing prestige because of demolishing the shanties. However, this proposal did not regarded positively by the parliament. Members of the Parliaments did not like the idea of labeling people as squatters. (Heper, 1978). Actually, as well as the country did not have an obvious immigration policy, it did not have an experience of shanties neither. In fact, the Minister of Interior found it “positive” that the poor people were solving their own housing problems by themselves. He said “with time, these people will be shown new places and get out of shanties, and in this way they will clean the aspects that disturb the aesthetics of the city, but for now the shanties provided a need.” (Şenyapılı, 2006).

To sustain its political existence, Democratic Party kept supporting the agricultural regions, which put the city workers in difficulty. This bottleneck of city economy was in the core of the plan of development policies. After the *coup d’état* in 1960, during the imported substitution industrialization process between 1960-1980, Development Plans were an important base for the State to plot its ideology over space. The number of 78 thousand shanties in 1962 augmented to 195 thousands after 10 years. At the same year, 40% of the population consisted of squatters. The Shanty Law, which aimed to regulate this process was issued in 1966. In 1970’s, besides those on the treasury lands, people started to build shanties with title deeds in the agricultural areas outside the municipality lands, away from any kind of regulation.

However, a strong authority over the shanty areas was not established for many years. When the rapidly urbanizing rural areas started to be insufficient to provide the needs of the poor, the State, who was incapable of obtaining authority over a stable city, decided to embrace a strategy that limited the State with a national frame, by leaving the town a little bit. (Tekeli, 1998) Besides the rapid on-going squatting, another reality that changed the shaping of space was the apartments in the planned areas. (Figure 10, Figure 11).

Highway centered regeneration

The social class basis of the Democratic Party, which was in authority in 1950, was the alliance of the mercantile bourgeois and the large land owners. (Oktar, Varlı, 2010). In fact, Menderes trusted in this alliance so much that he once said: “*As long as the peasants are with us, how much are the ideas of Istanbul intellectuals worth?*” (S.P Huntington and J.K Dominguez, transferred by: Oktar, Varlı, 2010). Furthermore, the Head of the Democratic Party Adnan Menderes, who embraced the idea of a liberal and externally open economy, focused more on

highways as a response to the incoming Marshall helps. He also interpreted metro as “*It’s a wasteful investment under the ground.*” Highway policies of Menderes evacuated the old city patterns and created new, rigid spaces. (Figure 12, Figure 13, Figure 14).

One of the most important progresses in the regeneration of Istanbul is the construction of Bosphorus Bridge. The bridge shaped the city macroform by being the spine of the town (Figure 15).



Figure 10. Squatter Areas
(source:<http://wowturkey.com/forum/viewtopic.php?p=1854914>).



Figure 11. Modern Parts of the City (source: nostalji-resimleri.blogspot.com).



Figure 12. Dolmabahçe Stadium (source: İAM Archive).



Figure 13. Beşiktaş Barbaros Boulevard (source: İAM Archive).



Figure 14: The construction of Vatan Street (source: İAM Archieve).



Figure 15. Construction of Bosphoros Bridge (source: mimdap.org).

Mass Housing Projects:

In 1950's, there were two important mass housing project experiences, regulated by the State. Real Estate and Credit Bank was the main character of the process. Koşuyolu, Levent and Ataköy were the first modern regions of the mass housing projects, created for the low middle class. Koşuyolu Houses were built by Real Estate and Credit Banks in 1946-1962 (Figure 16).

Consisted by the 400 houses, the first part of the houses were started to be built in 1947. In 1950 1. Levent was completed (Figure 17).

Ataköy Houses, started on the expropriated area on London Asphalt by Real Estate and Credit Bank, was finished in 1955. (Figure 18, Figure 19).

Local elections in 1973, a right-wing Party in the center for the first time, left-wing Parties in big cities, and interference in city space weakened the impact of the center. While utilizing guiding aspects, the social democrat municipality that came out of this experience started to regard these innovations and the decisions of the development of city, as tools. The guiding and encouraging understanding of municipality that embraced simultaneously with the rest of the world, also brought regulation function of the municipalities in 1970's. This regulative understanding gave birth to Fordist approach of municipalities. Innovations of the municipalities in first mass housing were a big step in terms of the interference of local, instead of central in the cities, and also symbolized an innovative local experience, which gained power against the central authority. In short, with the new Republic, the State who made a big impact on city space and its regeneration in early times changed its approach, and –for some time- agreed to stay behind the local. However, the slogan “we need rice not plans” hinted the special policies of the State in 80's.

Neoliberal period

The process of postmodern organization caused Turkey to embrace a new urbanization policy. One progress that created the basis of this policy was the *coup d'état* in 1980. After the coup

d'état, 1982 constitution came into force. In 1983, a new Cabinet that fit the privatization trend of Europe and America was created in 1983. Then, basic laws that created the basis for the regeneration of city space came into force one after another.

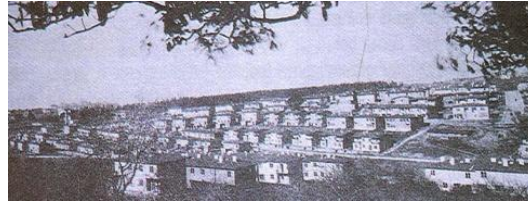


Figure 16. Koşuyolu Houses (source: wowTURKEY.com).



Figure17. Levent 1. Stage Houses (source: wowTURKEY.com).

After the 1. Stage, 2. Levent in 1951, 3. Levent in 1952 and 4. Levent in 1960 was made.



Figure 18. Construction of Ataköy (source: wowTURKEY.com).



Figure 19. Ataköy Houses (source: wowTURKEY.com).

Although 80's were the years in which the basic laws of the city were written, those laws needed approximately 10 years to be applied by transforming the space. Even though policies were embraced simultaneously with the rest of the world, it was going to take time to realise the observable effects of the legal reconstruction. Anavatan Party, with its Liberal-conservative policy, opened the way for city innovations and the transformation of resources of center into investment. After the cities became the center of the capital accumulation and the rent became important for the capital accumulation, private capital started to participate in its direct sanctions on the space (Sancar, www.ozgurlukdunyasi.org).

The way to work with outside capital was opened in those times. Welfare policies left its place to innovative and operator municipalities with the augmenting liberal values.

As it is in the West, 1980's were the years in which the decentralization became more popular and the local government gained power in Turkey as well. The reason for that is mostly the convenience of the negotiation and sharing on an area with local government. In this period, in which the 17 zoning relieves were in progress, the space generation in Istanbul, like in other cities, occurred as the shanties transformed into apartments. The city lost its empty lands quickly. In mid-80's, when Beyoğlu Municipality did not give license for the Gökkafes project planned to be made in Dolmabahçe, central government gave housing permission to Ministry of Public Works, and in one night the border of the strict of Gökkafes was changed and transferred to Sisli Municipality.

In 1989, with the construction of 2. Bosphorus Bridge, and with the neighbor roads opened to service, the shanties were transformed into apartments in first Hasköy, Kağıthane, Caglayan, Gultepe, Ortabayir, and then Sarigazi, Samandira and Sultanbeyli (Figure 20).

In 1980's, Head of the Municipality, Bedrettin Dalan, used the slogan "I'm going to make Haliç as blue as my eyes." to promise the crowd to clean Haliç, which was highly polluted because of industrialization. Indeed, he both worked for the deindustrialization of Haliç by cleansing and rendering Haliç to be used for recreational purposes, and for the Istanbul traffic by making a "scalpel operation." In historical Taksim district, he opened Tarlabası Boulevard, which was a very controversial project for demolishing numerous civil architecture artifacts. In that period, the cases of the profession chambers were lost due to the "superior public interest" verdict. Whereas, Haliç shore was cleansed from industrialization and there was a green corridor created along the shore (Figure 21, Figure 22, Figure 23).



Figure 20. Illegally constructed area of the town (source: www.emlakkulisi.com).



Figure 21. Persembе Bazaar (source: www.arkitera.com).



Figure 22. Haliç shore (source: www.dunyabulteni.net).



Figure 23. Tarlabası Destruction (source: www.arkitera.com).

In early and mid-80's, the difference between the two development plan, the difference between the perspectives of welfare State and neo-liberal State on space could be seen clearly. 4. Five Years Development Plan covers the years 1979-1983 says: "City lands were subjects of the private ownership. Thus, all special regulation attempts that involve the solutions of the problems in housing plans, which is one of the basic tools of urbanization policy, are insufficient. 5. Plan covers the years 1985-1989 was concentrated on current illegal constructions and services for shanties, and on improving them.

Post-2000 Period

A situation like the coup d'état and post-coup d'état reconstruction was repeated in 2000's. Justice and Development Party, which was born in the conservative-liberal and had a strong base, gained a success in the central and local governments, and on a large geography since the elections in 1994. The most important dynamics that shaped the period was the increasing demands of the global capital and the Marmara earthquake in 1999. Laws that are issued one after another and attempts for institutional reconstruction made the power of central authority on the regeneration of space clear. Contrary to 80's, the central authority had the control of the negotiations and the important area decisions.

In these times, Istanbul was assigned to foreign investors and strengthening big construction companies. According to the laws that created the basis for regeneration, first the historical areas and then the shanty areas, and then the shore and forest areas took a step through big projects in the regeneration process. 3. Bosphorus Bridge, Sulukule and Tarlabası Renewal Projects, Ataşehir Finance Center Project, Galataport, and other cruise shore area regeneration projects started to re-shape the city. Actors of the process were more compared to those of earlier periods: starting from 1994, NGO's took more roles in the participation mechanisms and the private sector shaped the process more strongly compared to 80's.

In the post-2000's, the role and the capability of local governments gradually reduced. Whereas, the central government transformed into an innovative contractor to reconstruct its content to strengthen its capability, with institutions like Environment and Urbanization Minister and Mass Housing Administration. This reconstruction overlooked all the actual plans and represented a projet-centered mentality –one-man governance-. Kanal İstanbul project, also known as "Crazy Project of the Prime Minister", started by overlooking the agricultural areas, natural registered areas and areas at the risk of natural disasters, and also ignoring the advices of the masters. The effects of such a situation could be seen in many examples. Journalist Necati Doğru mentioned 3. Bridge as the following in one of his articles: "I've asked to the Mayor, Kadir Topbaş; "...the feet and the direction of the third brige, which will affect the city you're governing in many aspects are determined by Ankara who sees the city from a helicopter. Does it sound right?" Kadir Tobaş answered me. "No, it's not." and he claimed: "The direction won't be determined by the helicopter. In the plan that he made for Turkey, the Trasportation Minister developed '3. Brige Project Proposal' for Istanbul. This project developed by the Minister will be evaluated by Istanbul Metropolitan Planning Center in terms of 'compliance and land usage analysis', and then the exact direction will be presented to Istanbul Metropolitan Municipality Council."

The effect of power and the capability was clearly obvious in Taksim Gezi Park events which took place in the world press. Who came face to face with the society were just the Prime Minister and the Governor. 2000's has witnessed that the architectural design has been strengthened by the symbols of power. Ataşehir Mosque and Çamlıca Mosque which is planned to build on the top of Çamlıca the most striking examples of this process (Figure 24, 25).



Figure 24. Ataşehir Mosque (source: www.yapi.com.tr).



Figure 25. Çamlıca Mosque (source: www.yapi.com.tr).

Evaluation

As a result, it is not a new experience for Istanbul to witness the reflections of the ideology of the State on space. Plus, this experience transformed the judgement verdict into applications made by overlooking even the international institutions. Spatial verdicts were made with the “one voice” of the center, and the term planning stayed behind in the regeneration of space. The appearance of political Islam in public space augmented with symbols and signs. In Turkey, the appearance of Islam in public is also a part of a politically organized social attempt to create an Islamic society system to create a middle-class “ethos” (Saktanber, 2007). This process can be summarized with the following chart (Table 2).

Table 2. The role of the State and its ideology in the regeneration of urban space

Period	Policy	Actor	Regeneration of Space	Tools	Situation of the State-Paradigm
From the early Republic periods to 1980's	Rural Policies	Central Authority	İdeal Republican Village Village Institutes, Public Houses	Legal and Institutional Reconstruction Planning Development Plans after 1964	Pluralist - paradigm
	Urban Policies	Central Authority	Transition from Organic Pattern to Rigid Pattern Evacuation of the Past Large Boulevards Ceremony Areas Public Buildings Theatres, Cinemas, etc. Cultural Buildings Squatter areas		
Neoliberal period	Urban Policies	Central and local authority	<u>Before 1990's</u> Squatter areas Unplanned construction Bridges	Military coup d'état Globalization Legal and institutional reconstruction	Class-centered paradigm
		Military between 80-83 Speculators	<u>After 1990's</u> High office buildings Huge shopping centers Mass housing	Development Plans Major Projects Privatization Zoning Relief Earthquake	
2000 sonrası dönem	Rural Policies	Central authority	Transformation of rural areas to urban areas	Legal and Institutional Reconstruction	Governing paradigm
	Urban Policies	Central authority Private sector NGO's	Transformation of urban areas Skyscrapers Huge shopping centers Comprehensive luxury housing projects Icons and symbols of political Islam	Major Projects "Crazy" Projects Privatization	

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Within and outside virtual walls: spatial configuration, touristic and immigrant co presence and routes in Rome (IT) city core

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Abstract. *Social and spatial complexity is the most outstanding feature of contemporary Rome (IT) metropolitan core, one of the main touristic destinations in Europe for its touristic attractions and a pluricultural metropolis, one of the main immigration gateways to Western Europe. Space Syntax methods and tools were applied to describe and analyze Rome (IT) spatial network measuring accessibility – connectivity, integration - segregation correlated to movement potential and fluxes probability. Data was empirically collected for Trastevere and Esquilino neighborhoods, providing a configurational explanation for foreigner's locational choices. We target to describe sociospatial practices enabling spatial governance and its impacts on co presence diversification and ethnic centralities. Our hypothesis is that urban grid morphological differences play a main role in fulfilling these users' expectations towards interaction with locals and mobility and can explain social appropriation of space transformations, triggering gentrification and significant co presence processes from which emerge enclaves and interethnic neighborhoods. Our purposes are: (1) to describe and analyze Rome city core spatial street network, applying Space Syntax tools and modeling methods; (2) to correlate route choice probability at local, global and metropolitan scales to immigrant and tourists spatial practices and locational choices; (3) to identify relations between spatial configuration and ethnic groups spatial agency; (4) to analyze users groups sociospatial strategies impact on neighborhoods' spatial lives.*

Key Words: spatial configuration, Rome (IT) city core, spatial governance, neighborhoods transformations; foreigners' routes, significant co presence

Foreword: Rome, the intercultural metropolis shades plural cities

Social meanings for place and space are not uniform and these are old news for the city of Rome (IT), for centuries a pluriethnic city, the earliest Western / Mediterranean Empire Capital. Italy has been an emigration country for about 100 years. From 1970ies on, it became a major *off-CEE* immigration attractor, drawing African, Middle Eastern, East European and Far Eastern steady foreign fluxes. Urban life cultural plurality was enhanced by *brain drain* processes, endogenous migrations (S-N) and tourism intensification. These processes impacted Italian cities strongly, causing the reorganization of local social relations and neighborhoods' spatial lives transformations with impacts on co presence, natural movement and land use patterns related to migration, touristic fluxes, globalization (*grassroots specially*, Appadurai, 2000), European territorial reorganization and contemporary diasporas from which emerge new forms of citizenship and group affiliation. That frame Italian urban planner's concerns on cultural heritage, socioeconomic integration, neighborhoods' transformations and residential segregation

and were summed on MEGARIDE / European Urban Directives Chart (1994¹¹⁶) towards interethnic integration and UNESCO *MOST* meetings (1984) addressing tourism impact on European metropolis. Their concern is that “cities might provide diversified places to fulfill the needs of its citizen’s majority and different ethnic groups, understanding diversity and alterity as a valuable social capital linked to urban development positive standards” (Beguinot, 2009, 30-2), adding that the contemporary interethnic city must be open, equalitarian, intelligible and sustainable, goals drawn from sociospatial qualities.

Rome is exemplary of large scale social processes ignited elsewhere and spread by networks informing foreigner's locational choices which modify urban dynamics, promote selective reconfigurations on interface patterns between local and strangers, movement and co presence, impacting sociospatial integration. Its metropolitan area is a patchwork of self-contained, fragmented, discontinuous and morphologically diverse urban sprawls that challenge its core spatial structure resilience and compacity. These relate to the way in which city core public places are socially appropriated by its *users*.

Space Syntax (Hillier & Hanson, 1984) methods and tools describe space as a system of constraints and potentials which define social interaction patterns through local (inhabitants) or global (strangers) control. Foreigner's collectives diversified co presence or ethnic segmented gathering practices suggest that *strangers* (Hillier & Hanson, 1984; Vaughan, 2007) unfold subcategories that capture the spatial system morphological properties to fulfill their expectations towards socioeconomic integration, interaction with locals and mobility.

Configurational analysis depicts social behavior from spatial patterns inequalities driving movement and co presence potentials. Provides evidences to analyze how foreigners experience the city, where foreigners presence is strong enough to provide places a new identity and attribute meaning for conflictive social relations from the way in which control over spatial structure privilege inhabitants or strangers, enhancing social boundaries or easing their transition from one status to another (Hillier, 1993). These processes drive a selective reconfiguration of land uses and *significant co presence* emergency according to cultural group's autonomy and bordering practices (APPADURAI, 2000). While in site, the group might regulate co presence in the area, a process known as *spatial governance*, reinforcing fluxes to collectively built centralities in a way that can affect other people behavior and assign these places symbolic meanings.

Our targets in describing Rome configuration are to provide sociospatial evidences that explain differences on foreigners' locational choices for gathering and the emergence of specialized centralities leaving for further research the intertwinements between urban sprawl, spatial segregation and these groups social reproduction. We focus on two neighborhoods - *Trastevere* and *Esquilino* - supplying empirical evidence of foreigners' - tourists and immigrants spatial behavior in order to test our hypothesis and analyze the correlation between spatial variables and co presence patterns (Hillier, 1999). We aim to contribute to the discussion on interethnic / pluricultural relations within European metropolis and their changing human landscapes.

We justify our methods by the premises: a) the neighborhoods cluster high land uses and attractors related to foreigners co presence giving emergency to specialized functional centralities that act as *place signifiers* - *Chinatown* (MUDU, 2006), touristic ghetto-, b) "*inassimilable ethnic groups*", even when represent an unexpressive population share (2% Chinese on Rome population), a lot less than the impressive amount of tourists (up to 50% of the city's population) that flood the city every summer, monopolize urban planning debate; c) Tourist herds' definitely impact spatial life locally and ignite long lasting transformation processes such as gentrification ones; d) meanings given to co presence and interaction system based on avoidance / gathering (Holanda, 2010), are driven by subjective values affected by alterity and otherness notions (APPADURAI, 2000).

¹¹⁶ Beguinot, Corrado (ed.) 1995 Carta Di Megaride 94. Città Della Pace-Città Della Scienza. Napoli: Aa.Vv, Napoli.

We focus on immigrant and tourists /short term resident's different goals towards spatial integration, their sociospatial logics and the phenomena described above. Foreigners control over space might relate to mobility, accessibility and functional centralities and the way in which socioeconomic integration is achieved. It might be through individual entrepreneurship and community agency or through stable gathering places where renew and spread supportive networks providing landmarks for shared social and cultural practices and work opportunities information diffusion.

Alessandria (2004) findings on foreign workers gathering practices depict their goals to minimize suburbanization, residential segregation, group spatial dispersion and social marginalization negative integration effects and to face social discrimination through visibility strategies and cultural identity affirmative behavior performed in central public places. Their locational choices contemplate good accessibility to group's main clustering zones and transport / commuting nodes stable references, both vital for social network stability. That is why *betweenness* centralities matter (Hillier, 1999).

For tourists, accessibility, connectivity and straight forward routes to their hotspots explain their locational choices, since becoming local is not among their priorities. Navigating a foreign city where they won't stay long enough matter: through movement and *walking distance* matter. Tourist's information networks produce and are feed by stable spatial references which, in turn, promote functional clustering and specialized centralities.

Our hypothesis is that foreigner's locational strategies are intertwined to the spatial structure, driving the election for gathering places according to collectives' social expectations towards interaction with locals and among themselves and whose regards towards spatial and social integration are built in different ways. For these reasons, addressing foreigner's co presence as a relational byproduct of spatial patterns differentiation grant meaning to their spatial strategies, to Rome spatial syntax.

Rome metropolitan core spatial network: the analysis and its goals

If contemporary social relations are built from and through movement potential rather than territoriality, navigational information depicted from the spatial network might enforce social boundaries, since movement is a *kind* of amorphous and dynamic power driven by potential connectivity and node control. For that we provide a configurational description applying three Space Syntax modeling methods - Axial, Angular and metric Radius (Hillier & Iida, 2005) from which depict the morphological properties that enable us to analyze strangers subcategory (Hillier & Hanson, 1984) - tourists and foreign workers - spatial behavior.

Rome city core was decomposed into a one-dimensional graph, the axial map (Figure 1) depicting its spatial network (Hillier, 2013) modeled using *depthmapX* software© (Varoudis, 2009). The mapping boundaries were established by spatial barriers and urban grid discontinuities surrounding the core: geomorphic barriers (rivers and hills), main *ring roads* and railroads, institutional / archaeological compounds, urban grid discontinuities (Figure 1).

Hillier & Iida (2005) definitions that integration is topological closeness, Choice is bridging or accessibility and Segment Analysis is connectivity potential modulated by cognitive information ponder correlations for foreigners spatial behavior within the city core. If *integration* (R_n , R_3) measures potentials and *choice* probability, we might compare them to empirically collected data on ethnic and tourists clustering and spatial practices (Hillier, 1999).

Axial analysis focuses on topological integration. Urban grids deformation degree is measured by continuity, linearity, connectivity and control potentials between its parts (Hillier & Hanson, 1984). Local and global Integration (HHR_n/R_3) inform the potential for natural movement and co presence within the urban grid. Analysis enable to explain group clustering choices towards interaction with inhabitants and social boundaries emergence through groups' most instrumental exercise of power: control over places. Route choice (HH_{Choice}) depicts the shortest paths providing best accessibility between all parts of the system, attributing the most

probable used routes an iconographic hierarchy ranging from red to blue, allowing to evaluate fluxes probabilities along routes.

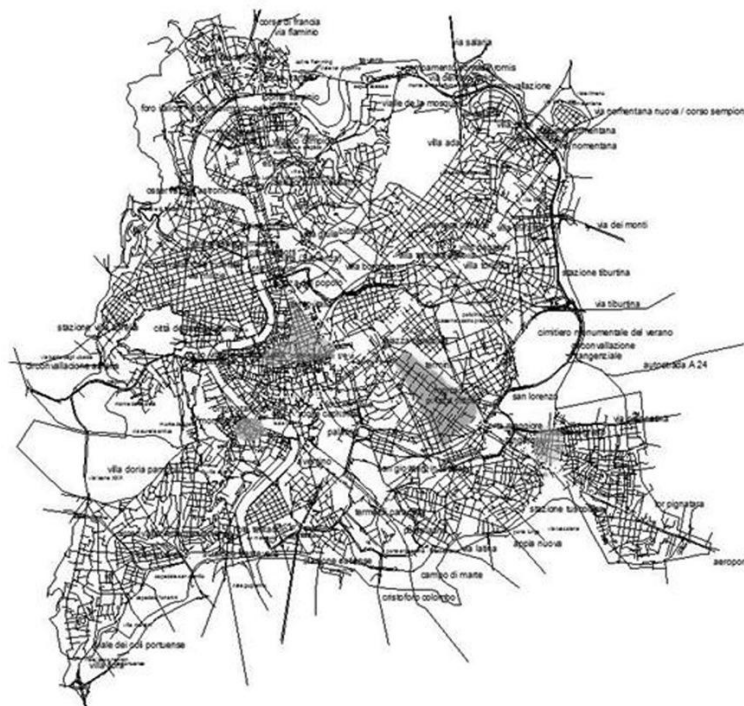


Figure 1. Axial map of Rome city core (Andrea Braga, Fabio Zampieri & Daniela Reckziegel) on cartographic shapes mosaic (© Università La Sapienza di Roma, Data Library developed by G. Longo), recomposed by Zampieri. Cartographic source: Lamco S.r.l; Catizzone, A., Regione Lazio, Carta Tecnica Regionale, volo 2002, restituzione, 2005. Costanti di transito da Gauss-Boaga a U.T.M. ED50, Elemento n°37406(1,2,3,4).

Spatial structure ringness strength equals to weak synergy between local and global spatial patterns, differentiating the ways space is socially appropriated (idem) underlying the notion of meaningful co presence (Hillier, 1999a): control and bordering of public spaces, in short spatial governance, for which avoidance and gathering modify the notion of co presence as the “unaware presence of strangers and dwellers in the same convex space”.

Segment modeling transforms axial lines into nodes according to the deflecting angle of its connections to other segments and captures cognitive information implicated in navigation; what is perceived as spatial and visual continuity /along a route (SegInt) modifying deepness topological structure to depict more accurate fluxes probabilities . The analysis consider *betweenness* centrality on different metric radius (SegChoice 500m, 1km, 5Km) to evaluate the role route choice has on the emergence of specialized centralities as a function of local, global or metropolitan movement.

These provided configurational evidence for foreigner's successful exploitation of the urban grid morphological properties according to their different objectives towards integration in correlation to their sociospatial behavior of unexpected centralities “which can only be explained beyond street grid configuration, through navigational patterns” (Hillier & Iida, 2005).

Rome city core configurational description: touristic and immigrant co presence and routes

Axial and Segment modeling's (Figure 2) depict *Corso Italia* (*Cardo – Decumanus* system) as the most integrated axis within the city core, a linear centrality at global and local scales. It stretches from *Piazza Venezia*, the gateway to *Foro Romano*, to the end of *via Flaminia - Foro Italico*, connecting both Ancient Rome ritual centers, defining the main route through the old city core and to its expansions beyond *Tevere* river (W,N), *Pincio*, *Palatino* and *Quirinale* hills (E, S) through two ceremonial plazas – *del Popolo* (N) and *Venezia* (S) both are encircled by main traffic connections.

Axial Choice (HH) depicts quite accurately routes from *Piazza del Popolo* to *Vatican city*, *Castel Sant'Angelo* and *Trastevere* (W), main touristic attractions. *Via Flaminia* (N) stretches *Corso* integration on a single axis towards Imperial archeological sites and newer developments (*Vila Olimpica*, *Parioli*). From *Piazza Venezia* (S), *Vias dei Fori Imperiali* (*Colosseo*) and *Del Teatro di Marcello* enclose archeological monuments (*Foro Romano*, *Palatino*, *Circo Massimo*) connected by *via Appia*.

The *Corso* integration / connectivity robustness turns it into the spatial network central node: it controls routes / touristic paths through the old core (*Pantheon*, *Piazza Navona*, etc.) and to core surroundings. It also contributes to exploring the scenic and picturesque character of the area by providing visual fields which improve navigation while wandering around: *Corso* is a compass for wanderers venturing into the old core allowing strangers to regain control over navigation, out of the labyrinth.

Comparison between axial local / global integration evidenced secondary functional centralities subjected by the *Corso* integration / connectivity robustness which bounds different phases on urban evolution. On its Western side, spatial system is deeper and less intelligible due to strong grid deformation denoting local (inhabitants) control over the whole city core.

Corso (W), *Via del Babuino* (E) and *via Nazionale* (S) form a triangle of shallow, well integrated and connected axes bounded by *Pinchio* hills / *Villa Borghese* (E). Its deformed orthogonal grid has better global integration that grants strangers control over this part of the system. It defines a perimeter for Rome's symbolic and functional centralities and tourists stroll freely from *Piazza di Spagna* to *Fontana di Trevi*, *Campidoglio* and *Quirinale*.

Axial Choice depicts radial axes connecting urban expansions to the *Corso* formed by Ancient Rome roads system that structured its regional territory (*Salara*, *Ostiense*, *Casilina*, *Portuense*, *Tiburtina*) and ritual periphery (*Cimitero Monumentale*) outside the city walls. The longest E-W axis linking *Piazza di Spagna* to the *Tevere* banks / *Castel Sant'Angelo*, across the *Corso* with higher integration measure is *Via Condotti*, a reference for tourists and shoppers.

The triangle stretches south from *Piazza Venezia*, linking *Palatino - Colosseo* / *Colle Oppio* and *XX Settembre / Nomentana* (S) / *Via Cavour* (E) connecting peripheries (E) and 19th century monumental sites. The city's main commuting node, *Termini* train station is the far vortex (E) beyond which global integration fades, bounding the compact city and reinforcing sprawl discontinuities through superimposed spatial barriers.

18th and 19th centuries changes urban grid expansions turning linear functional centralities into distributive through the fusion between orthogonal and radial systems, distributing global integration.

Metropolitan sprawl follows residential segregation patterns for lower or upper classes indistinctively captured better through Segment Analysis. Spatial network global integration (SegInt) is more robust than axial, pondered by connectivity that highlight large scale circulation hierarchies (ring roads) as preferable routes surrounding the city core, outside the walls connected to commuting nodes (train stations radial roads systems). The measure depicts routes from peripheries to the centre and between neighborhoods, around the core forming a ring road system connecting each part of the metropolitan discontinuous sprawl. Their efficiency in taking vehicular movement to the old core perimeter change the ancient centre-

periphery global choice radial structure into a deformed wheel, improving the urban grid ringness which, in turn, improve connectivity and accessibility between system's parts.



Figure 2. Rome axial (HH) and angular (Seg) modeling DepthMap aided by Claudio Ugalde

Changing metric radius to segment choice modeling (Figure 3) enabled to depict the urban grid changes following sociospatial transformations to the city core (500m) spatial patterns such as late medieval segregation between civic (Campidoglio) and religious (Piazza San Pietro), their connection through Corso Vittorio Emmanuele (W) and consequent N-S old core divide into unbalanced halves, that produced a popular, pollute and peripheral southern centrality (Campo di Fiori).



Figure 3. Route Choice system Axial and Segment modeling (Claudio Ugalde). Route from the Old Core to Trastevere is highlighted in red/yellow for 500m radius.

Segment Choice for 1Km radius (Figure 4) highlights the radial system linking the city core to its expansions and another commuting node at the end of *via Flaminia*: *Piazas Mancini and Apollodoro*, both functional and ethnic centralities to immigrant domestic help scattered along upscale neighborhoods (*Parioli*), referential to South Americans gathering practices. Expanding radius to 5km, secondary and local centralities emerge along routes connecting suburbia to the core (E-W) where middle class developments abound. Street markets and immigrant significant co presence on public squares along transportation main routes and commuting nodes evidence their preference for highly accessible and visible gathering practices targeting alterity affirmative behavior as their sociospatial integration strategy and endogenous bond renewal.

Comparing Choice system, axial and angular, we find out coherent morphological boundaries to residential developments provided by main axes capturing both configurational and functional centralities. That indicates that local centralities tend to linearity, shared by more than one neighborhood, what reinforces connection and integration between different socioeconomic clusters. Roman peripheries are highly segregated, but well connected to the core, a possible explanation for tourists keeping their ground near the core and for immigrants choice of gathering places (Figure 4).

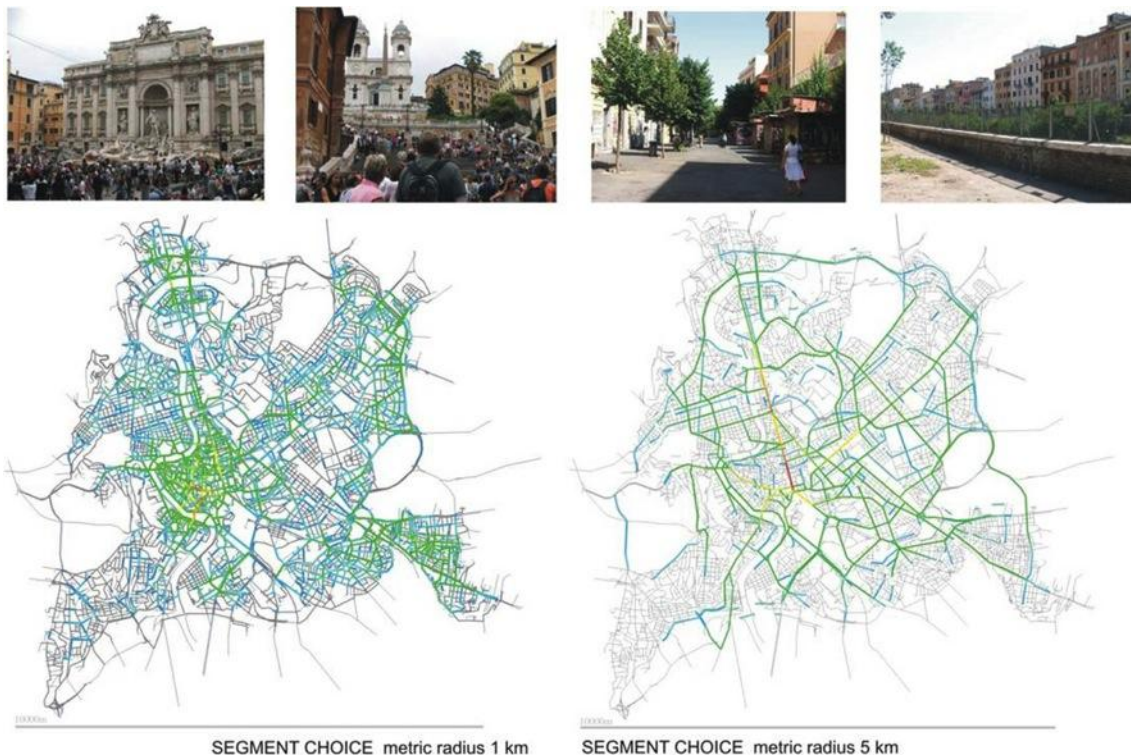


Figure 4. (Above, left) Fontana di Trevi and Piazza di Spagna: two main touristic hotspots located within the Old core higher Axial Segmented Integration area, always full of tourists; Circunvalazione Casilina and via del Pigneto (right), one of c Rome oldest suburbs (SE), going through a gentrification process. Photos: Andrea Braga, 2011. Below: Segment Choice 1 and 5 Km radius (Claudio Ugalde). The short route in orange (W) links Largo Argentina and Campo dei Fiori to Trastevere (right). 5km radius depicts routes linking Termini to SE suburbs. The two main axes (NE) are via Salaria and Viale Libia, enclosing newer residential developments. Lungotevere main vehicular route encircles the old city core. The Corso segment with intenser fluxes cuts the old core.

Strangers in paradise: spatial qualities turned *Trastevere* into a tourists' enclave

Trastevere (W) was one of the earliest Rome urban expansions (13th century). A walled medieval compound built on rural land across the *Tevere*. The spatial system is deep, poorly connected to its surroundings, a quality reinforced by topographical boundaries (W). Large densely built blocks and small scale public spaces produce a series of short axes indicating local inhabitants control and spatial solidarity. In 1980ies it resembled a *typical italian village*: neighbors chattering through open windows and laundry lines crisscrossing narrow streets (Figure 5).

Control over space being one of the main forces driving the organization of social relations, enhance different spatial strategies to fulfill foreigners purposes *locally*, transforming not only these places social lives but also Rome population imaginary over them. Final stop for main touristic routes, *Trastevere* is a gated community since its earliest days, converted successfully into an American *expats* enclave.

The neighborhood gentrification process was anchored by the opening of three USA college branches focusing *study term abroad* that turned long term tourists into short term residents, enabling their local control over space. *Trastevere* social and spatial life is turning into a simulacrum through drastic changes: dwellings converted into short term rental unities / student hostels, local shops replaced by restaurants, cafes, tourist shops, meeting new inhabitant's needs.

SegChoice (radius 500m, 1 Km) fluxes probability is coherent with empirically observed movement and co presence along routes irradiating from *Piazza di Santa Maria in Trastevere* to main hotspots on the old city core, providing strong spatial reasons to become a tourist's enclave. Local control is strong; it is spatially segregated from its surroundings but well connected to points of touristic interest; conforms to *campus lifestyle* with its cafes, restaurants and "student dorms" that enable this *expat* community to experience Rome without being infatuated by metropolitan life.

Retracing the highlighted route choice system back to *Trastevere* (Figure 5) reveal that intense fluxes are more probable along the circuit connecting *Piazza Venezia*, *Largo Argentina*, *Campo di Fiori*, *Ponte Sisto* to *Piazza Santa Maria in Trastevere*. It explains why we were fooled by *Trastevere* axial segregation, when empirical evidence was counterintuitive: shorter and straight routes connecting city core attractions to the neighborhood justify its touristic attractiveness. *Trastevere* is at *walking distance to / through* main Rome touristic attractions.

A group strongest potential mobility might weaken other group's chances towards the same opportunities. Tourists spatial governance empower themselves towards local control over movement and route choice discouraging diversified co presence. We ask ourselves if their spatial behavior weaken Rome inhabitant's ties to such places, changing their identity locally and globally from which emerge new kinds of specific and exclusive centralities.

Tourists tend to limit interaction with inhabitants to a minimum. Axial integration is less important to them than route choice and *betweenness* centrality. Spatial segregation might become an advantage as long as the potential enclave is strategically located and connected to / connecting points of interest. Clustering provides safety and enhances significant co presence in a highly accessible spot. *Trastevere* sums those spatial / instrumental qualities money can buy; therefore Americans spatial governance is noticeable here. No wonder the neighborhood plays a special role on Woody Allen's *To Rome with Love* (2012).

Strangers meet in paradise: spatial reasons that turned Esquilino into an interethnic neighborhood

Esquilino is considered the most globalized, cosmopolitan Rome neighborhood and a successful interethnic community case, even if official data (legal immigrants, 2010) is only 36% of neighborhood population share. Residents major ethnic groups are diversified: Eritreans, Bangalores, Philippines and Romenians are numerically expressive (7,8% to 5,9%). Other

groups subjected to immigration fluxes aren't dwellers (chinese, polish, africans, indians, afganis) either workers / users of services hub give sense to the statement above. Copresence is defined by interethnic relations giving emergency to special forms of sociospatial and economical integration and place image.

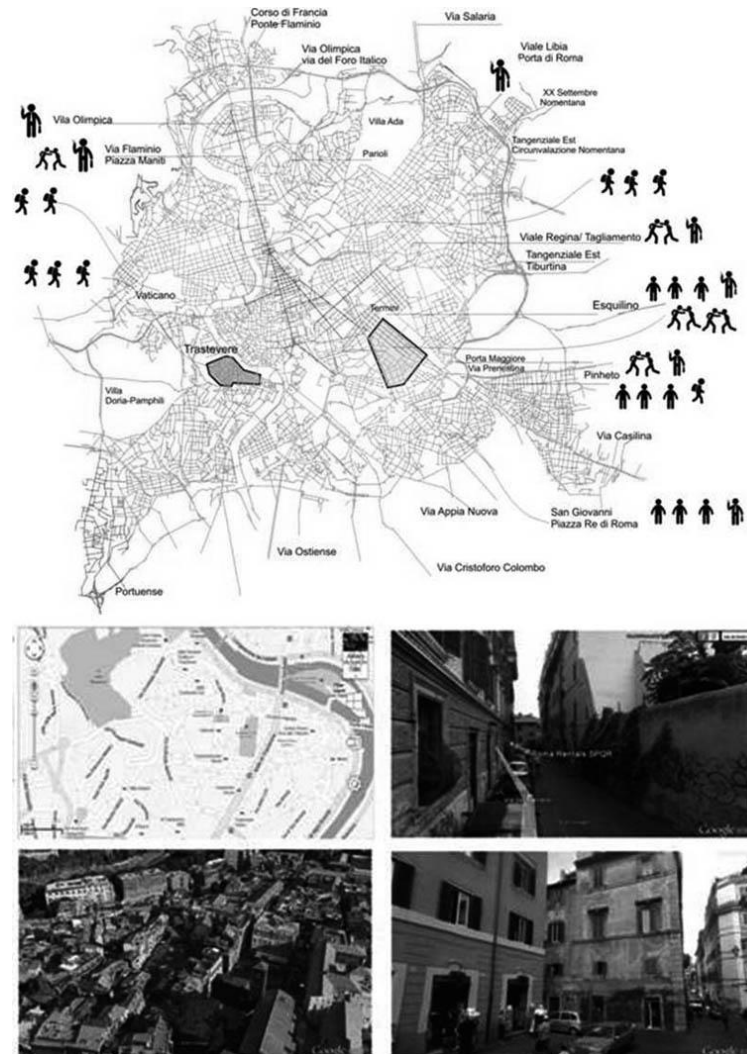


Figure 5. Above HH Integration Rn displaying empirically collected data on tourists (backpack), inhabitants (cell phone) and strong foreign workers movement / gathering (hugging) places (Andrea Braga, 2011). Centre: Trastevere map showing American universities campi and neighborhood landscapes (Google Earth, Street view); Below: Pigneto neighborhood maps and images (images: Google Earth, Street view).

An 18th century urban expansion that changed the city core development E-W along its historical fringes, *Esquilino* orthogonal grid is cut by diagonals spreading from a large scale piazza, *Vittorio Emanuele* (250mx120m) at its geometric centre. Sinergy between local / global integration mesaures distributes control among inhabitants and strangers, symbolic of Italy unification: urban modernization, territorial and sociocultural integration (Aymonino, 1985). Since its once borgeois founding, *Esquilino* is foreigner's territory. Decadent in the eighties, was enrolled on Rome Municipality's *Historical centre renovation plan* (1981-5, SPQR) strategies to ignite socioeconomic changes: *Termini* modernization, urban and environmental

recuperation, street food market (1902-2001) replacement, via GGiolitti extension to *Porta Maggiore* and new functions induction (hotels, culture, education).

Centrality spread easily through the orthogonal grid according to complex dynamics from which an *immigrant centrality* (MUDU, 2006) emerged through ethnic entrepreneurship, grassroots globalization and interactions between sociospatial and political variables and also interfaces between inhabitants /strangers, *italians* / ethnocultural groups, concurrent with italians neglecting the use of public places. Places potential centrality are key in urban transformation processes and to understand appropriation conflicts due to interfaces intensity it encloses, living out of diversification / especialization duality (Hillier, 1999).

Strong spatial reasons lead Esquilino to be known as an immigrant centre (Figure 6), reassigning roles between *local* / *strangers*. Good accessibility and connectivity to immediate periphery potentialize *to* and *through* movement, configuring centrality, in which commercial activity relay, strengthen by monopolist attractors, transport hubs and global integration robustness that meet immigrants objectives towards socioeconomic integration and endogenous - exogenous interface system. Economic variables were low cost real estate; local commerce decay and depopulation that activated ethnic agency promoting complex transformations that unbalanced the once evenly distributed spatial control between inhabitants and strangers, turning the neighborhood into what its shallow spatial structure and its connectivity to peripheral areas allow better: to become a functional centrality, for better or worst. That's why immigrants *occupied* Esquilino.



Figure 6. Top-down left-right: Esquilino and Piazza Vittorio (Andrea Braga, 2011; CRAPSI et al, 2010); Orchestra di Piazza Vittorio (2002): Cultural Hybridism and conviviality in pluriethnic Esquilino (Source: Ethnic newspapers Bellobuono et al. Marino, 2010); Esquilino market (Piccione, 2010); Other images are all by Andrea Braga, 2011.

The context favored ethnic entrepreneurship specialization by branches (LIGHT et al. 2009) summing up to transform the neighborhood's spatial and social lives. Spatial governance emerges from conflictive sociospatial practises and unbalanced control over spatial dynamics attributing meaning to ethnic copresence: Italians seldom gather in public, immigrants do the opposite despite group membership. Ethnicity might be considered spatially built in Esquilino.

Distributive connectedness and accessibility disperse centralities and give way to several gathering places to which groups refer according to their interest, needs and degree of social and economical integration.

Esquilino is a strangers place, its shallowness, accesibility and conectivity attract immigants eager to mingle and integrate themselves into the city's economical and social life. A stable functional centrality confirms its importance in structuring SE urban expansion. Its orthogonal grid provides the fair ground for interaction between locals and strangers. We might risk saying that once in *Esquilino* foreigners feel at home, explaining why the neighborhood is an example of positive sociocultural and economic interethnic integration.

Walking along invisible borderlines: Esquilino spatial configuration, ethnic commerce and plural territorialities

Co presence data collected empirically display main gathering places which support ethnic solidarity networks, enabling us to analyze different spatial strategies operated by immigrants on their locational choices. Addressing foreigner's co presence as a relational byproduct of spatial patterns differentiation provided some evidence to their voluntary clustering at *Esquilino*, appropriated as a metropolitan centrality.

Enclosed by main routes linking *Termini* to Southern suburbs, the area is alive with *to* and *through* movement reinforced by the mere location of this monopolist attractor. Accessibility to the city core, connectivity to surroundings and main metropolitan commuting hubs reinforce its functional centrality and are instrumental to ethnic/cultural groups gathering choices since global integration matters for foreigners. Significant co presence follows criteria related to spatial control: foreign workers might be *inhabitants* if living /working on the neighborhood; or *strangers* who come from afar to socialize or shop. Gathering places vary according to ethnicity, inhabitants / strangers *divide*, integration measures and movement potentials. If the *Corso* axis is where tourists and inhabitant's co presence and movement are evenly distributed, the orthogonal grid integration differences ponder significant co presence (Figure 7).

Via *GGiolliti* / *Piazza Vittorio* Eastside define the perimeter where HHRn is stronger, concentrating most part of ethnic / metropolitan commerce and foreign co presence. HHRn/R3 depicts stronger integration measures on N-S axes. Via *GGiolliti* is the longest and most globally integrated axis connecting to the ring road system (*Circonvallazione Tiburtina, SE*) and captures vehicular movement on the neighborhood periphery. Pedestrian movement is weak beyond *Termini* secondary entrance and ethnic significant co presence is outstanding between *Cattaneo* and *Cappellini* streets, where's a sort of newly *immigrates* service hub (restaurants, call & remittance centers, hostels, DVDs/ newsagents) emerged. The site is easily spotted from *Termini* but secluded from pedestrian movement, on an elevated sidewalk. Around its corners (Capellini /Rattazi) a step deeper, beauty parlors, *International Amnesty* and other legal assistance offices provide refugees / immigrant's social support, services and gathering references, leading us to conclude that this area attracts foreigners *strangers* to the neighborhood, barely venturing far from its boundaries (Figure 5). Co presence is mainly African and masculine and groups are small.

Esquilino food market entrance (*Principe Amedeo*) attracts ethnic restoration and specialized food suppliers to its vicinity, organizing its spatial concentration and spread: Shop management gives sense to ethnic groups gatherings and include travel agencies, call/remittance centers, restoration in the mix. Foreign inhabitant's masculine co presence is high on weekdays, gatherings usually outside small cafes near the market, solidarity built through their trade and gender. Co presence diversification and movement increase on Saturdays, market's grand day, when the whole street turns into a pluricultural and interethnic gathering place. On Sundays, gatherings move to *Piazza Vittorio* where ethnic, gender and age groups have stable meeting points inside and around its limits.

Piazza Fanti vicinity defines the boundary between interethnic *Esquilino* and touristic Rome; from there until via *Cavour* there are almost exclusively hotels, B&B, guest houses and tourism

related services. Around the Piazza, Bangalore jewelry shops and beauty parlors mix with African handcraft, Chinese retail and restaurants. Ethnic co presence is weaker, groups are smaller but spatial governance is stronger, each group controlling small stretches of sidewalk.

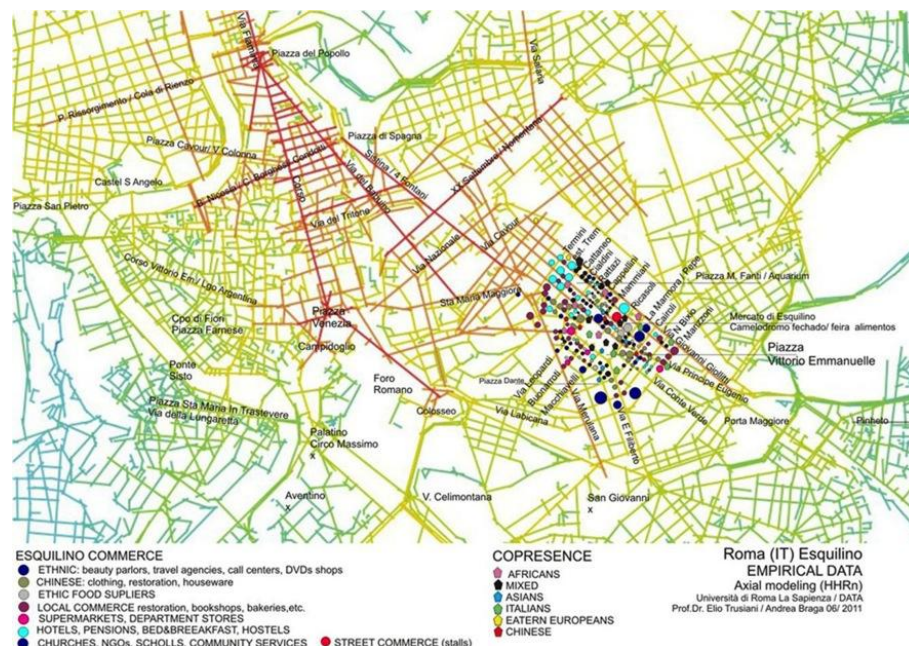


Figure 7. Co presence and ethnic land use labels dispersion in Esquilino (Andrea Braga, 2011).

Via La Marmora block between *Principe Amedeo* and *Piazza Vittorio* is Indian/ Bengali territory where *Bollywood DVD* 's shops, clothing and newsagents draw this group major co presence. Chinese commerce (clothing wholesalers /retail) cluster on *Piazza Vittorio* eastern side, sprawling north along *Napoleone III / Carlo Alberto*, where it diversifies (beauty parlors, ethnics, restoration) and South along *Conte Verde* (clothing), where through movement is intense. *Palazzo del Freddo* (traditional ice cream factory) turned global ironically through Far Eastern franchises, *Mas* department store and missionary churches outstand among Chinese homogeneous shops testifying for previous commercial trends and diversifying co presence.

The Western side of *Piazza Vittorio* is a secondary functional centrality to the city core spreading towards *via Cavour* (N) / *Merulana* (W) with traditional shops still doing business (popular department stores, cafes, clothing, and hotels). Shorter axes perpendicular to *Piazza Vittorio* (W, *Foscolo*, *Machiavelli*, *Leopardi*) concentrate neighborhood commerce (supermarkets, giftshops) but also some ethnic services such as call centers, remittance, electronics, travel agencies and beauty parlors (massage) hidden from main *through movement* routes, but accessible to *insiders*. Streets seem *empty*, large institutional buildings and dwellings predominate, movement and co presence are weak, stronger local control is easily perceived. Foreigners gather on the sidewalks, attentive to people passing by, arousing uneasiness reinforced by the ambiguity of services provided.

Ethnic ommerce is usually placed along less integrated axes. Grassroots globalized business networks nodify along axes displaying better to / through movement potentials. Foreign workers who see themselves as locals gather along most integrated axes. Newcomers tend to gather in more secluded places, meaning axes which natural movement potentials aren't fulfilled, but remain important vehicular routes through the neighborhood, displaying good accessibility and connectiveness locally and globally.

Piazza Vittorio seems to be the boundary between the prevalence of local and global integration and their effects on social and spatial life. On its Western side movement and co

presence are weak, local commerce prevails and ethnic co presence is discrete. On its Eastern side through movement is intense, reinforced by commuting nodes; foreigner's co presence remarkable since integration higher measures favors stranger's control.

Foreign workers mere copresence in public spaces denotes their eagerness for urbanity, attributing meaning to different integration patterns within the neighborhood. We identified three functional centralities based on commercial branches distribution (Figure6): its Northern zone extends city core centrality, taken over by tourism services and commerce; Piazza Vittorio west side a neighborhood centrality punctuated by low profile ethnic commerce and services; and a metropolitan one (SE), sensitive to fluxes through Eastern peripheries, re-built on immigrant/ethnic entrepreneurship. Their superposition plus the configuration potential to fullfil different social agendas feed conflict over space and impacts social imaginary for its spatial qualities resilience that enable profound functional transformations.

Esquilino social life operates between neighborhood and ethnic relations: foreigners can be neighbors according to its spatial integration hierarchy that eases conviviality. Economical decay might be overcome thanks to its local connectivity, global integration, high accessibility and gentrification process ignited institutionally. Its spatial patterns jeopardize coherence between social exclusion and spatial segregation, challenging the political agenda because addresses *new romans* integration to Italian society, which extent and form is molded through spatial integration equal to economic one.

The neighborhood spatial and social life is divided by an E-W boundary, *Piazza Vittorio*: an Eastern *ethnic Esquilino* (Figure 8) and a Western Roman one. *Piazza Vittorio* itself is a frontier zone where spatial governance is negotiated evenly between Italians and foreigners, immigrants and tourists, where different forms of territoriality might be displayed side-by-side. Where foreigner's become *new romans*, where *romans* acknowledge their *otherness*.



Figure 8. ethnic commerce and service on GGiolliti elevated sidewalk and Termini connection to San Lorenzo. Esquilino market surroundings (photos Andrea Braga, 2011).

The social sense of urban form: Where do you come from? Where are you heading to?

Spatial pattern discontinuities endure the ways in which social categories occupy and regulate movement, mediating significant co presence and defining spatial governance. Integration, accessibility and connectivity hierarchical differences establish differences on movement potentials implied in the form and intensity co presence is organized according to each groups'

interaction strategies to members/non members. Foreigners elect and assign gathering places exploring more than one form of distance between themselves and those considered outsiders, through the routes they choose, through the spatial qualities that inform their locational choices.

Orthogonal grids distribute integration potential quite evenly. In such cases, slight differences on integration and connectivity potentials might be the clue to understand foreigners locational choices from which significant co presence patterns emerges. Movement potential and fluxes probability drive centrality processes shaped by the kind of movement they require and co presence they facilitate (HILLIER, 1999).

As for foreigner's movement and routes, we addressed the spatial strategies structuring gathering places network correlated to spatial configuration; their potential to connect to and command other network nodes and route segments is explanative of foreigners sociospatial locational strategies towards interfaces with themselves and to others. While in movement it is the route which identifies or classifies locals from strangers, in the way it provides straight paths to main collective attractors. Foreigners build strong links based on shared experiences along routes: tourists and immigrants alike, to the point they might be identified through them. They define borderlines to social appropriation of space, their reachable limits within the city spatial system.

If bounding is a self-organised spatial process related to groups strategic choices towards endogenous and exogenous forms of interface, spatial integration is prerogative to interact evenly with social diversity on daily practices, in co presence. According to an *Orchestra di Piazza Vittorio* member:

"Piazza Vittorio is changing, for better or worse, it is being transformed. Places aren't supposed to change on behalf of people who doesn't live there. Yet daily life imposes its own movement patterns, and changes on it are noticeable if movement is weak on market days; in other cases, changes are silent and people remain unaware of them, except those living nearby. And those who live here are Chinese tango dancers. What matters here is complexity, difficulties living together, being in co presence, these minor conflicts and integration gestures." (Piccolo, 2006, p.7).

Assuming that enclaves are space used as capital on gentrification or economical integration processes, than both, interethnic *Esquilino* and *Ameritown* in *Trastevere* are enclaves of different kinds: one remains a gated community, dwellers, even in transit, exert local control, transforming its social and spatial life in a way that jeopardize its cultural heritage. The other is open to global fluxes that transform sociospatial integration promoting interethnic conviviality not without conflicts. One enclave is a spatial compound, the other a strategic node in global networks which encompasses the whole metropolitan area and beyond. Both promote radical changes on neighborhoods landscapes.

Tourist's interaction with locals is selective and casual related to where they move about and might benefit from sociospatial segregation. Immigrant interaction with locals is essential to their socioeconomic integration, benefiting from spatial integration. On both cases their spatial strategies target to modulate interfaces to their own benefit. On both cases spatial governance is exerted, transforming places identities. Foreigner's practices, co presence and route choice become signifiers. Therefore, the questions:

Where do you come from? Where are you heading to?

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Analysis of urban morphology on festival space decorated on urban space, focusing reviewing spaces and closed spaces in the case of Chichibu Night Festival in Japan

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Abstract. *Urban spaces transform into festival spaces when urban spaces are decorated with various ornaments and various events are held in urban spaces. In the case that audience over permissible amount crowd of festival spaces, it is theme to control audience for safety and to design good spaces to see at the same time. In Chichibu Night Festival in Chichibu city in Japan, which is one of the three biggest float festivals in Japan, there are three hundreds of thousands of audience in the last night of festival. Owners of the sites along the float route take two different ways as follows, to open outside spaces to put pay reviewing seats (reviewing spaces) or to close outside spaces by barricades (closed spaces). This paper aims to clarify characteristics of reviewing spaces and closed spaces in the case of Chichibu Night Festival in behalf of float festival in Japan. Findings are three points as follows. 1) Reviewing spaces are set to crossings, hill and Otabisyo (the place where the sacred palanquin is lodged during a festival) which are highlight areas of float festival, and are able to be typed three patterns by relationship between reviewing spaces and the ground, 2) The whole area where crossings, hill and Otabisyo are located changed closed space for safety because many audience crowd to, 3) In closed spaces, barricades are set up by plywoods and iron plates along boundary line of streets so audience can't enter the sites.*

Key Words: festival space, urban space, Chichibu Night Festival, reviewing spaces, closed spaces

Outline of this study

Urban spaces transform into festival spaces when urban spaces are decorated with various ornaments and various events are held in urban spaces. In the case that audience over permissible amount crowd of festival spaces, it is theme to control audience for safety and to design good spaces to see at the same time. In Chichibu Night Festival in Chichibu city in Japan, which is one of the three biggest float festivals in Japan, there are three hundreds of thousands of audience in the last night of festival. Because audience over permissible amount crowd around along the float route, owners of the sites along the float route take two different ways as follows, to open outside spaces to put pay reviewing seats (reviewing spaces) or to close outside spaces by barricades (closed spaces). This paper aims to clarify characteristics of reviewing spaces and closed spaces in the case of Chichibu Night Festival in behalf of float festival in Japan. I define reviewing spaces as the spaces which put pay reviewing seats and receive audience positively and closed spaces as the spaces which refuse audience by barricades, and both spaces have common features as follows, 1) these are festival spaces and 2) sites along the float route and 3) outside spaces.

Next, I talk about how to study. First, when I find reviewing spaces or closed spaces along the float route in Chichibu Night Festival in 3 Dec. 2012, I plot points of them in the map, photograph and film. Second, I type reviewing spaces about relationship between reviewing seats and ground. Third, I grasp areas which were closed during towing floats. Fourth I type closed spaces about materials of barricades.

The outline of Chichibu Night Festival

Chichibu Night Festival is held from 1 to 6 Dec. every year as annual festival of Chichibu Shrine. Main festival events in Chichibu Night Festival are 1) towing floats around town area, 2) playing Kabuki on the floats, 3) playing "Hikiodori" on the floats, and 4) towing floats from Chichibu Shrine to "Otabisyo" (the place where the sacred palanquin is lodged during a festival). Main places of Chichibu Night Festival are Chichibu Shrine, "Otabisyo" and Chuoh street which is main route of towing floats. Chuoh street 9-13 meters in width is main street. Modern buildings and historical buildings are mixed along Chuoh street. Towing floats event start from Chichibu Shrine, make a round of the Shrine, and arrive at "Otabisyo" by way of Chuoh street, Seijin street and Dango hill.

The characteristics of reviewing spaces

I plot points of reviewing spaces on the map (figure 1). There are 4 points near crossings (a, b, c in figure 1), 8 points near Dango hill and 1 point in Otabisyo. Every points are set near view points of towing floats.

Next, I analyze each reviewing spaces. Reviewing spaces are able to be typed three patterns by relationship between reviewing spaces and the ground (figure 1). First, there are 6 points called "ground level type" which are set reviewing seats on the same level of the ground. They are separated by red-and-white-striped curtains (A-3, A-5, A-6 in figure 1), blue vinyl seats (A-2 in figure 1), or color cones (A-1 in figure 1) between seats and streets. Sometimes chairs and benches are set. Second, there are 3 points called "stairs type" where reviewing seats are set like stairs (B-1, B-2, B-3 in figure 1). There are reviewing seats of stairs type in Otabisyo to enjoy seeing floats meeting together inside Otabisyo where people couldn't enter from 17:30 (B-3 in figure 1). Stairs type is good way in case of long depth of reviewing seats. Third, there are 4 points called "platform type" whose level is higher than the ground and flat. They are separated by red-and-white-striped curtains (C-4 in figure 1) or white vinyl seats (C-1, C-2, C-3 in figure 1) between seats and streets. Audience are easy to see floats because of high level.

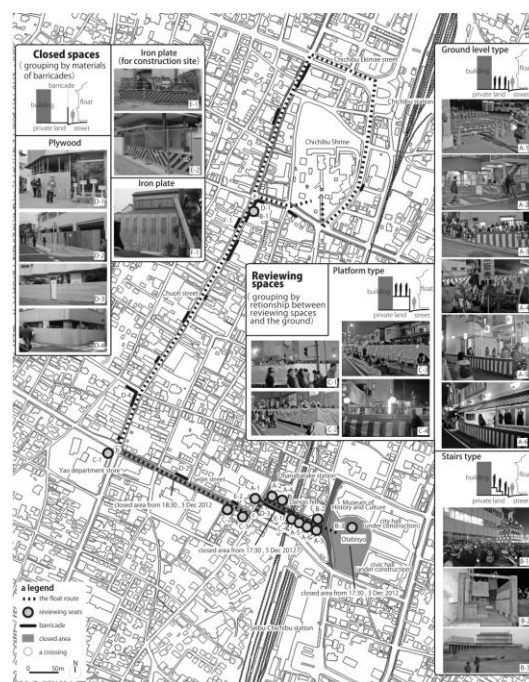


Figure 1. Reviewing spaces and closed spaces in Chichibu Night Festival

The characteristics of closed spaces

First, I grasp closed area while towing floats. There are three closed areas as follows, along Seijin street, along Dango hill and Otabisyo which are climax areas of towing floats (figure 1). Closed spaces are distributed everywhere along float route (figure 1). In all closed spaces, barricades are set up along boundary line of streets. The major materials of barricades are plywoods (D-1, D-2, D-3, D-4 in figure 1) and iron plates (E-1, E-2, F-1 in figure 1).

Conclusion

Findings are three points as follows. 1) Reviewing spaces are set to crossings, hill and Otabisyo which are highlight areas of float festival, and are able to be typed three patterns by relationship between reviewing spaces and the ground, 2) The areas of crossings, along Seijin street, along Dango hill and Otabisyo which are highlight areas of float festival are closed for safety because many audience crowd to, therefore areas itself are closed spaces, 3) In closed spaces, barricades are set up by plywoods and iron plates along boundary line of streets, so audience can't enter the sites.

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Mi casa es tu casa: the creation of the new Rambla del Raval in the historic center of Barcelona, between urban renewal and touristic branding.

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Abstract. *In the last twenty years Barcelona has become a top touristic destination. An important part in this achievement is due to the extensive effort in urban reshaping started in the 80's of the last century. The interventions in the historic center have had a key role in the regeneration and the promotion of the city on the global stage. The operations in the Old City (Ciutat Vella), led by famous architects like Bohigas and Busquets, were based on Aldo Rossi's theories on urban shapes, and followed an unusual dialogue between existing and new architecture. The creation of the whole new Rambla del Raval (1996-2001) throughout the demolition of almost 3000 houses in the historic tissue, has been the most consistent operation. The physical impact of the Rambla had been vast and deep: the transformations have gone way beyond the expected effects and one of the first consequences has been the creation of an ideal terrain vague where the increasing communities of non-European immigrants filled both the physical and social voids created by the interventions. The 'new' Old City of Barcelona entered in a process of gentrification, becoming a incredibly popular touristic destination, a result that was out of any plan when the renovation started. Newcomers (tourists, visitors and immigrants) have, quite obviously, adapted faster and better to the new morphology of the center and, differently from the locals, they appreciate the original historic features of old urban tissue. The paper, based on my PhD research, aims to describe how the urban process triggered by the Rambla del Raval has generated both physical and social transformations which had a mutual influence, far beyond the original intentions of planners, administrators and inhabitants.*

Key Words: Barcelona, historic centers, immigration, tourism, public space

Introduction

The historic center of Barcelona is now the administrative district of Ciutat Vella, the “old town”, which includes the large Raval sector, a once rural area that became part of the city when its walls were constructed in the fourteenth century. With the construction of the new grid extension of the Catalan capital designed by Cerdà in 1859, the old town entered into a rapid process of social and physical decline, with the Raval as a critical focus of poverty, insalubrity, prostitution and petty crime enhanced by its proximity to the seaport. The area, popularly known as the Barrio Chino, or Chinese Quarter, since the 1920s, was the most urgent problem facing the first elected Barcelona City Council (BCC) when it embarked on what was known as the “reconstruction of Barcelona” (Bohigas, 1985) in 1981. A detailed plan (Pla Especial de Reforma Interior, PERI) for the Raval was passed in 1985 as part of the Pla General Metropolità (Metropolitan Master Plan) of 1976. In the 1985 PERI, the architects Xavier Sust and Carles Díaz designed an articulated system of public spaces to be created in the dense urban fabric of the Raval, from the popular South sector (bombed during the 1936-1939 Spanish Civil War and subject to ongoing remodeling since the time of Cerdà) to the North sector, where a cultural hub of museums and university faculties was to be built, reusing and transforming the many abandoned religious buildings. In the late 1980s, Promoció de Ciutat Vella (Procivesa) was constituted, a company with joint capital (51% Barcelona City Council and 49% private investors) and the mission of managing the urban renovation of Ciutat Vella.

Shaping the urban matter

The 1985 PERI envisaged linking the interventions in the South and North sectors of the Raval by opening up a huge central space called the Pla Central del Raval (PCR) in the middle of the urban fabric. In its technical report, the project was described as a reevaluation of the entire district:

[By means of this] operation, five blocks will be demolished to create a large central space measuring 60x235 meters, similar to Rome's Piazza Navona. The existing buildings along the sides will be maintained while, at each end, a new construction will provide access to the space via a loggia. The treatment [of the new ends] must provide distinctive frontages on the new plaza, as they have to compensate for and balance the sides, where the [existing] irregular building is not of very high quality. (Procivesa, 1988).

The reference to Piazza Navona was used repeatedly, but the analogy was simply a geometrical reference, since the former Stadium of Domitian was the product of centuries of largely unplanned sedimentation, whereas this project was a planned and designed demolition and remodeling. The declared intention of respecting the existing urban fabric, local residents and popular atmosphere was stated as a priority in the operation, but it was no obstacle to the destruction of over 400 apartments in a significant change of scale from the surrounding neighborhood.

In the 1985 scheme (Figure 1), the short sides of the new plaza were supposed to comprise arcaded buildings incorporating the area's few noteworthy architectural features. These porches reflected the then common architectural aspiration to the Italian movement *La Tendenza* and were intended to give a visual order to the largely unplanned Raval environment.

In relation to other contemporary urban remodeling projects in Barcelona, the 1985 PERI suggested the continuation of operations previously carried out in the center. This continuity was, however, only apparent; unlike other projects such as Carme Fiol's Fossar de les Moreres, in this case the layout accorded no architectural value to the surrounding buildings. At the same time, its proportions ruled out any affinity with small interventions in the center, such as Plaça de la Mercè, a square created by demolishing a semi-abandoned residential block. Residents' associations pointed out that the overall design of the operation coincided with the location of blocks already affected by a process of expropriation started by previous, obsolete planning, as the architect Beth Galí noted: "[the Administration plans to] create this new space in the place where it is easiest [and] most convenient, without considering whether this is where it's really needed" (Espada, 1998). Frustrated plans from the 1950s and 1960s had in fact left their mark in legal and urban terms, making it difficult hypothetically to withdraw from processes of expropriation that were already under way, with all the foreseeable complications.

In 1987, two years after the Raval's new project had been approved, the details had still not been defined. Documents in municipal archives show a considerable number of sketches, notes and memos referring to subsequent specifications that were never implemented. Embryonic indications for the design of the floor plan revealed planners' uncertainty about the final morphology of the space, and no serious study of the elevations of new building was ever carried out.

The situation changed in the summer of 1990, when the University of Barcelona began negotiations with the City Council to move the humanities faculties to new facilities to be built in a large, empty urban space located in the former convent area of Raval North. The technical office of Procivesa welcomed the proposal and used it as an opportunity to rethink the whole 1985 PERI. In 1992, after signing the agreement with University, the Council decided to implement a preventive one-year suspension of expropriation and building permits on the future PCR site, pending a new project outsourced to the architect Jaume Artigues, which was completed in 1993. The new plan redistributed open spaces originally planned in Raval North, taking into account another operation promoted between 1991 and 1993 by the Generalitat

(Catalan regional government) in Raval South, substantially at odds with the 1985 PERI¹¹⁷. This new operation dismissed the arcaded square planned as an intermediate space between the future “Piazza Navona” and the construction site of Richard Meier’s MACBA. This tract of public space was brought within the limits of the Raval’s new plaza project, thereby reducing the number of buildings to be demolished in the area as a whole.



Figure 1. On the left, the map of the active expropriations in a plan from the 1985 PERI. On the right, a sketch of the first version of PCR, with the first layout of the Loggias. (from Arxiu Municipal del Districte de Ciutat Vella).

As regard the future space’s morphology, the 1985 PERI included the demolition of five street blocks, but the new version of the PCR did not include new constructions at the north and south ends, and would produce a much larger open space. The square it proposed did not look like a closed urban salon, since it opened onto the commercial streets of Sant Pau and Hospital. As regards the sides, the construction of the Riereta gardens to the west was postponed indefinitely, and, to the east, a new intervention was planned between the project site and the historic Carrer d’en Robador (Figure 2).

The technical argument used to justify the modification of the 1985 design was that the land where the north and south ends were to be built did not meet the requirements of the PERI, according to which any plot of land should be “intrinsically easy to address in constructive terms” (Artigues, 1993 and Artigues and Cabrera, private conversations in 2012). When municipal architects studied the executive aspects, various legal and technical complications emerged, particularly in relation to the management of land for which the 1985 project had not foreseen a unified treatment. A plan to rehabilitate the façades overlooking the plaza was added to the new project, which replaced the Italian influences of the first version with local architectural references. As a result of these changes, the area covered by the square (58x317 m) would be almost two acres.

¹¹⁷ The Generalitat was required to fit the BCC prescriptions only in few, basic elements. This fact has been, for some years, a generator of discrepancies in policies and operations between municipal and regional administration.

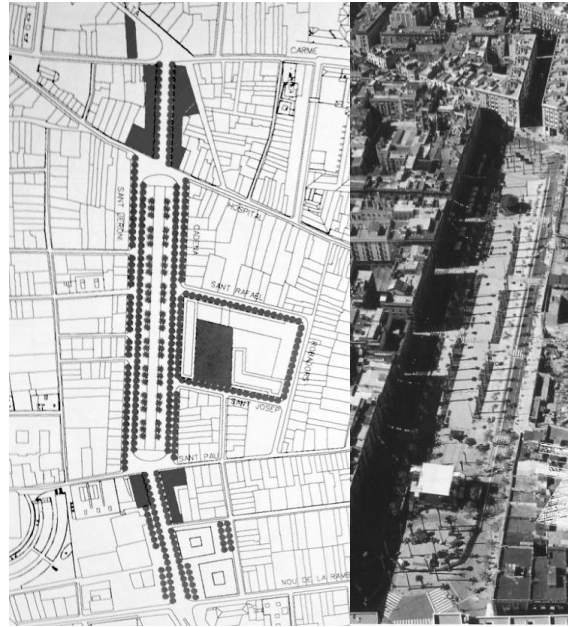


Figure 2. On the left, the 1993 proposal (Procivesa 1996). On the right, aerial view of the completed Rambla del Raval in 1999.

The amended plan received final approval in 1994, coinciding with European Union grants that would fund up to 85% of the operation. ERDF funding was obtained with a semantic trick because the project was presented as “environmental regeneration” in order to comply with grant requirements, designed to finance development based on ecological and sustainable criteria in accordance with the EU’s Green Paper. The semantic ploy was only apparent, however; the new plan really was a plan for environmental improvement. Besides increasing the amount of public space (enhanced by a double row of trees), the operation effectively reorganized all the technical services, introducing a pneumatic waste collection system and an efficient mechanism for draining and reusing rainwater to irrigate the trees. The project actually marked the end of the Raval’s long history of periodic flooding.

The architect Jaume Artigues materialized the new project jointly with the architect Pere Cabrera, of Procivesa. From a compositional viewpoint, it was a diligent Barcelona-style exercise, with one outstanding non-orthodox element: trees. The great mass of green (133 trees, including palms, planes and jacarandas) mitigated the colossal dimensions of the opening and constituted the main difference between the project for this plaza and the many places dures, the hard squares that had characterized the city in the 1980s, when local practice had tended to shun any visual elements that prevented the unitary perception of space. In the PCR, a hierarchy of grassy and paved areas culminated in a central section with a pedestrian corridor, designed for strolling and for setting up markets or similar activities. Throughout, lines of stones marking the outlines of the demolished blocks would punctuate the pavement. At the northern and southern ends, two large ellipses cut into the ground, highlighted by palm trees, mark the limits of the project without the volumetric solidity originally envisaged.

The new square emerged as a convincing architectural composition but caused considerable controversy as an urban operation. Criticism was initially leveled at real-estate issues; to give the project its final dimensions, the number of demolitions within the PCR area was extended (Figure 3), affecting some listed buildings such as the Modernista townhouse of Can Buxeres and the Sastre Marqués pharmacy designed by Puig i Cadafalch. The heritage status of these items had been previously downgraded to keep up an appearance of correctness. Though neither was a major monument, the chosen method (declassification) was hasty and led to protests in defense of architectural heritage. Many residents’ associations and individual citizens (including

famous names such as the writer Manuel Vázquez Montalbán and the dramatist Josep Maria Benet i Jornet) spoke out against the threat represented by the planned destruction of the Raval's historic fabric and a "Neighborhood Heritage Destruction List" was published¹¹⁸.



Figure 3. A picture of the first demolitions of PCR, in 1998.

Difficult as the proposed morphologic change of the district was, the process of expropriation was even more complex. Council administrators and local residents' associations had agreed on a model of compensation, with residents being required to demonstrate a minimum of five years' continued occupation and proof of legal occupation (utility bills were accepted) to be eligible. Those entitled were offered the choice of reallocation in the Raval or elsewhere in the city, or financial compensation. Although (as thorough documentation and interviews suggest) everyone who met the requirements and expressed the desire to stay in the area received satisfaction, conflict was inevitable.

Firstly, there was the attitude of the municipal employees, generally described as uncooperative. This was probably due to awareness that residents of other districts were trying to exploit the blurred legal situation of many buildings, the ownership of which was sometimes impossible to clarify; it was well known that many individuals, some highly conflictive, took up occupancy of apartments, pretending to be eligible for compensation.

There was also the unchecked economic trend. By late 1995 (coinciding with the start of demolition), there was a dramatic increase in real-estate prices, generating major friction between the Administration and residents about the expropriations, which had noticeably increased. Council planners did not want to postpone the construction once announced, since property values quickly outstripped the appraisals carried out in 1993, making them impracticable.

In operational terms, the granting of ERDF funds came as a boost, and in early 1999 the first project phase was complete. A huge celebration under the slogan "El Raval de la gent" (The Raval of the people) marked the opening, presented as a new lease of life for the district. The space was thus christened "Rambla del Raval", prompting local writer Quim Monzó to comment ironically on the contradiction inherent in a space that was designed as a plaza and came into being as an avenue to nowhere, with no clear purpose other than letting the sun in¹¹⁹

¹¹⁸ Vázquez Montalbán gave, in his novels of the 1980s and 1990s, a good description of the atmosphere of old Raval, perceiving the transformations going on. In 1999, Benet i Jornet described in the pièce "Olors" the drama of a Barcelona family who must leave the territory where have lived for generations. In 2000, activist Octavi Alexandre edited, on his own, an exhaustive list of historic buildings demolished during the renovation process of the center.

¹¹⁹ The writer Quim Monzó and the journalist Lluís Permanyer wrote several articles in the local newspaper *La Vanguardia*, pointing out that the name "Rambla" is supposed to be, in Catalan language, an avenue resulting by covering some former urban creek. The Rambla del Raval was, instead, a new cut in the urban fabric.

On September 16, 2000, the last building was demolished and the now empty space was inaugurated with a festive event. General enthusiasm momentarily took precedence over complaints about expropriation, demolition and social conflict. Newspaper chronicles described the end of “centuries of marginalization” of the Raval, whose residents could finally emerge from the neighborhood without being ashamed of their origin, and where ladies from the bourgeois Sarrià district could venture to visit the new Rambla without risk¹²⁰.



Figure 4. Municipal advertising in the local press, of the new Rambla del Raval. The slogan says: “Rambla del Raval, 1988 a project, 2001 a reality”.

Leaving aside the celebratory tone of press and officials, there were inevitably pros and cons to the Rambla del Raval operation. The pros included innovative design and private investment in remodeling buildings, which occurred surprisingly fast in comparison with other city-center sectors. Private spending totaled 890 million pesetas, whereas the Administration had spent 17 billion pesetas (85% from the ERDF), 8.3 billion of which went on reallocating 925 residents.

As regards the cons, real-estate prices had risen far more than expected: for a flat in a publicly rehabilitated building, the average price per square meter rose from 193,000 pesetas in 1995 to 230,000 pesetas in 2000. In the case of new warehouses or apartments rehabilitated by individuals, the prices tripled. For the first time, real-estate agencies specializing in the Raval appeared. This was positive in itself, but it led to a huge, unchecked rise in prices leading to speculation with private property and the unexpected effect of momentary stagnation of the market¹²¹. The apartments overlooking the new Rambla were sold for 400,000 pts/m², and the average rent skyrocketed from 15,000 to over 75,000 pts/month.

Turning to look at social problems, twelve months after the inauguration of what is now called Rambla del Raval, there was no perceptible sign of improvement. Drug dealing and use, petty crime and prostitution, poverty and insalubrity picked up where they had left off, and initial enthusiasm gave way to general disenchantment. The big question, repeatedly echoed by the local press, was whether such an enormous operation had actually been necessary.

¹²⁰ In almost every newspaper like *La Vanguardia*, *El Mundo* or *El País* between July and October 2000, there are daily chronicles of how the city of Barcelona was discovering the new space in the former Barrio Chino.

¹²¹ Such a contradiction in the economical ambit (the stagnation of the market coinciding with the rising of the prices) was only apparent: the administration had not considered, in original plan, that somebody out of Raval could have interest in invest in the area. The stagnation was, thus, the consequence of the enlargement of the potential range of buyers, since many owners were just waiting to see where was the new limit of the market.

Operation robador

Doubts and criticism gained intensity when work began on the project to remodel the adjacent area around Carrer d'en Robador in spring 2000. Unlike the new Rambla, the Robador plan could not even remotely be termed environmental regeneration; it was purely—and quite explicitly—an initiative on the part of Barcelona City Council to raise funds to avoid bank debt. This self-financing tactic, alien to Procivesa's mission, was based on a zero-profit logic, since improvement of the historic center would in itself generate substantial opportunities for business and prosperity (Brunet i Cid, 1996).

In the 1985 PERI, no significant intervention had been planned in the two blocks between Carrer d'en Robador and the new Rambla. Five years later, however, following the approval of the project's new layout, political voices were raised about the risks of such a large operation in terms of time and cost. Some parties called for a parallel operation to produce capital gains that would compensate for the dreaded rise of costs and secure a reserve of land that could, at least partially, be used for public infrastructures.

The solution seemed to lie in and around Carrer d'en Robador, one of Barcelona's most conflictive streets, famous for its round-the-clock prostitution that aggravated other problems like drugs, petty crime, STDs and lack of investment in private properties. A shock intervention here was therefore seen as an effective way to consolidate the success of the neighboring Rambla del Raval (Figure 5).



Figure 5. Layout of the Robador operation as presented in municipal advertising in local press in 2001.

At the end of 1994, Procivesa was commissioned to draft the plan. An initial layout envisaged the expropriation and demolition of 50 buildings, freeing up 12,706.48 m² of land, 2,700 as public gardens (initially referred to as the Jardins d'en Robador). Studies of the executive aspects started and, in 1995, the area was the subject of an international student architect competition at the UIA 96 Congress held in Barcelona (Procivesa, 1996).

To speed up proceedings, Procivesa decided to act as an independent agent in the open market in direct negotiations for buying properties, expediting the usual expropriation process. Meanwhile, the social climate heated up when the City Council confirmed that the buildings in the Robador area would be demolished. The brusque management of the expropriations, together with the popular belief that the promised gardens would be replaced by a private underground car park, increased local residents' opposition.

In 1997, the architecture practice Martorell-Bohigas-McKay (MBM) signed an agreement to develop a new detailed plan for the area. MBM's configuration included a new building for the UGT trade union headquarters, 10,000 m² of social housing and another 10,000 m² to be sold on the free market, plus 9,500 m² for trade or services, and a public underground car park. At this point, Mayor Joan Clos personally called for the addition of a 4-star hotel with at least 110

rooms—cutting 7,000 m² from other uses—to benefit from Barcelona’s booming tourist trade (Cabrera, personal conversation in 2012).

It was, then, unsurprising that by the late 1990s the Robador operation was exciting even greater expectations than the Rambla del Raval, exceeding purely financial concerns, as Deputy Mayor Xavier Casas wrote in a confidential note three days after the inauguration of the Rambla:

[To a] large extent, right or wrongly, general opinion about the results of the huge investment throughout Ciutat Vella will be strongly influenced by the success of the development of the Robador area and the Rambla del Raval. Since the latter is practically defined down to the last detail, we now have to decide on the profiles of the Robador area. The key importance of creating the [right] real-estate product is obvious.

Josep Martorell, one of MBM’s principals, was also apprehensive about the outcome of the operation, since his task involved basic planning, with no specific project and no supervision or overall coordination of the new blocks. Presented to the public in its final version on September 28, 2001, the new plan sparked controversy due to the volume of a 45-meter high hotel. This height exceeded the regulatory maximum and, since it was impossible to amend the Master Plan, the only way to keep within legal boundaries was to compensate for this height by removing the four top floors of the municipal tower block built in the 1960s at the heart of the Barri Gòtic. It was also decided to include in the operation the new Film Theater of Catalonia (eventually built just meters away) to attract cultural tourism.

Identity vs. Planning

The Robador operation turned out to be extremely complex, both administratively and practically. The presence of many undocumented immigrants in abandoned apartments and the speculative expectations of owners (at one point, harassment became a social emergency) fed tensions that had already been reactivated by the persistence of petty crime in the new Rambla.

It was at this point that the spectacular and completely unexpected increase in newcomers to the Raval emerged as a crucial element in the ongoing urban process. The demographic transformation had started slowly a decade previously but became clearly visible in the mid-1990s, when the newcomers, primarily Pakistani, filled in the gaps in municipal plans. It was no coincidence or simply a matter of low rents that the Pakistani community grew from 600 to 10,000 inhabitants in the same years and on the same site that the new Rambla was built. They filled the empty space with a visible identity, welcoming the opportunity of a livable public space well suited to a culture that was used to living much of its social life in public spaces¹²². The immigrants replaced the historic inhabitants with almost no conflict and saw the traditional urban fabric through new eyes, unaware of local prejudices and complaints about the infamous Barrio Chino. Moreover, the Pakistanis were interested in safeguarding their businesses and created vigilance against drug dealers and pickpockets. These extemporary initiatives were not enough to eliminate crime; many petty criminals benefited from municipal urban planning, since it provided fresh victims in the form of new residents or visitors from other districts. In addition, tourists began to be a considerable presence in the area, fascinated by the myth of the infamous Barrio Chino (however much less dangerous than many similar areas in London, Paris or Athens), and attracting even more pickpockets.

The increasing presence of foreigners, who had “inexplicably exceeded the locals in both trade and in attendance” (El País, 2001), became the main problem of the Rambla del Raval just a few years after its inauguration. The 1985 PERI was drafted with the ultimate aim of freeing the area from the marginal living conditions that had made the name “Barrio Chino” a synonym of urban poverty worldwide. Almost fifteen years later, the flamboyant new Rambla had erased

¹²² In 2002, a show called “Super Raval” featured a kind of Pakistani Superman who solved the district’s problems. In the same year, a movie, *En construcció* (directed by José Guerin), and a music compilation, “Barcelona Raval Sessions”, highlighted the far-reaching metamorphosis of the sector’s identity.

much of that wretched identity, leaving in its place a blurred image. Most long-time residents left the area, replaced by new communities, mostly from unfamiliar (for the most of Barcelonans) areas of the planet. At the same time, tourists became a regular presence, though showing far more interest in the now relatively safe bohemian atmosphere of places like Bar Marsella (whose absinthe was praised by Ernest Hemingway) than the contemporary urban and interior design promoted by Barcelona City Council (Delgado, 2005). In an attempt to create a landmark in the space, in 2003 a sculpture by Colombian artist Fernando Botero was installed in the southern stretch of the new Rambla. The presence of his gigantic bronze Gato (Cat) has been well received by residents and visitors, and has gone some way to moderate the frequent vandalism in nearby streets.

By 2005, the area was once again more dangerous than the rest of the center, though still not comparable to the dramatic situation thirty years previously. The residents' associations claimed that the Rambla had made things even worse, because its large empty space provided the young population (Erasmus students, squatters and local gangs) with a perfect public venue for socializing, with the attendant noise, consumption of alcohol and drugs, and fights. A more serious danger emerged in 2008, when petty crime and international Islamist terrorism unexpectedly joined forces; counterfeit copies of passports stolen from tourists on the Rambla del Raval by local pickpockets were found in the hands of Al-Qaida members in the Middle East¹²³.

The inauguration on February 12, 2012 of the Film Theater of Catalonia, designed by architect Josep Lluís Mateo, marked the end of the main interventions in the area, still [2014] dotted with street prostitution (officially banned since 2011) and latent social tension between the various groups of residents (Pakistanis, Africans, Europeans, Spaniards and Catalans). In this sense, the Rambla del Raval can be regarded as having failed to construct the new local identity envisioned by the plan's original mission.

At the same time, Artigues and Cabrera's project has reached its maturity as a work of public space design. Geographer Edward Soja could now [2014] hardly repeat the words he uttered in 2001, declaring that the Rambla was the worst thing he had seen during his visit to Barcelona (La Vanguardia, 2001).

Conclusions

More than ten years later, what was once a wide-open empty space is now a pleasant place that channels many surrounding pedestrian streets and is a reference point for neighborhood life. Thanks also to the successful activation of private investment in the buildings that line it, the Rambla has acquired a visual coherence, and many people who go there everyday do not realize that the space was created from scratch at the end of 2000. The large Pakistani community has played a significant role in this process, never expressing discomfort with the demolitions or the morphological distortion of the district, as many arrived in Barcelona when the main destruction was already past. In a curious historic tradeoff, the construction of the Rambla del Raval, originally designed as an urban improvement in response to a century-old demand on the part of a desperate district, has become the ideal scenario for all kinds of newcomers, playing the same role as a sandbox in computer security: it provides a safe environment for new arrivals, with relatively low conflict with the rest of the city, until the true nature of the process is clear. This probably explains why the area's important demographic change did not provoke the tensions and violence seen in other European cities at this time, including Barcelona's parallel operation in the eastern sector of Ciutat Vella, where a considerably less aggressive intervention produced

¹²³ The most remarkable case happened in the event of the 2011 Mumbai attacks, where the main commando used counterfeited passport reportedly stolen in Raval two years before.

major neighborhood confrontations between 1996 and 2004 (Calavita and Ferrer, 2000; Capel, 2005; Delgado, 2007).

Less clear is the effect of the Robador intervention, halfway between a clumsy attempt to mix different social realities (one of the most acclaimed ideas of the social democrat Council of the 1980s) and the clash of irreconcilable urban settings. This contrast is apparent every day around the tower block that is the 4-star Hotel Barceló, where middle-class tourists, street prostitutes and the Carrer Sant Rafael mosque share the same area with mutual suspicion, latent tension, minimum contact and no real interaction. In this sense, the fears expressed by opponents of the project, that hotel guests would use the Rambla as a drop-off point for their cabs without ever interacting with the environment, have been fully confirmed by daily experience.

However, the assertive morphological intervention of the Rambla del Raval has also somehow helped to dissolve the traditional barrier between the street and the inside of the city blocks. As Francesc Muñoz pointed out, many bars, clubs and restaurants recently to have opened in the area have big, transparent frontages and interiors that echo the compositional theme of the new outdoor design (Muñoz, 2008).

The real unplanned factor has been the tourist boom, not just as statistical data but as a phenomenon. In Barcelona City Council's political plans in the early 1980s, the creation of an appealing new image for the Raval was a clear objective. The role of the cultural hub in the northern sector and the "Piazza Navona" in the old Barrio Chino was to attract to this part of the old town Barcelonans who had previously never dared to pass the Liceu opera theater, the gateway to the "underworld" (Scarnato, 2013). The initial aspiration to Italian models of contemporary urbanism (particularly Aldo Rossi, Carlo Aymonino and Umberto Secchi) was supposed to represent a step forward at both urban and social level. The surprising success as a tourist destination of the Catalan capital after the 1992 Olympics was also fueled by amazing images of a remodeled Barcelona, where architects and planners were able to shape the city and, to some extent, its society. This, at least, was the mantra of many official messages around the change of millennium.

Neither the non-European newcomers nor today's large volume of tourists met these expectations. The Rambla del Raval is the stage of a social drama where, rather than following a common script, the actors try to inhabit the space according to needs, desires and possibilities only partially in keeping with Barcelona Council's original plans. For instance, the popular atmosphere of the sector lives on, as clothes hanging from the balconies (forbidden elsewhere) prove at any time of day. Pakistanis have adapted very well to the "Ravalestan" spirit, and both short- and mid-term visitors (between one and eight months) appreciate a moderately roguish environment. Moreover, tourism has a major impact on the current trend of apartment renovation, emerging as a trending habit on the part of owners and designers, once reluctant to see any technical or aesthetic value in the area's houses.

Behind the reevaluation of the physical characteristics of old Raval houses there is a trend with unpredictable and potentially much greater consequences for economic and social identity than the shock intervention of the new Rambla. The future of the area will depend largely on the stance adopted by Barcelona City Council on the effects for real estate of the area's touristic success.

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The role of municipality in urban regeneration: the case of Lisbon's Eastern waterfront

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Abstract. *Urban regeneration as an integrated process is an essential component of the current and future public policies, which justifies its research. Post-industrial and declined areas, such as the Eastern waterfront of Lisbon, are complex and peculiar territories that require a critical look on urban regeneration and management. We analyse it aiming to understand the crucial changing role of the municipality in urban regeneration processes – through political, governance models and agents – as well as the main agents of change involved in strategic, collaborative planning. Within this scope, we consider the transformation of public policies, urban plans and governance models until now; the urban planning/management led by Lisbon's municipality, partnerships and public participation; the evolution of urban morphology of the case study and its relation with the city and the metropolitan area. Considering the contemporary context of scarcity of financial resources and the triggered challenges by globalisation, we intend to contribute to the debate on the evolution of spatial planning and management. We conclude that new ways of planning based on urban regeneration are emergent opportunities throughout the construction of networks of communication and cooperation among several agents of change - government, private sector and communities –, where Architects are elementary.*

Key Words: Urban regeneration, municipal planning/management, public participation, Lisbon, collaborative planning

Introduction

Urban regeneration is currently an essential component of public policies, which justifies its research (Portas 2003; Ferreira 2013). However, although urban regeneration is widely experienced, it is still a slightly understood phenomenon (Friecke 2007, p.2).

Despite there is not a standard/universal definition worldwide, in this particular context we define urban regeneration as integrated, inclusive, collaborative and strategic social and economic processes of (re)developing specific urban areas (MAOTDR 2007; 2013). Consequently, municipalities play a decisive role of planning, management and especially change, throughout the definition of strategies, political/governance models and instruments (Fidalgo 2012).

Many cities, especially industrial ones, were affected by the most severe industrial decline during the 20th century, leading to mass joblessness and subsequently an out movement of people (Friecke 2007, p.4). Post-industrial cities and urban areas suffered remarkable economic decline. De-industrialization brought about by reductions in demand for traditional products and intensifying competition from elsewhere has eliminated much of the industrial base, employment and social stability that existed in 1960's (Friecke 2007, p.4). The consequences for the cities – such as: polarization of demographic development between different regions (growth islands next to shrinking regions); demographic decline in cities with severe impacts on municipal housing (vacancy, deterioration), real estate market (decrease of property values), technical and social infrastructure (under-use) and retail development (lack of consumer traffic, slump in sales); ongoing suburbanization to the detriment of downtown development/population (Friecke 2007, p.4).

Urban development and urban regeneration are complex processes, which are influenced by many general conditions, such as the impacts of demographic and economic change (Friecke

2007, p.2). The current tendency of shrinking cities has been transforming urban planning and management in the last decades, focusing on and highlighting urban regeneration operations.

The Eastern waterfront of Lisbon is peculiar since it is a complex, post-industrial and declined area (Custódio and Folgado 1999) in the city, requiring a critical look on its urban planning and management, according to strategic, integrated and collaborative planning (Alves 2001; Ribeiro 2012).

We analyse it aiming to understand the crucial changing role of the municipality in urban regeneration processes, through political, governance models as well as the main agents of change involved in strategic, collaborative planning. Within this scope, we consider: (i) the transformation of public policies, urban plans and governance models until now; (ii) the urban planning/management led by Lisbon's municipality, partnerships and public participation; (iii) the evolution of urban morphology of the case study and its relation with the city and the metropolitan area.

Aware of the implied difficulties in urban regeneration and the new challenges imposed on Urban development policy, we intend to contribute to the debate on the evolution of spatial planning and management through the analysis of conceptualizing, monitoring and management practices of urban regeneration operations in the territory as well as the main agents of change involved, focusing on Lisbon's municipality.

Considering the contemporary context of scarcity of resources, funds and the triggered challenges by globalization (Ferreira 2005), we conclude that new ways of planning are emergent and an opportunity (Tyler, et al. 2013) throughout the construction of networks of communication and cooperation among several social actors - government, private sector and community (Alves 2001) – where Architects are elementary.

Urban regeneration and (re)development: strategies, instruments and agents of change

In this section, we focus on a brief enlightenment of the main strategies and instruments led by municipalities on urban regeneration to cope with urban decline and the most important agents of change that are involved.

It is important to be aware of the fact of the meaning of urban regeneration has widened since the early 1990s, when it was associated mainly with economic and infrastructural development (Davies 2002, p.9). However, it is now an umbrella term understood as the promotion of the social, economic and environmental well-being of an area (Davies 2002, p.9). The wide-ranging and integrated visions and actions of urban regeneration lead to the resolution of urban problems, seeking to improve economic, social and environmental conditions of specific urban areas that have been changed (Roberts and Sykes, 2000:17 cited in Friessecke (2007:6). Therefore, urban regeneration means improving the physical, economic and social well-being of current cities (Friessecke 2007, p.1). Over the past years it has played an important role due to the changing demographic (i.e., shrinking populations, ageing, diversification of lifestyles and migration) and economic (i.e., globalization, the deregulation of markets, rise in unemployment) conditions (Friessecke 2007, p.1). Those complex processes lead to a strong pressure for urban change due to vacant land and building, obsolete or under-used infrastructure and social segregation (Friessecke 2007, p.1), such as gentrification.

Urban regeneration programs are locally and regionally developed, inducing the participation of several formally independent organizations and individuals (Figueira 2007).

In council-manager governments, the council is more generally expected to arrive at some sort of consensus of views (Davies 2002). The task of the council may even be interpreted as finding the best means to ends which are assumed to be agreed upon (Davies 2002).

In Portugal, as it happens worldwide and especially in the U.S.A. and U.K., Central Government is becoming more influential in the local policy arena (Davies 2002). The model of 'governing without government' (Rhodes cited in Davies 2002, p.1), depending on the interaction of public and private sector actors in (informal) networks in order to generate

economic growth, is being departed from the influence and control by central states (Davies 2002, p.1), especially since 2008 (Crisis). Although partnerships are a distinctive mode of governance (Davies 2002, p.1), having been developed in the 1990s, they are losing strength. Hence, individuals and organizations must collaborate to achieve goals (Davies 2002, p.5). Empowerment (or collaborative synergy) is an important issue for theories of networking and regime governance is a highly specific form of collaborative politics and a specialized form of networking (Davies 2002, p.5-8).

Whereas urban planning and urban development in Europe have been heavily development-orientated with the focus on extending infrastructure and designating new residential areas, globalization, demographic and economic change leads to substantial changes in urban development policy (Friecke 2007, p.2). Urban growth has been replaced by stagnation and shrinkage processes at many places in Europe in the last decades (Friecke 2007, p.2). This process of change rises to new challenges and tasks for the federal governments, states and municipalities and results in a new planning range and readjusted urban support instruments coping with shrinkage (Friecke 2007, p.2), such as urban regeneration.

Facing deep transformations, cities are undergoing structural changes (Friecke 2007, p.6) as its governance models through multi-scale networks (Davies 2002). Urban regeneration is a multidisciplinary approach that requires a well coordinated set of strategies and options (Fidalgo 2012, p.8). Currently, it is one of the main goals of urban policies of central and local entities at national and international scales. In the contemporary context of change, urban policies and especially integrated processes highlight the need to rethink the relation between citizens, State and territory in terms of models and solutions of governance, considering, however, the individualities of each municipality.

Nevertheless, it is important to highlight that urban regeneration is beyond *urban renewal* (which is an essentially physical change process), *urban development* (general mission) and *urban revitalization* (which has no precise method or approach and is fundamentally about social-economic transformation) (Lang 2005, p.8 cited in Friecke 2007, p.6). It should be based upon a detailed analysis of the condition of an urban area and seek to ensure consensus through the fullest possible participation and cooperation of all stakeholders with a legitimate interest in the regeneration of the area (Roberts and Sykes 2000, p.18 cited in Friecke 2007, p.6), which can be achieved through partnerships (Friecke 2007, p.6).

In general, and according to Friecke (2007), the priority objectives of urban regeneration can be specified in the following categories: (i)improving housing and living conditions of the residents of older districts; (ii) strengthening and supporting the vitality and economic functions of such districts; (iii) renewing and preserving their building stock as well as their urban physical and social structure.

There is a variety of themes and topics involved in urban regeneration, and the multiplicity of interrelated outputs (Friecke 2007, p.6). Nevertheless, any urban regeneration strategy needs to be adapted to each circumstance and place within which it operates (Friecke 2007, p.6).

We follow the definition of urban regeneration including the principle of ensuring sustainable development in all areas of public and private policy as a “comprehensive and integrated vision and action which leads to the resolution of urban problems and which seeks to bring about a lasting improvement in the economic, physical, social and environmental condition of an area that has been subject to change” (Roberts and Sykes 2000, p.17 cited in Stouten 2010, p.28).

As in many other European countries, the role of local authorities became marginalized as central government began to encourage planning in partnership with private investors (Stouten 2010, p.27). The relation between State, city and citizen grew apart (Ferreira 2005). Cities became agents of state, dependent on putting national public policies into practice and legitimizing forms of land management prescribed by the state (Stouten 2010, p.27).

Today local governments are taking the initiative, within their own constitutional limits, to launch programs of urban regeneration in a climate governed by a pan-European concern to

adopt a uniform cooperative policy (Couch, Fraser and Percy 2003; Drewe, Klein and Hulsbergen 2008 cited in Stouten 2010, p.28). The strategy adopted for urban regeneration involves a continuous process of refurbishment and modernization of the urban fabric rather than short-term fixes (Stouten 2010, p.28). This strategy combined physical, economic and social restructuring, re-engineering and reinvention of the city-region (Ravetz 2000, p.274 cited in Stouten 2010, p.28), such as: (i) Physical restructuring, continuous and city-wide, to achieve strategic environmental targets; (ii) Diversification of employment and the economy to counter risks generated by globalization; (iii) Social empowerment through community action and the third sector economy; (iv) Urban and environmental planning for the city-region ('a sustainable development framework').

Being aware of spatial relationships underlie territorial politics at all levels (such as neighbourhood, city, regional, state and global) (Stouten 2010, p.28), we consider that urban development is influenced by the relationships between spatial and social processes that have been developed during the last decades (Stouten 2010, p.28).

Main strategies and instruments: Partnerships

It is consensual in Europe (e.g.: Netherlands and UK) on the importance of an appropriate model for a more compact, mixed-use urban form towards the creation of sustainable cities (Raco 2007 cited in Stouten 2010, p.52). A compact city gives priority to urban regeneration, the revitalization of the city centre, restrictions on planned developments in rural areas, high density, mixed functions, public transport and the concentration of urban development at public transport interchanges and the concentration of urban development at public transport interchanges and, to encourage sustainable development, reduction in the use of motor vehicles and pollution and minimizing the loss of rural areas (Stouten 2010, p.52-53).

The financial situation in many cities is concerning, so that municipalities ascertain losses of revenues to finance urban (re)development, local public transportation improvement and the construction and maintenance of roads, schools, hospitals, cultural and sports facilities (Friecke 2007, p.1). Therefore, partnerships between public and private sector may be a reasonable instrument for urban (re)development and urban revitalization.

The range of partnership activities is divided between 'policy' and 'implementation' types (Davies 2002, p.9). Collaboration tend to be structured in the production of 'policy' partnerships responsible for establishing goals and making funding bids, and 'implementation' partnerships responsible for project delivery (Davies 2002, p.10). These types of partnerships exhibit different collaborative dynamics (Davies 2002, p.10). However, the endogenous dynamic to regeneration dynamics is weak (Davies 2002, p.10).

According to Elkin (cited in Davies 2002, p.15), current partnership structures would have to be redesigned to enable local innovation and autonomous action. For instance, in the U.S.A., while local governments are 'creatures of the state', they enjoy practical autonomy (Stone 1998, p.2 cited in Davies 2002, p.15). According to Rhodes (cited in Davies 2002, p.15), autonomy is a condition of networking, trust and diplomacy, although it is not an evident feature of local regeneration politics in Britain. However, local collaborative dynamics remain weak across a wide range of local governance activities in Britain (Davies 2002, p.16), due to the fact of: not only regeneration partnerships but also local politics in general, are characterized by hierarchies which are becoming stronger (Davies 2002, p.16); it is easier to build and sustain where the influence of central government is weakest (Davies 2002, p.16); where new participatory mechanisms have been established as part of the drive to re-build local democracy and they have succeeded in mobilizing sections of a given community, they have not given local citizens more control over local politics (Davies 2002, p.16). Participatory strategies have not resulted in bottom-up networks, because they are constrained by hierarchical tendencies and also because non-state actors do not have sufficient leverage, once involved, to make a difference (Davies 2002, p.16).

According to Figueira (2007, p.33), urban planning and management depends on public participation through the coordination between several agents and multidisciplinary groups: (i) representatives of political and administrative power, mediators and policy makers related to the choices within spatial planning; (ii) Professionals (technicians, experts and investigators) with relevant and specific academic skills/competencies, provided with technical know-how about interventions on territory; (iii) Economical agents and potential investors, i.e. stakeholders, on rentable outcomes of urban operations (e.g.: private sector); (iv) civil society, i.e., common citizens and/or final receivers of the taken urban options, decisions and interventions on the territory that they occupy (e.g.: local communities and residents).

According to DGOTDU (2002), public participation in urban planning is a right of citizens, through the participation on the elaboration, alteration, revision, execution and evaluation of territorial management tools, as well as formulating suggestions and requesting for clarification through those processes and participating on the final phase of public discussion before the approval of urban plans (Figueira 2007, p.12-13). In general, public participation is related to the capacity of involving local population and communities on social development of their territories (Sanoff 2000, p.1 cited in Figueira 2007, p.13). «[Public Participation] reduces the feeling of anonymity and communicates to the user a greater degree of concern on the part of the management of administration. [With] it, residents are actively involved in the development process; there will be a better maintained physical environment, greater public spirit, more use satisfaction and significant financial changes.» (Becker 1997 cited in Figueira 2007, p.13).

The strengthening of public participation on urban planning and management reflects on the reinforcement of democratization of/on that process, which reflects a wider and more consequent involvement of society (Figueira 2007, p.57). Thus, other methodological approaches are needed, in order to guarantee participated, inclusive and integrated development processes, such as decentralization of power of decision (Figueira 2007, p.57). We consider that this approach may be advantageous in urban regeneration through the reinforcement of local administration entities (i.e.: Municipalities and especially Parishes) (Figueira 2007, p.57), interactive processes (Figueira 2007, p.11) throughout regular debriefing sessions with local communities and also incentives for people to present problems and proposals to improve the city and its specific urban areas, that would be discussed and later reflected on urban plans (e.g.: Municipal Master Plans), as a way of (re)developing a (symbolic) sense of belonging and identity with the territory (Figueira 2007, p.57). This type of effective, strategic and collaborative participation on urban planning and management is performed through cooperation (such as partnerships and delegation of power) and also controlled by citizens, since its contribution determines the final decisions (Figueira 2007, p.12).

The role of municipality in urban regeneration processes: the case of Lisbon's Eastern waterfront area

Considering that the city is the stage of democracy and public participation is structurally fundamental on urban regeneration processes, in order to achieve social cohesion and to (re)develop a sense of trust and identity between communities on specific urban areas, we analyze the case of Lisbon's Eastern waterfront. That complex, post-industrial and declined area (Custódio and Folgado 1999) in the city requires a critical look on its urban management. due to its urban evolution and importance of industrial and port activities, is currently a declined area. Therefore, the role of municipality has in urban regeneration processes is essential, through the implementation of public policies, such as *Política de Cidades - POLIS XXI* (MAOTDR 2007; 2013) and also urban plans. This scenario reveals an innovative management philosophy on urban and spatial planning and management in large cities (Ferrão 1994; 2013), considering not only the administrative boundaries that are defined on the Municipal Master Plan (CML 2012) but also promoting social, physical and economic connections with the surrounding region, i.e., its metropolitan area (AML 2001).

We consider the case study area along the Eastern waterfront area of Lisbon (Portugal), specifically between *Santa Apolónia* and *Parque das Nações*. The consequent urban mutations and evolution of the city, since its rural genesis (XVth century), the important industrial and infrastructural overlap (during the XIXth century) and the aftermost declining process from 1960s, built complex and heterogeneous urban landscapes until today (Custódio and Folgado, 1999; Nevado 2013). The implementation of pollutant industries, large scale infrastructures (e.g.: railways and port activities), disqualifed neighbourhoods and the consequent process of deindustrialization and the transfer of industry to other metropolitan areas around Tagus river (e.g.: *Margem Sul*) since 1950, in parallel with globalization and urban sprawl on Lisbon's metropolitan area, promoted the lost of importance of Eastern waterfront area transforming it as peripheral in the city in the last decades (Nevado 2013).

However, nowadays that territory represents opportunities through urban regeneration, by reconnecting Tagus River to the city, articulating port areas with consolidated/obsolete urban tissues and reconnecting it to central areas of the city through the reinforcement of accessibilities.

Local authority in Municipalities is implemented through several entities - such as Town Halls, its Representatives (i.e.: Presidents), Municipal Assemblies and Parishes - that determine the use and form of occupation and development of cities (Figueira 2007, p.33). In the last decade, communities have been required to participate on urban regeneration, through meetings in local Parishes and Town Councils (Figueira 2007), forming partnerships (e.g.: *Parcerias para a Regeneração Urbana* (Fidalgo 2012; CML 2012), among other strategies with benefits for redeveloping urban declined areas (Tyler, et al. 2000).

But although public-private partnerships for urban regeneration are a useful tool, they are still not sufficient for solving the current problems. Thus, it is needed a wider political strategy that involve not only public investment programs but also private ones, in order to stimulate the renting market, reviewing the estate tax system and also the legislation on urban rehabilitation (Fidalgo 2012, p.vii). As we can identify on PDML – the current Municipal Master Plan of Lisbon (CML 2012) -, the Municipal Council of Lisbon has been redirecting efforts towards urban regeneration of the Eastern waterfront area of the city, for instance, by transforming and updating the legal framework of renting regime. Despite some lack of articulation between urban policies and the *Administration of the Port of Lisbon*, urban plans and especially Municipal Master Plans focus on urban regeneration and rehabilitation (e.g.: PDML) (CML 2012). The role of municipality is, therefore, essential in urban regeneration of Lisbon's Eastern waterfront and to articulate it with other areas on the city, improving employment and attracting people and investment.

Considering the transformation of public urban policies (Ribeiro 2012), urban plans and governance models until now, The urban planning/management strategies and instruments (e.g.: urban policies, urban plans such as Municipal Master Plans and strategic urban plans) led by Lisbon's municipality, partnerships and public participation as well as the evolution of urban morphology of the case study and its relation with the city and the metropolitan area, we conclude that the changing role of the municipality in urban regeneration processes is crucial, especially in the current context of scarcity of financial funds (Bourdin 2011).

Conclusions

Considering the contemporary context of scarcity of resources, funds and the triggered challenges by globalisation, we conclude that new ways of planning are emergent and an opportunity throughout the construction of networks of communication and cooperation among several social actors - government, private sector and community – where Architects are elementary. We intended to contribute to the debate on the evolution of spatial planning and management, focusing on the role of Lisbon's municipality on urban regeneration on the Eastern waterfront area of the city.

In this study we analyzed the role of municipality in urban regeneration operations on the Eastern waterfront of Lisbon, focusing on the main agents of change and the need of alternative methodological approaches. The chosen case study stands out for its ability to generate new visions and practices of urban regeneration through municipal action, public discussion and participation, under a flexible coordination and combining different types of agents. Considering the long-term of urban regeneration projects, its institutional and financial complexity, it is necessary a wide political and social support for strategic and prospective (re)development proposals. Besides physical transformations, urban regeneration must provide social consensus, closer relations between citizens, developers and local authorities in order to be successful. Therefore, interactive collaboration among communities and institutional entities is needed in several phases of development, implementation and review of legal mechanisms of municipal urban planning and management, to (re)create and reinforce a sense of identity with the occupied territory. Public participation plays a fundamental role during the several phases of the process, in order to supply integrated approaches.

We emphasized on the relation of local government structures in processes of urban regeneration, to contribute for the economic growth and development of communities. There is still needed greater flexibility and transparency of political processes - especially on urban planning, management and regeneration -, as well as wider coordination between Administration entities and scales (e.g.: Central VS Local), decentralization and a monitored execution through innovative processes of governance and partnership, including local and regional actors (Ferreira 2005).

Once that redevelopment strategies and operations are not only a local but global phenomenon, the involved entities and communities need to be coordinated at different scales (e.g.: city-region). Hence, the role of the municipality on urban regeneration is crucial to update IGT, diagnose problems and advantages, test and implement urban regeneration proposals and alternative scenarios for the waterfront of Lisbon, articulating it with the city, its metropolitan area, at a national scale and in global networks and flows, as an international port city.

This study also reveals that part of the handicaps of municipal/local planning of the last decades can be surpassed through different methodological approaches (such as partnerships, public participation and debate, and urban plans/instruments of territorial management) with advantageous outcomes. The current legal framework highlights Municipal Master Plans as synthesis of the strategy of local (re)development (Rodrigues 2005, p.136). Therefore, the conception, management, execution and monitoring of the urban plans must embrace public participation of local communities (Rodrigues 2005, p.136), in order to achieve social cohesion, more inclusive approaches on urban (re)development - especially on urban regeneration -, and forming consensus about competitive development of global cities (Figueira 2007, p.1) besides connecting communities to the contemporary city (Lawless and Pearson 2012).

In general and in spite of urban decline, waterfronts of post-industrial and port cities are emergent central areas, fulfilled with opportunities through urban regeneration and strategic (re)development. Considering the scale of contemporary metropolitan city, the situation of obsolescence, diversity and rigorous field of the *Administration of the Port of Lisbon* on the riverfront, the Eastern area of Lisbon is a relevant case within the scope of urban regeneration. Although EXPO '98 global event and operation of urban regeneration had redirected critical looks on this area, the current situation of urban decline along the river triggers challenges of contemporary urban/spatial planning and management. However, that area is emerging in the current context of scarcity of financial resources, through the implementation of strategic models of municipal urban restructuring and (re)creation of central areas and identity.

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The re-appropriation of industrial sites in the urban form of the post-Communist city

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Abstract. *The paper purposes to analyse the phenomenon of the re-appropriation of post-communist post-industrial urban sites in the city of Bucharest. The study aims to develop an interpretation of the various conditions, from the technological to the ideological, that has contributed or could contribute to determining the nature of the re-appropriation in terms of both urban memory and functional re-use. Initially, the study will examine specific urban, industrial sites built between the late 19th and early 20th centuries, as function of the industrialization of the Romanian economy, seen in their development in the urban topography. From the middle of the 20th century, these spaces were included in the communist project of growing Romanian industry. Examining the extent of the embodiment of the communist ideologies in projecting a new urban form, the second part of the paper will investigate which was the role of ideology in the process of appropriation and re-appropriation of these industrial sites. In today's Bucharest a big part of these spaces, lots of them already part of the industrial archaeological patrimony, constitute huge un-used areas blocking the fluidity of the urban tissue. The paper thus asks, can the contemporary re-appropriation of these sites result in an authentic rehabilitation of the urban tissue, generating forms of political praxes that negotiate the various historical layers or appropriation and re-appropriation which would mediate different understanding of urban memory and different experiences?*

Key Words: Industrial sites, ideology, re-appropriation, urban memory, re-use

Introduction

The perpetual changes in the urban spatiality, the projects overlapping or successive in time, are themes shaping the city's specificity. Especially when certain events occur having a deep impact at the social, economic or political level, the city reacts through changes manifested at a physical level (the fabric of the city) and more important, in the way the new changes are appropriated by the inhabitants (Stanilov, 2007). The almost 25 years from the 1989 Revolution allowed, more or less, the new forces to manifest and to re-shape the post-Communist, city following new principles. As Dingsdale noticed, 'urban form has been often described in social theory as a passive element of our social existence, a mirror reflecting past and present socio-economic conditions, or a "text" serving as a basis for their interpretation' (Dingsdale, 1999: 65).

The paper brings the hypothesis that industrial areas constituted significant spaces not only for the economical context, but also they manifested themselves as urban and mental landscapes both in Communism and post-Communism, representing one of the main themes which shaped the urban topography. Furthermore, the socio-economic changes engendered by the fall of the Communism can be clearly observed in the industrial areas. Their decline is probably the most prominent site of the transition period manifested into the urban tissue (Kiss, 2007: p.147). It proposes, therefore, that Bucharest can function as an exemplary context, through which the issue of the re-appropriation of the post-Communist industrial spaces can be considered. After the fall of the Ceausescu regime, the decline of the industry determined the emergence of disaffected or ruined spaces into the urban topography, acting now as huge spaces of numerous layers of history. The industrial architecture of Bucharest was of major importance during the Communist era, but it, currently, exists as large patches of dead or underutilized urban tissue.

The paper's purpose is to examine the evolution of spatial patterns of the industrial landscape both in the Communist and post-Communist city's topography.

The first part of the study will draw the evolution of industrial spaces in Bucharest showing the way they influenced the form of the actual city. Their evolution before and during Communism will be explored. Having as well an ideological purpose – where the propaganda was omnipresent – they led to deep changes in the urban tissue not only by their own presence, but also by determining the emergence of new housing districts for the people who migrated to the city. The second part will try to give an understanding of these spaces in the Communist context, connecting them with notions belonging to the common imaginary and *habitus*. The 'industry' and the 'factory' represented semantic elements during Communism being the realm where ideology fully unfolded attributing to these spaces a moral connotation (Chelcea, 2008: p.98). The works of Henri Lefebvre and of some texts belonging to the Critical Theory will serve as framework for approaching concepts such as *urban memory* and *ideology*, seen in their relation to the theme of industry. The final part of the work will concentrate on the contemporary re-appropriation of these industrial sites by the urban tissue. The impact of political and socio-economic transformation can be clearly observed in the industrial areas of the post-Communist city. One of the many areas of the city of Bucharest will serve as example for investigating the way these spaces have adapted or not to the new capitalist post-Communist context.

Before 1989, along with social housing and buildings of representation, the most important theme in terms both of architecture/urban planning and social manifestation was the industry. Even if in the Western countries, the end of the industrial era began much earlier, in the Eastern part of Europe it ended only after the fall of Communism. The economic changes were strictly connected with the political regimes and they involved radical transformations at the level of urban form and social perception of the city. These changes can be easily observed in the industrial areas of many post-socialist cities (Kiss, 2007). Their contemporary understanding is not only connected with the economic importance but it also has cultural dimensions. According to the era in which they existed, they also determined various controversies related to the cultural place they occupy in the industry of the city. Since their emergence, in the second half of the 19th century, the industrial spaces would represent a source of exploitation for the pre-war socialists, whilst the nationalists will consider them a symbolic contamination with craftsmen coming from other countries (Chelcea, 2008: p. 9). During Communism, these spaces will be seen by the Party as a source of progress and as the main spaces where the propaganda was disclosed. For the workers and the inhabitants around them, the ideology's rituals present in the factories became a tiresome manifestation of the regime because of the official visits and of the excessive visibility in media and in the 50s literature (Chelcea, 2008: p.9). Today, again, a new semantic is assigned to these spaces, mainly informed by their economic potential. Apart from the nostalgic image which still persists in the collective memory, they are now 'haunted' by the 'urban developers' who consider them as real business opportunities due to their central location.

The two layers of the city – the Communist and the post-Communist one – coexist as framework for the new development being superimposed over the old urban fabric (Stanilov, 8). In most cases, this overlapping of such different patterns also reflected the chaotic manner in which the city developed. The factors that have contributed to the greatest extent to this development have been generated by the new players and by the misapplication of some developmental schemes taken from the West and applied without caring too much about adjusting them according to the context, anyway precarious. The block type structure, unitary, of the state, for more than 50 years, was after 1990, fragmented and dissipated in various directions because of the political, social and economic interests (Stanilov, 8).

The theme of industry in Bucharest before 1989

Before 1880, Bucharest's economy was characterized by small handcraft industries. There were few exceptions, as the Assan's Mill (1853), the Metallurgical Factory Le Maitre (1864), The Brick Factory Max Tonolla (1865) or the Ceramic and Basalt Factory (1865). The rhythm of industrial growth increased significantly also due to the establishment of the National Bank of Romania in 1880, with the support of the liberal party which had the power at the time. At the beginning of the 20th century, the number of factories started to grow, such that in the 30s there were 332 factories. The accelerated growth of industrial development in Bucharest was due to various factors including its status as capital, acquired after 1859¹²⁴. Hosting the state institutions influenced both the growth of the industry and the intense urbanization of the city (Chelcea, 2008: 101). The administrative factor was very important as well, especially after 1918 when, after doubling the territory and the population, the administration increased even more¹²⁵. As a result, Bucharest was, until the beginning of the 20th century, rather a consumer city than one of production (Madgearu, 1999: 132), meaning that it represented a large market for selling different products. Another factor which determined the industrialization was the expansion of Romanian Railways (Caile Ferate Romane), which created new opportunities for the city's industry through a rapid and cheap transport of the merchandise. New train stations were built – Filaret Train Station (1869), Gara de Nord (1872) and Obor (1904) – which constituted the core of Bucharest's industrial areas (Chelcea, 2008: 104). The most important industrial areas of the city began to take shape. Their location was determined mostly by the railroads and other transportation networks. Therefore, in the first decades of the 20th century, six main industrial areas could be identified in the urban landscape, all of them having as common point a strong connection with the transportation routes. Later, during Communism, a period obsessed with production (it was a production society, not a consumer society!), the rhythm of the economy, especially industry, grew much faster than in the West. In short time, the industry became completely nationalized: the main companies were the first to go, by a decree of 11 June 1948, and the others followed (Boia, 2001: 119). Soon after that, other three industrial areas emerged, due mainly to the growth in the number of the population and to the city's expansion, but also to Communism which tried to exploit the whole industrial potential of the city. This era presented a huge opportunity for outlining a new spatial structure of industrial activities due to the new regime which reshaped drastically the socio-economic system. However, the former industrial zones within the city did not change much – most of the factories being rebuilt or reused on their existing sites. Being at that time under the USSR's influence¹²⁶ and seen as well as an element of propaganda, the evolution of the industry was made through the modernization of the nationalized factories and presented in a very triumphalist way in the journals of that time. During this period, the economy of Bucharest was no longer guided by the market, but by the "plan", as a general principle of organization (Chelcea, 2008:112). Ceausescu emphasized the industry's development rate without taking into account the real economic indicators. These were completed by an absolute economic control. On the short term, this economic system had a positive impact on the social plan: a large amount of working places was created, the urbanization of the villages and a relative wellbeing. On a long term, it turned out to be a bankrupt policy which determined the industrial specialization of whole regions, without offering alternatives. At a large scale, the Communists would invest only

¹²⁴ Bucharest became the capital of the two Romanian provinces (Moldavia and Wallachia) after their unification on 24 January 1859.

¹²⁵ For instance, in 1930, 15% of all the public servants from Romania were living and working in Bucharest (Golopenita, 2002: 350).

¹²⁶ The USSR's influence manifested in Romania from 1947, after the abdication of King Michael I, until 1965, with the beginning of Ceausescu's government. Where Gheorghiu-Dej (the Communist leader after 1947) had hewed to a Stalinist line while the Soviet Union was in a reformist period, Ceausescu initially appeared to be a reformist.

in three fields: the heavy industry, infrastructure and projects with a propagandistic character (the Danube-Bucharest Canal and the transformation of Bucharest into one of the ports to the Danube, the Civic Centre and the People's Palace, and the transformation of the villages through systematization into agro-industrial cities). The period between 60s and 70s is the period of quantitative expansion but qualitative reduction, both at the dwelling level and industrial activities. Bucharest becomes the target for great investments in the industrial field (the development of IMGB factories, or Republica, old Malaxa). It is also the time when large housing districts will be built due to the increasing job offer in the capital and also to the migration of the people from the countryside to the city. Districts as Berceni, Titan-Balta-Alba, Drumul Taberei, Colentina, Rahova, Ferentari or Crangasi are consequences of these changes. These new buildings were very modest in terms of space for living for each inhabitant, but also in terms of the quality of the services – reason for which they were nicknamed 'matchboxes'. The forced industrialization also absorbed an important part of the rural population and it sent them into the towns where they were never fully integrated (Boia, 111). In communist Romania, urban planning was centralized, technocratic and subordinated to national economic objectives. It proceeded within the institutional and ideological framework of a single-party system (Hirt, 2005: 222). The building of a new world was announced: 'entire areas of the towns were flattened, without sparing historical buildings or even tiny segments of the traditional urban landscape' (Boia, 2001: 136). The district of tower blocks and the factory¹²⁷ became the great symbol of Communist modernization. The idea of the transformation of the towns as the ideal solution was embedded in the human consciousness by the very aggressive propaganda showing the magnificence of the newly-built areas. This attitude is also part of a rhetoric of the 'active new' characteristic for the Communist discourse. The new tendency implies 'the erasure of the traces left by the capitalist society founded on exploitation and its replacement with a new built environment that would rest under the sign of satisfying the material and spiritual needs of the working class' (Zahariade, 2011: 34). As a consequence, the country has to become an immense building site.

Industry as embodiment of ideology

Assuming the theoretical system of Henri Lefebvre, the production of space can be framed into three categories: representations of space, spaces of representations and spatial practices. Transferred to the Communist and post-Communist cities, all these three elements contribute to the shaping of spaces, to their re-semantization and assignment of different understandings. The representations of space which imply ideology and power can be best put into relation with the industrial spaces and their role in the Communist system. After Communism, and implicitly, after the end of the industrial era, these spaces continued of course to be part of the urban tissue, engendering the production of other types of spaces: "the shift from one mode to another must entail the production of a new space" (Lefebvre, 1991: p.46). The industrial spaces have been – from spaces of representation of the ideology during Communism to the most encountered actual condition of waste land – subject of nostalgias and fuel for visions of reconstruction or preservation, without trying though to integrate them into the lived present (Boyer, 1996: p.1). The Communist industrialization – a 'transformist' phenomenon of general mobilization itself – needs people in order to occupy the work force. For this, the first step is constituted by the industrial and general massification of the education. According to the instructions of the 12th Congress of PCR (The Romanian Communist Party), 90% of the students graduating secondary school will be enrolled in industrial and agro-industrial high schools (Cernat, 2008: 235).

¹²⁷ On the cover of one of the touristic guides for Bucharest, issued in 1962, the factory was illustrated as one of the main urban elements which contributed to the identity of the city (*Ghidul Bucurestiului*, Dan Berindei, 1962).

To which extent the Communist appropriation of the industrial sites resulted in the normalization of ideology, and by extension of the integration of ideology into the daily praxis? Here, we may speak of a ritualization of space, referring to the types of industrial and political praxes that evolved in the industrial Communist period. In the terms of the Critical Theory, ideology, 'spatialized or otherwise, is not just *false consciousness*' (Goonewardena, 2005: 51) as Althusser noted, but at some point, it comes to represent also the reality, in one way or another, besides reflecting it wrongly. In other words, during Communism, the ideology became part of human daily praxes, and proposed, instead of a naturally-appropriated tradition, a new tradition. 'However, while admitting that they [ideologies] do not correspond to reality, i.e. that they constitute an illusion, we admit that they do make allusion to reality, and that they need only be 'interpreted' to discover the reality of the world behind their imaginary representation of that world (ideology=*illusion/allusion*)' (Althusser, 1971: 162)

Ideology, said Althusser, is necessary in every society which needs its people to be formed and transformed in order to respond to the offered conditions of existence (Althusser, 1990: 235; Goonewardena, 2005: 53). 'Ideology, [...] springs from a situation in which social life has become too complex to be grasped as a whole by everyday consciousness. There is thus the need for an imaginary model of it, which will bear something of the oversimplifying relation to social reality that a map does to an actual terrain. Society, in the terminology of the eighteenth century, has become 'sublime': it is an object which cannot be represented. 'For the people as a whole to get their bearings within it, it is essential to construct a myth which will translate theoretical knowledge into more graphic, immediate terms' (Eagleton, 1991: 151).

Space as a general concept has always been seen in relation to 'notions of human utopia, whether social, political, or economic' (Buck-Morss, 1994). Space is not a passive surface, a *tabula rasa*, but, as like other commodities in the words of Walter Benjamin, is itself actively produced on the one side, and it has in its turn influences on the humans that are part of it. After Communism, along with the industrial buildings it was not just ideology that was dissolute, but also a 'particular collective and individual identity, a social order that sustained life both physically [...] through the communities and solidarity that emerged within them' (Pusca, 241). Any kind of shift from a political or economic system to another 'must entail the production of a new space' (Lefebvre, 46). The space is produced by the conditions and context it takes place in. The human factor is also a significant component of the image and appropriation of a certain territory, and as Richard Sennett assumes (*Flesh and Stones*, 1994), the body and the built environment have always had a very strong symbiosis along the history, the morphology of the ancient cities being closely related to the human body – as, for instance, the need for a centrality. The traditional city gathered its inhabitants around central squares where some symbolical institutions such as a church or parliaments were being housed. The modern city, and especially the Communist city, removes these landmarks from the urban topography or simply shifts the core of the community towards places of production such as industrial sites, around which all the human activity is now concentrated. The city of Bucharest had a fragmented structure, being organized in heterogeneous *mahalale* (slums), which constituted themselves around centers, usually marked by the church. They represented the basic cell which determined the structure of the entire city. After the instauration of Communism, these cells not only physically dissolved by being incorporated into the new proposed urban tissue, habitat of a 'new man', but especially in symbolic terms, by destroying their centers and by replacing them with spaces of production. The Communist strategy will attempt the urban and social unification and rationalization and the main themes of the city will be the industry and the social housing. They will constitute a priority for the socialist project and over the old fragmented structure of the city a new one will be overlapped, unifying tissue which will modify not only the morphology of the urban topography, but also a certain natural appropriation of the space already learned and in a way ritualized in the human consciousness. The many years of Communist regime, also determined a re-semanticization of the city and of its landmarks. The new conditions ideologically imposed transformed the initially pseudo-reality into a lived reality which started to be appropriated by the inhabitants.

The industrial sites after the 1989

The end of Communism brought about radical changes in the context within which urban planning operates, such as: the development of a multi-party political system; a more stratified society; the re-introduction of private property rights to land and various structures; the end of the Communist economic; the highly decreased role of public institutions and the emergence of a great variety of actors, mostly from the private sector (Nedovic-Budic, 2001). Covering up a significant part of the city – the industrial spaces are now lying in ruin or underutilized, forming large patches of dead tissue in the urban fabric. After 1990, many of Bucharest's factories have deeply changed their purpose. The effects of deindustrialization could be both seen in terms of urban metamorphosis and as social problem (Chelcea, 2008: p.243).

The new changes, both in terms of law and economy, were the main conditions that weakened the urban planning as well. The development of the private sector, the re-consideration of the lands and real estate market (Hirt, 2005: 224), but also the chaotic way of reacting in a democratic regime whose practice was missing, would represent elements which would diminish significantly the management of a controlled and rational urban growth and change. After the huge housing districts inherited from the former regime, the most significant weight in Bucharest's urban landscape will refer, after 1990, to the industrial sites. They are still seen to embody, maybe the strongest, the heredity of the previous regime. Relevant for the urban topography and imaginary in their various stages these spaces should now be re-appropriated into a new paradigm, of the post-industrial post-Communist city and should deal the various layers of understandings and legacies of their past in order to re-integrate them into the actual urban tissue and memory.

To outline the way the industrial sites in the city of Bucharest have evolved, I will use as example the case of one of the industrial areas in Bucharest – Stefan Cel Mare – Obor – Pantelimon. I will consider three industrial spaces belonging to this area in order to emphasize the way in which the urban tissue has developed in the last 25 years. The chosen industrial spaces also represent images of the way in which these fragments of the city have been reutilized in the post-Communist post-industrial city.

Urban renewal as tabula rasa

Many of the historical industrial spaces have been demolished during Communism because they didn't satisfy anymore the standards for production, and few of them were demolished after 2000. The gesture of *tabula rasa* seemed to be the only choice to exploit the land underneath the Dambovită Mill, one of the oldest mills in Bucharest. The site in question included actually two mills, one of them, Olmazu Mill, whose building date is not very sure, but which appears on the 1911 city plans; the other, very close to it, the Commercial Mill, was built in the 20s. After the nationalization, in 1948, the two mills merged into Intreprinderea de Panificație Dambovită which was demolished in 2005-2006 (Chelcea, 2008: p.199). In 2005-2006, it was demolished with the purpose of using the land for the construction of a new housing project. It was the first time when the public opinion reacted at this kind of urban gesture. Becoming part of the collective memory of the area and of the city, it was presented as well as urban and epic landmark in some Romanian literature books.

Ruin

Situated in the same area and built in 1853, the Assan's Mill was the first steam mill in Romania, using the most sophisticated equipment for that time and marking the beginning of the industrial era in the country (Chelcea, 2008: p. 203). After the nationalization law in June 1948, it became the state's property and it continued to function under various purposes. The Mill marked the surrounding urban space, also seen in the toponymy of the streets named after the mill and its activity: Assan's Boat, Fainari (related to the flour), Silozului (Silo's Street),

Irimicului (Middling's Street), and others. After 1990, becoming also part of the national patrimony, the mill is now a private property left in ruin in the middle of Communist housing blocks. The Assan's property covered initially an area of more than 5,41 acres, but because of the blocks built before 1990, the area of the industrial complex was diminished to 4,7 acres. Currently, all the buildings of the complex are in an advanced stage of degradation. Expected to disappear by itself, in order to make room for new investments in the terrain situated in a central area, the complex was subject to various mysterious fires and free of any type of security which led to vandalism.

Partial use and conversion proposal

The Malaxa Factories were began being built during the 1930s. Today, the industrial complex covers an area of 91,16 acres. The most important and valuable part of the complex was edified between 1930-1943, by the famous Romanian architect, Horia Creanga, in the modernist style. They are now part of the national architectural and industrial patrimony. After the instauration of Communism, the factories remained for a while under the control of their owner, due to the financial support given to the Socialist Party. Taken by the state after the immigration to the US of Nicolae Malaxa, at the end of 1940, they were renamed in the 60s the *23 August Factories*. "The Communists transformed them into a symbol of the fight of the workers against the capitalist 'exploiters'". Becoming a 'city within a city', this complex of factories had more than 17 000 employees during the 70s and maybe some more in the 80s (Chelcea, 2008: p. 219). Today, part of them is still in use at a very low capacity, with less than 400 employees, some of the buildings are rented as office spaces, but as a whole they still represent an underutilized space. In 2003, a study and a project for the conversion of the whole industrial area was made. 'Located in the Eastern area of Bucharest, in the proximity of the lake chain, an area deemed as an extraordinary natural patrimony to be developed for entertainment and leisure and, offering access to the Danube (the Oltenita fluvial port) by means of the railway terminal (Bucharest Titan stop), the FAUR industrial site could be integrated into the town reconversion by taking-up specific industrial activities, such as storage and services, ensuring the direct and fast connection to all great European industrial towns located in the area influenced by the Danube, reaching all the way to the North Sea, and this confers it the opportunity to be included in the European configuration of the global development strategies'(Radulescu, 2010: p.41)¹²⁸.

Conclusion

As a general conclusion, the paper suggests that the radical change produced after 1989, on various levels, has manifested deeply its influence in the urban landscape and especially in the former industrial areas.

One of the main center of production during the 20th century, 'affected' by a late de-industrialization because of the political regime, Bucharest finds itself today in the situation of searching for new purposes for the disaffected industrial spaces. The mismanagement of these spaces is caused also on the one hand by the fact that these spaces, nationalized by the law of June 1948, were claimed by the inheritors of the former owners, who will try in many cases to exploit the lands having a significant value. On the other hand, even if, in theory most of them belong to the national patrimony and their protection is mandatory, the new owners found each time a way to destroy indirectly the monument.

In terms of the urban and social semantics, their presence along all these decades in the core of the city has contributed to establish a relationship between them and the inhabitants, and normalize the symbolical value of these various fragments in the urban tissue. Therefore, the

¹²⁸ Radulescu, I., 2010: 'Faur – Uzinele Malaxa – Un sit industrial de interes european' 'Faur – Malaxa Factories – An Industrial Site of European Interest' in *Seria Arhitectura*, 2, n. 2, vol. 1

recovery of these spaces, having not only a symbolical value, but also an architectural and economic one, should imply not only their re-insertion in the functional urban tissue, but also the preservation of their character as landmarks of memory.

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Urban mobility - Urban mutations. Means transport and morphological changes in the city of Belém

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Abstract. *Urban mobility is among the important agents that contribute to morphological changes of city, new routes are executed and/or enlarged, large spaces transformed and resized, new technologies and techniques tried and updated, at the end they all linked the intensity of demand of the population. The history of Belém do Pará contains direct influences of design mode of Portuguese overseas cities from the early 17th century: strategic location on the margin of a river, articulation with the place where it was implanted and regular trace of the urban grid (Teixeira, 2012). In the 19th century, a large lowland area was grounded, expanding the regular layout with new avenues, and with the significant increase of the urban population, two trams companies settled also contributed with expansion of roads. However with the start of construction (1883) and the inauguration of Estrada de Ferro de Bragança-EFB (1908), and with the lifting of the “Primeira Légua Patrimonial” (1883-1886), authored by Manoel Odorico of Nina Ribeiro, that Belém began major changes in their morphology. The study shows the transformations arising from urban mobility in two spaces of great importance for the town of Belém: the “Complexo Viário de São Braz” and the “Complexo Viário do Entroncamento”.*

Key Words: urban mobility, history, morphology, means of transport, mutations

Means of transport of passengers and cargo and mutations in Belém (1870-2014).

Carts, Trains, Tramways, Garapeiras, Zeppelins, Buses and Cars (1870-1948).

The city of Belém in Pará State, Brazil, belongs to the territory of Eastern Amazonia and is part of a plain, where the levels of land relative to sea vary with dimensions of -4, 00 m to 18.50 m, still possessing water basins and a very high water table level, which makes it liable for flooding caused by atmospheric precipitations especially when these coincide with high tides, flash floods that occur mainly in the areas of lower quotas.

Due to inner city watershed structure and geographical location, the means of river transport represented by vessels of all sizes and quiet has always been present in Belém that is bathed by a bay and a big river, as part of its territory, several islands located nearby. Its ports receive vessels from all the States of the Amazon region, especially the municipalities of the State of Pará in the northern region, including those located on the Marajó Island.

Small boats both rowing (mounts and barges) as sailing (canoes), can still be seen today navigating streams that penetrate into the urban area, as is the case of the Igarapé do Tucunduba, which bisects the Campus in the neighborhood of Guamá. Those boats and those of other sizes and models, but can be seen in the daily life of the edge of the city, sliding the Guamá River and the Bay of Guajara, or anchored in ports and docks like “Ver-o-Peso”, nodal point and visual landmark in Belém.

Unfortunately the means of river transport intraurbano in the city of Belém no longer happen, symbolically, from the first decade of the 19th century, with the beginning of the embankment on the large flooded the Piry, and then gradually through rectification and channeling of arms of rivers, streams and creeks. In generally, speaking, these interventions have contributed and still contribute to the emergence of new avenues, when fully grounded, or if kept and ground, in this case allowing the use of its banks for the construction of pedestrian routes or car routes.

The first company of Tramways circulating in Belém do Pará was the "Estrada de Ferro Paraense", owned by the North American James B. Bond, hired in September 1, 1869. In 1874, this company no longer belonged to the American businessman, who had sold to Manoel Bueno & Cia in 1870, which transferred rights acquired for a company of joint-stock company. However, everything indicates that in the same year, Manuel Bueno created the "Company of Bonds Para" to manage cars pulled by pairs of donkeys, rail gauge 0, 75 m, but that did not begin to operate immediately in the city (Província do Pará, 1874).

Third owner of the so called "Urban Railroad Company Para", the Corporation developed its activities with 3 locomotives, 12 passenger cars and freight cars 8, that constituted the undercarriage for both main lines and for a branch, all gauge 1, 435 m, your responsibility.

The first line which connected downtown, taking as a starting point the Government Palace Square, until the "Arraial de Nazareth", an extension of 3.413 Miles, has contributed significantly to the development of the nascent Neighborhood of Nazareth, still considered the outskirts of the city.

The second line which connected the "Largo de Nazareth" through Independence Square and ending at one of the limits of "Primeira Léguas Patrimonial", represented by the "Boulevard da Câmara", contributed to the definition of two other important neighborhoods, São Braz and Marco.

In 1873 the two lines transported a total of 265,343 passengers. Even with this performance, reviews the use of steam trams multiplied. Questions about quantity of locomotives to be insufficient, the unraveling of the curves, the wrong choice of the gauge onto the tracks, the use of tracks already used, and especially why animals have not been used as traction (Província do Pará, 1874).

The incorporation of the trams of animal traction, the "Company of Bonds Para" on urban practice didn't happen before 1874. The important thing was that taking advantage of the layout of existing roads in the three neighborhoods already solidified of Belém, "Cidade Velha, Comercial and Campina", installed their lines and expanded its services. In 1894, the "Urban Railroad Company Para" assumed all lines of trams and continued to contribute to the expansion of the urban area of Belém until 1905, when it was sold to the company of English origin "The Stop Electric Railway and Lighting Company". Two years later, in 1907, began circulating the trams moved to electricity, the so-called Tramways, the responsibility of that company. And in 1908, the streetcars of animal traction have been disabled.

For 40 years, the electric trams of The Pará Electric Railway and Lighting Company "contributed significantly to the expansion of the city of Belém, taking his pace declined, by war economy, during the period of the Second World War. No longer circulate in the year 1947, paradoxically for reasons of economy of electric power to the city, but it wasn't just that the reason. Others, such as the increase in population, urban sprawl, the emergence of new neighborhoods with consequent increase in the number of routes, and the competition from bus.

The increase of the quantity of these vehicles in the last ten years has been quite significant, went from 87 existing units in 1938 for 300 units in 1947 (Tobias, 2004). These vehicles, in addition to the conventional historical models had, including those manufactured with wooden and/or assembled in the city itself, as the "Garapeiras", that worked from the early decades of the 20th century until the Zeppelins, which circulated from 1948, they all not depended on Rails or electric energy to work and were places not served by Tramways, also contributing to the extinction of that collective means of transport, which was already considered obsolete for mass human displacement (Mendes, 1998).

Buses, Trucks, Trailers, Cars, Motorcycles and Bicycles (1948-2014).

The legacy of roads left to the town of Belém since the plan/survey of Nina Ribeiro in 1883-1886, implemented and become reality for many municipal administrations, was such, that from the year 1948 until 1988, the year of the country's new Constitution, which allowed the creation of the Transport Company of the City of Belém - CTBel, urban transport in existing routes

coexisted in Belém. The road network was enough at that moment for the displacement of the inhabitants of the town, in the various modes of transportation, really happening facts significant that caused the high population density index and the increase in the number of vehicles on roads, such as the invasions of areas of lower level quotas, "baixadas", where traditionally inhabited people of lower purchasing power the large number of housing estates, consolidated in the late 1990, intrusions on the periphery, urban sprawl and the verticalization that starts in the early 50 in central District.

However, in the Decade of 1990, historically inherited road network began to reach the limit of its capacity, in relation to the amount of existing vehicles, especially in relation to the number of automobiles expanded in recent years, and recently by the large number of bicycles.

With the little wide road network, in the next decade, from 2000, the presence of the automobile in Belém and in other municipalities of the metropolitan region has intensified, as demonstrated by the sheer numbers recorded in the period from 2001 to 2012, from 142,032 to 300,275 cars, meaning an increase of 111.14%. Nevertheless, in figures, the participation of motorcycles is even more expressive, 8.1% in 2001 to 27.7% in 2012, in relation to the total number of vehicles in the Metropolitan Region of Belém (Rodrigues, 2013).

Urban mobility and mutations in two important areas of the City

Complexo Viário de São Braz

This space has been studied recently in its evolution as a public square, in the research project presented the UFPA, under the title of "Analysis of changes in urban space and buildings of the city of Belém do Pará: architectural and urbanistic truths of every project executed", and which gave rise to the work plan entitled "Mutations of the former of Largo da Independência in Belém do Pará 19th century, later named Largo de São Braz to the current area occupied by squares of the Trabalhadore, Leitura, Floriano Peixoto and the Municipal Market, Set the IAPI, bus station and other buildings in it deployed" (Fig. 01). The designation used here aims to establish terminological binding with another space then parsed, and already known by the technicians as the "Complexo Viário do Entroncamento".

The "Complexo Viário de São Braz" began to form even in the 19th century, when from the Largo de Nazareth, in the year 1862, there emerged a new road in continuing the Road of Nazareth. This new Road, named as "Independence", with approximately 1,200 metres ahead and in a straight line, opened in a large space, which in 1861 was Independence Square, then called the Largo de São Braz and later Praça Floriano Peixoto (Cruz, 1945; Muniz, 1904).

Already with the name of Largo de São Braz, the large space was represented graphically in its fullness, in the city of Belém plant prepared by polytechnic engineer Manoel Odorico of Nina Ribeiro, to the City Council of Belém from 1883 to 1886. The Largo, possessing an initial area around 28 ha (Fig. 02), with 700 m long and 400 m wide, that already showed that representation had been deployed, inside, some urban facilities, High Reservoir (water tower) and the first Railway Station building of Estrada de Ferro de Bragança. Were also shown and identified the rails of the means of transport, using the space of Largo as a path. Historical photos show a few dwellings located in their extremes, indicating the feasibility of housing and the possibility of offsets to the inhabitants to the location and to the city center (Muniz, 1904).

One of the tracks depicted in the map belonged to second line of steam trams of "Urban Railroad Company Para", described above, and which connected the Largo de Nazareth until the Boulevard in front of the camera. The other representation of tracks belonged to the line of trams pulled by animals of the "Company of Bonds Para", which connected the Largo from Nazareth to the cemetery of Santa Isabel. The third representation of tracks belonged to the Branch of the railroad, which connected the São Braz Station to the Central Station of Belém, located in the public garden (Andrade, 2010).



Figure 1. Aerial photograph of the Largo de São Braz in 1998, with influences of the rails of the tramways and train lines. Source: Prefeitura Municipal de Belém Ortho-photos. 2001.



Figure 2. Detail of a map of Nina Ribeiro de 1883-1886 showing the space occupied by the Largo de São Braz and the lines of tramways (1) and the railroad line of Bragança (2).Source: Muniz, 1904.

Complexo Viário do Entroncamento

The name of “Entroncamento” for this space exists since the first decade of the 20th century, but still in the 19th century, there were forecasting and rail project would ensure its future existence. The space analysis is an important Point Nodal¹²⁹ the city, which lies at the intersection of Almirante Barroso Avenue, main entrance and exit of the city, with the Augusto Montenegro Avenue. These two avenues have hosted or were created from the tracks of the

¹²⁹ There is no doubt that the “Complexo Viário do Entroncamento” is a “nodal point” in accordance with the concept of the five elements created by Kevin Lynch to analyze the image of the city: “(...) strategic places of a city through which the observer can enter, are the intensive outbreaks for which or from which he travelled. Can be basically joints, places of interruption of transportation, a cross or a convergence of routes, times of passage of one structure to another. Or they can be mere concentrations begin to be important because it is the condensation of some use or any physical characteristic, such as a meeting point in a corner or a closed square.” Lynch, Kevin. *A Imagem da Cidade*.

main Line of the Estrada de Ferro de Bragança (EFB) and the tracks of the “Ramal de Pinheiro”, respectively.

‘The terrain “Entroncamento” remained preserved in its original triangular shape (Fig.03) until around 1965, when they were disabled the services of the railway, and from there came to be occupied by wooden buildings in precarious conditions of hygiene and safety, mostly for commercial purposes to foodstuff, until the early 1980, when it was vacated entirely for the construction of a memorial even without changing the original shape.

The lack of road alternatives for entrance and exit of Belém and access to neighborhoods of their expansion area, caused in the following years the density of traffic in that area. Road interventions performed at the “Entroncamento” from the years of 1990, for traffic congestion solution, which charted in the following limits of saturation, not brought significant improvements to urban mobility. In order to reverse this situation, in January 2014, was deployed in space the "Complexo Viário do Entroncamento" (Fig. 04), consisting of three high, small tunnels and pathways snippets extension.



Figure 3. Detail of Map of the aerial photographs of Belém (CODEM-PMB-1973).



Figure 4. Aerial view “Complexo Viário do Entroncamento” .Source: Google Earth 2014.

Final Considerations

It is clear by the historical summary of modes of transportation in the city of Belém, that the mutations occurred in the flooded areas, rivers and creeks watershed located in the urban area, can not be used for the emergence of new waterways, which could contribute in the present day with a more ecological and sustainable utilization for the benefit of the quality of life of the

inhabitants of the city. These mutations of the urban space, since the first major land runs, had as a priority the creation of new roads to link important points of the city and improve the traffic of people and animals. The 19th century was in its early decades, but the morphological change of that area and other areas throughout the city, following the same principle, are sources of trouble until nowadays. The intense rainfall regime of the Amazon region and the coincidences with the high tide brings back the same situation for these areas every year.

The two spaces chosen for analysis of morphological changes induced by urban mobility, different from the historical situation of the areas flooded and backfilled, are situated in pockets along structural pathways that have higher level dimensions of the city, reaching 18 feet above sea level, which makes them immediately, valued differentiated areas for execution of architectural projects, urban and infrastructure of urban mobility.

The influence of the means of transport on the morphology of these spaces is found in its genesis, as was the case of the “Complexo Viário de São Braz”, that had one of their main routes defined by the internal steam tram line in 1870, and another route their initial coverage area defined by rails of “Ramal da Estrada de Ferro de Bragança” that went from São Braz to the center of the city in 1887. In the case of the “Complexo Viário do Entroncamento”, its original triangular shape and area were defined by the rails of the main line of “Estrada de Ferro de Bragança” and the rails of the “Ramal do Entroncamento – Vila de Pinheiro” in 1906, and by meeting the guidelines required for rail projects at the time, in the specific case to the stroke of the train lines, establishing large cornering, with greater than 100 m, for the execution of the maneuvers come true with the total security required.

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Tracing Urban Catalysts in ‘Noorderkwartier’ Area

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Abstract. *After WWII the ‘Noorderkwartier’ Area, North of Amsterdam functioned as overflow for the city. Spatial policies in the Netherlands at that time aimed at reducing urban pressure on the ‘Randstad’. (Cammen, 2013) Costly policies of redistribution of urban development towards the peripheries were developed. (Healy, 2007) As a result a dispersed territory arose often linked to car mobility. Nowadays the policies are severely scaled down (Healy, 2007) and the area is confronted with possible downfall in population, employment, facilities and building production. To counter this for the area currently policies on Transit Oriented Development are under construction. (Provincie, 2010). Central in the concept of TOD is clustering spatial developments around nodes of public transport and thus re-establishing proximity. (Priemus, 2007) The research methodology applied to develop these policies mostly does not involve societal and spatial dynamics of these formation processes (Aken, 2004) This research aims to identify the key factors in urban change in relation to proximity to transit for understanding the processes involved to develop possible grip on the matter. By mapping the area historically since the commencement of transit and through spatial analyses the critical changes are identified for TOD. The processes underlying these critical changes will be studied and placed in their context.*

Key Words: urban morphology, transit oriented development, urban transformation processes, mapping, Amsterdam Metropolitan Area

Tracing Urban Catalysts in ‘Noorderkwartier’ Area

After WWII the ‘Noorderkwartier’ Area, North of Amsterdam functioned as overflow for the city. Spatial policies in the Netherlands at that time were aimed at reducing urban pressure on the ‘Randstad’. (Cammen, 2013) Costly policies of redistribution of urban development towards the peripheries were developed. (Healy, 2007) As a result post WWII a dispersed territory arose often linked to car mobility. Nowadays the policies are severely scaled down (Healy, 2007) In the most recent note on spatial policies (Ministerie van Infrastructuur en Ruimte, 2011), the role of the state is decreased to investments in infrastructure. By indicating where it is willing to invest in the infrastructures needed it aims to navigate spatial developments. Should the market be willing to participate in such spatial development the public will invest in those previously appointed projects. Currently the area of Noorderkwartier is confronted with a possible downfall in population, employment, facilities and building production. While simultaneously the means for intervention are limited to infrastructure investments and the provision of knowledge (Healy, 2007). At the provincial level currently a development is ongoing in the program ‘Densification around nodes of public transport’ which is part of the current main spatial policy (Structuurvisie Noord-Holland 2040, Kwaliteit door veelzijdigheid) (Provincie Noord-Holland, 2010). The policy has with its focus on transit locations and the aim of densification the characteristics of *Transit Oriented Development / TOD*. In the concept of *TOD* clustering spatial developments around nodes of public transport and thus re-establishing proximity is key. (Priemus, 2007) A normative standard for the influence of transit is the radius of 800 meters which coincides 10 minutes of walking which coincides with the distance generally considered to be acceptable as walking distance. The distance of 800 meter around a railway station is what defined as the railway station location.

In the early phase of this policy the methodology of the ‘Node-Place Model’ of Bertolini is used. The method is theoretical in character and gives on the bases of numerical input on spatial

development en transport provision predictions on to be expected developments in the railway location, The model does not take spatial and structural aspects into account (Waijjer, D.A. de, 2014). At a later stage, with the policy related publication ‘Maak Plaats!’ the reality of the locations would have been confronted with the Node-Place model. The predicting model is replaced by the ‘evolved’ ‘Vlinder-model’ (Leidraad Maak Plaats, 2013).

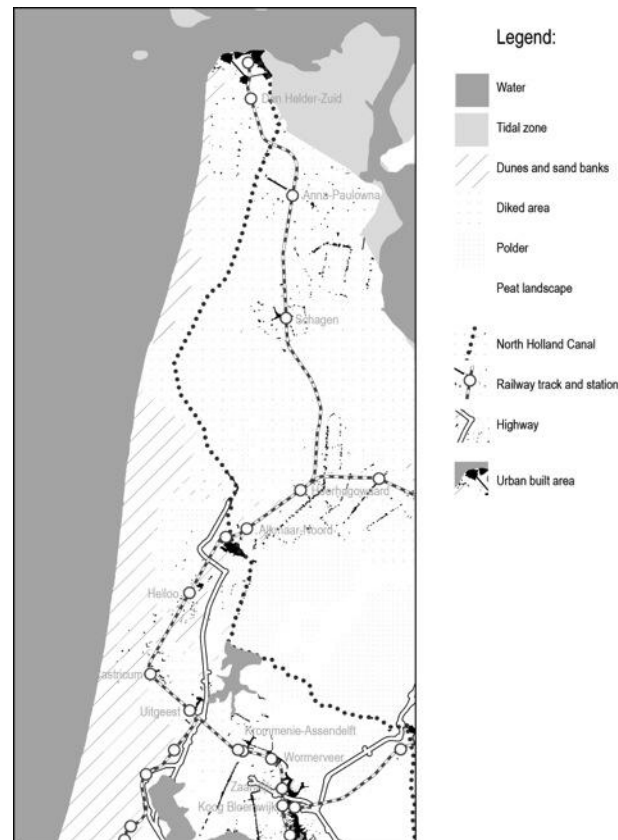


Figure 1. Landscapes and infrastructures in ‘Noord-Holland’.

Instead of using the predictive values now, in the ‘Vlinder’ model the desired direction of development is stated with the existing values as a starting point. How this goal is to be achieved is not elaborated, but it is suggested that a certain percentage of 50% of the future extensions should be within the railway locations and that this could be realised through a restrictive directing policy. The partially liberal oriented provincial Parliament endorses the aim for the 50% but the method of restrictive intervening policies is not accepted, it proposes a more detailed study on the matter. This research aims to identify the key factors in urban change in relation to proximity to transit for understanding the processes involved to develop possible grip on the matter. What are the driving forces in allocation of new development en how does this relate to the Transit locations. By mapping the area historically since the commencement of transit and through spatial analyses the critical changes are identified for *TOD*. The processes underlying these critical changes will be studied and placed in their context. It is of interest to illuminate the dynamics in allocation towards the transit locations. The province now concentrates its policy on a section of the railway line Amsterdam to Den Helder. This part of the line is subject to the ‘Program High Frequency Rail Transport, which entails an increase in frequency. This line is the subject of this paper. For this study the most central locations, which themselves are centralities are excluded. The locations of Den Helder, Alkmaar and Zaandam are therefore not taken into account. Per location the urban developments are analysed relative to the transit location to indicate the dynamics of the development processes.

Historical development of the Railway line

The line, line 'K' was built between 1862 and 1869 by State initiative to make the Military Port of Den Helder better connected in winter times. In the context of the policy of King William I to perpetuate to Netherlands as a nation. In the first plan for the trace of the line ran over the sand wall. There is a deviation in two parts, in both the North as in the South it is partially placed further eastwards. The factors involved in the Northern part were the polder reclamations of land, some of which were built on private investment and which had influence stakeholders. These were able to influence the course of the track. (van Giffen, 2006), a number of places in the area of Kop van Noord-Holland got a railway station for this reason: Anna Paulowna, Schagen, Heerhugowaard. In addition on a more local level factors as suitability of the surface and the possibilities on acquiring the necessary land play, this last aspect was involved in the realignment in the South.

The railway is opened in parts between 1867 en 1869 with 14 stations and 8 stops in the early stages. (Jonckers Nieboer, 1938). In the 1920s in public transport the bus rose and years of heavy losses for the railways followed, as a strategy to overcome this the railway company focussed on longer distance transport (Cavallo, 2007) this led in the area to the closing of 7 stops and 1 station. (Jonckers Nieboer, 1938). The places that already had a certain volume and or that by the arrival of the track had come to fruition stayed open those with lesser size were closed.

As a result of the large-scale developments in the area due to the postwar spatial policies the coverage on the line scattered from 38.5% in 1970, to 23% in 2010. The coverage is the percentage of inhabitants in a municipality that lives in a railway location. This is calculated with data from the report '22 stationslocaties Noorderkwartier in Kaart' (Engel, 2011). Already in the late 1960s it became clear the coverage was decreasing. and policies started to develop to link stations to extensions. In the 80 's a policy started to opened stations on areas that happen to be besides the railway track. (Cavallo, 2007).

Analyses on the developments on the Railway locations

In this paper per location the urban developments are analysed relative to the railway location and it is indicated what were the logics. For this the historical Topographical (Military) Maps of the area that go back until the middle of the 19th century are studied and the developments are mapped. The resulting maps show the developments in periods corresponding to typo morphological characteristics. The periods are: up to 1850, 1850-1910, 1910-1940, 1940-1970, 1970-2000, 2000-2010 (Engel, 2005). In this article the locations are grouped by type of landscape they are situated in; the Northern Coastal landscape, the landscape of sand banks parallel to the coast, the peat landscape with the Zaan. (Figure 1).

The 'Kop van Noord-Holland' area, coastal landscape

At the construction of the track between 1862 and 1867 the rail and the station were established between the settlement of Den Helder (1) and the eastern thereof located Military Warf (2). By its unique position as outpost on the sea the harbour of Den Helder has acquired the status of main Military Warf. A fortification was situated around Den Helder and the Warf. In the period after the construction of the track to 1910 there is only growth around the yard, in a strip of 700 meters around it (3). The station is located in this area therefor spatial developments and transit were linked. The yard got a growing number of activities assigned from national governments. By 1940 the whole area within the fortifications was build up. In the period after WWII new locations outside the fortifications were built in the 'satellite' quarters 'Nieuw Den Helder' (4),

and 'de Schooten' (5). A 'finger structure' of green areas between the satellites comes to the fore. After 1970, the district of Julianadorp is built remotely. In the 80 's from the policy of the railway company of opening stations to the recently expanded areas, at the quarter situated east of the railway track 'de Schooten', the station of Den Helder-Zuid was opened. By its peripheral situation and the halting growth of the Warf, the area is faced with a low demand for building production. Starting from early 80 's at the vacant East side of the track, an artist established a sculpture park and more recently in connection a nature reserve is developed (6), both in the green zone and both with spatial permanence. Further on the East on quite some distance (0.5 km) a business park 'Dogger-Dirksz Admiraal' (7) is developed. The district of 'de Schooten' is well disclosed, but the location itself is only half utilized.



Figure 2. Railway location Den Helder-Zuid.

The Anna Paulowna polder, in which the station is located, was between 1845-1847 reclaimed through private funding. The goal was to acquire agricultural land for exploitation in the sea mouth of the Zijpepolder. (bron) In 1865 the railway track between Den Helder and Alkmaar was inaugurated and the station was Anna Paulowna was opened, as described above it had a political cause. (Haarlem) The station was situated between the two settlements present within the polder; the core of 'Kleine Sluis' (1) and the hamlet 'Gelderse buurt' (2). 'Kleine Sluis' stemmed from the former harbour in the sea mouth of the Zijpe polder. The developments from the opening to 1910 take place at the railway station location towards 'Kleine Sluis' but merely around core of 'Kleine Sluis'. in the period between the two world wars, there are almost no developments in and around the cores but especially in the polder itself around Breezand (3). By the emergence of bulb cultivation from South of Holland, the land was suitable and cheap. For this reason the Stop of Breezand is opened in 1914, it is closed in 1938 when the railway company focusses on transport at longer distances. The post-war developments are only around 'Kleine Sluis', outside of the railway location, first the district 'Nieuwe Sluis' and subsequently around it 'de Elshof' (4). This development arrived now at the railway location. Since 2000, there are also developments West of the track in the form of business park 'Kruiswijk' (5). The combination of centrality of functions and the good car connection in the N249 road at 'Kleine Sluis' is stronger for attracting developments than that of the transit location with less further functions. The area is peripheral and has a low density, the car is the ideal means of transport.



Figure 3. Railway location Anna Paulowna.

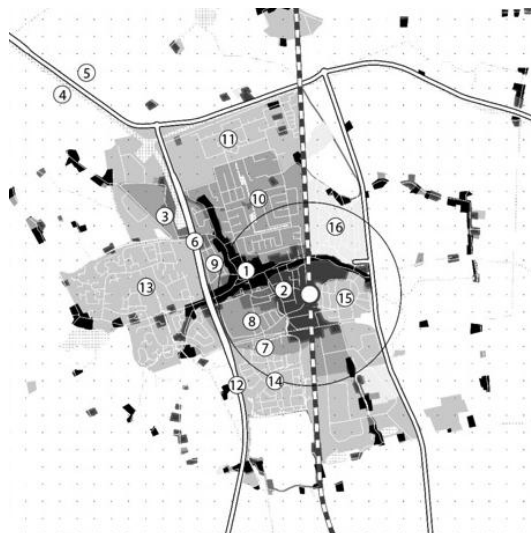


Figure 4. Railway location Schagen.

The station opens in 1865 and is located east of the core of Schagen (1) that is at the junction of three roads. Schagen is situated within the Westfriese Ommeringdijk, an area that has been protected from the sea as early as since the 11th century. To 1940 the development is mainly between the station and the existing core (2). In 1937, the port of Schagen (3) with the canal 'Stolpen-Schagen' (4) is yielded with the purpose to give access to the North Holland Canal. The harbour was politically very desired, but quickly proved an outdated means of transport. (BRON) This project also includes the road connection on the N9 (5) in the direction of the main cities in the area; Den Helder and Alkmaar and the construction of the local roads 'Westerweg' (6) and 'Zuiderweg' (7). Until 1960, the spatial developments are largely focused on the station area (Koningshuisbuurt) (8), but also close to the newly established car connection (Ambachtenbuurt) (9). Schagen most grown between 1970 and 1980; from 7,310 to 16,761 residents. In the years to 1970 the extensions are mainly outside the station location, in the North in Nesdijk (10) and Groeneweg (11), due to the good car accessibility, while at the same time sites closer to the station site were available. In the beginning of the 80's remotely from the station the most Northern part of Groeneweg is finished. In 1977 on the southern side

of the village a road connecting with Alkmaar N245 (12) is established, consequently the district of Waldervaart (13) is developed, with a focus on automobile transport system and outside the station location. The area to the east of the track all this time for housing untouched. Only in the 80's, as a consciousness of mobility problems arises, the development closer to the station starts with the district 'Muggenburg' (14) and mid 90's 'de Hoep-Zuid' (15) located directly at the train station. After 2000 and end in 2010, the district 'Hoep-Noord' (16) is developed.

The 'Kennemerland' area, landscape of sand walls

Heerhugowaard originates from the 17th century by reclamation of the Lake on private initiative. The structure of the polder is with a middle road and in parallel two main canals. Regents of Alkmaar had to grant permission for the project to be executed. Around 1850 the built area is along the South-North connection routes, mainly on the Middenweg (1). The track is placed parallel to the West side of the Middenweg, it runs through new share and the course is adapted to the possibility of exploiting the parcel boundaries. The station is placed at the point where connection was to Broek op Langedijk, a village with an important auction. At the same time a road from the station to the Middenweg, nowadays the Stationsweg (2), is created. In the period after 1865 to 1910, the only development is along the existing roads. Between 1910 and 1940 the Stationsweg gets occupied. There is a tremendous growth between 1940 and 2000, from 5.315 to 44.248 inhabitants, as a result of the growth poles to policy. After 1960 the huge urbanisation starts and Structural plans are made to accommodate this. A facilities core is appointed at Veenweg (3). In the plan of 1968, de Ooster (4) en Westertocht (5) are to be held as boundaries and there will be a new core shopping center on the South side Middelwaard (6). This is the new focal point of further development. From here further development will take place in the South (7). In the structure plan of 1981 the Strip South of the track is designated as zone for facilities clustering (Beveland) (8) and the station square (9) is developed, this should strengthen the position of Middelwaard as centrality. The developments at Heerhugowaard evolved around cores of facilities, at a later stage in the early 1980s the railway station area was involved in the plans. Because of the enormous population growth, build in low density around a nucleus of facilities, there has been an exceptionally low coverage of 9%.



Figure 5. Railway location Heerhugowaard.

Alkmaar begins to grow significantly in the 1950s whereas it is designated as overflow area and growth core for Amsterdam. Between 1940 and 2000 its population grows from 33.837 to

92.836 inhabitants. Caused by national policies to relieve the pressure on the Randstad Alkmaar gets the task to accommodate a huge population growth. The required developments will be related to car infrastructure which is simultaneously developed. Between 1940 and 70 the extensions take place around the existing city and are to the car bypass 'de Ommering' (1) (De Hoef (2), Overdie (3), Veiling (4), Industrierrein (5), Oudorp Oost (6) en Oudorp West.) (7) between 1970 and 1980 On the north side mainly related to the then delivered N245 road to Schagen (8) and N242 to Heerhugowaard (9). quarters of Bergermeer (10), Huiswaard I (11), de Horn (12) en 't Rak (13). In 1980 the railway companies policies were was to open railway stations to newly delivered districts, in Alkmaar in this context the station 'Alkmaar-Noord' is opened. It is situated next to the then western of the track neighbourhood 'Huiswaard II' (14) which was just completed. Both spatial developments are not very related to each other. On the East side of the station a sports complex, the North Holland Canal and a park 'Oudorperhout' (15) are situated. Half of the railway location consists of uninhabited area. The area of Alkmaar is almost completely related to car infrastructure infrastructure and has a very low coverage of 18% in 2010.

In 1850 the area of the railway location of Heiloo consists of the two cores of Oekdom (1) and the more important Heiloo (2) a core with some facilities. By its situation on a relatively narrow sand wall Heiloo has a parallel North-South road structure, the Kennemerstraatweg (3) was an important connection between the major cities of Haarlem and Alkmaar in the area and paved. The railway station (1867) was situated at Oekdom to facilitate the local horticulture. After the advent of the tramline Haarlem Alkmaar over the Kennemerstraatweg, Heiloo became a commuter village for rentiers of the region of Alkmaar. It had in the area a particular forested area on sand wall. The spatial developments until 1910 occur on the exiting road structure. In the period to 1940 the main developments are between the two cores. The areas within the road structure between the centrality of Heiloo and the station (4) are completely filled in. Subsequently in Heiloo's period of main growth; from 1950 to 1960 the rest of area in the railway location, within the road structure (5) is build. Thus, in 1960 the railway location is almost filled and it begins to build the first areas outside. It starts outside of the railway location around the core of Heiloo with plan East (6), and in the middle 60's on the other side of Heiloo; Egelshoek (7). Afterwards the developments are directly outside the stations location with plan West (8) and in the 80's that of 'het Die' (9). Heiloo does not have its own exit on the A9 highway, in the new appointments in the 'Program New Sand Wall' (plan Zuiderloo) evolves around this. The location of the plan South of Heiloo is perfect for a new railway location but with the focus on the missing linkt to the highway there are no plans for this. Additionally impacts the paradox that by the 'PHS' more stops are more difficult to realize. (Maakplaats, 2013).

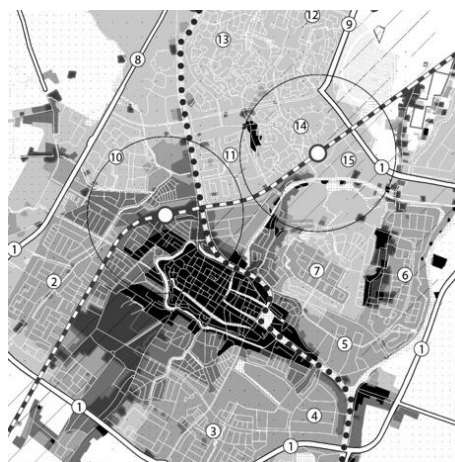


Figure 6. Railway location Alkmaar-Noord.

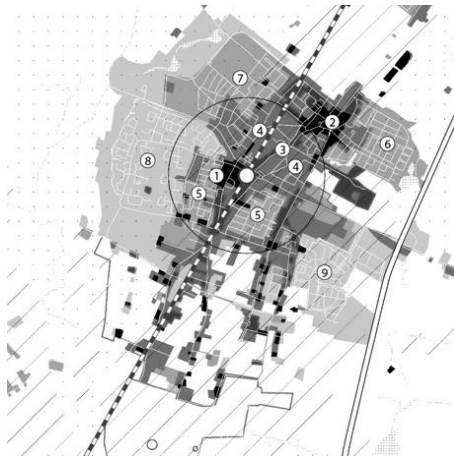


Figure 7. Railway location Heiloo.

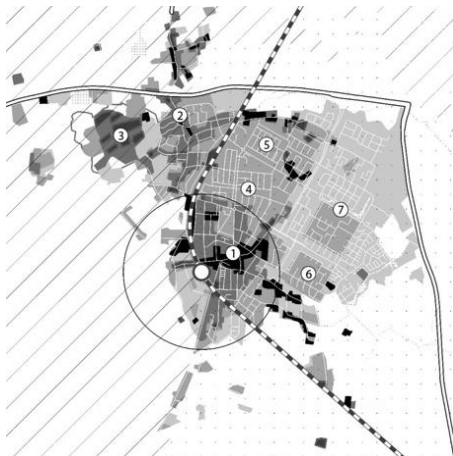


Figure 8: Railway location Castricum.

Castricum developed at the Kennemerstraatweg (1) (the connecting road from Alkmaar to Haarlem) at a small church. Buildings around this church with square the core of Castricum in 1850. The railway track is to on the West side of Castricum and makes a turn and is situated east along the other core of Bakkum (2). The railway station is placed at the curve in the track at the core of Castricum. Until 1910 there are almost no spatial developments, except at the psychiatric hospital Duin en Bosch (3) at Bakkum, which are entirely outside of the railway location. From 1910 to 1940, the population increased from 2813 to 8412. The urban extensions are primarily at Duin en Bosch and around the core of Castricum the latter is in the location. In the period after 1950 the both cores extend and further on with the Oranjebuurt (4) and Zeeheldenbuurt (5) the cores grow to each other.

The earlier developments in Duin en Bosch have influence on the further development in this period, the extensions are situated between the two cores. Proximity of existing urban territory is important for the allocation of new buildings in this period. Afterwards to the East a development starts of Molendijk (6) en Noordeind (7) which is not linked to existing territory these are completed in the early 80 's. West of the track almost no developments are taking place. When in the 1990s in general the development of building on 'the other side of the track' starts in Castricum this side with its particular landscape protected by law. By this not to be occupied area and by the developments around Bosch en Duin the site has the low coverage of

15% in 2010. Opening a station at Bakkum could improve this, there in an earlier period both sides of the track were built.

In 1850 Uitgeest was a ribbon (1) composed of the Middelweg and here directly parallel to Westergeest, with a core at the junction with the road to Castricum. The village lies on a sand wall. At Uitgeest two railway lines join, from the Zaan area and from Haarlem. The station is placed where they are joined and tracks are placed on the southernmost point of the Ribbon on a firm distance of 1 km. The station is located east of the Ribbon, Western would not have fitted in connection with the Assumervaart. (2) Until 1910 the building expansion only took place at the main core which is outside of the railway location. Afterwards the Hogeweg (3) is constructed up to 1940 the build finds place here. Also there is some ribbon development South of the station. Both developments are mainly in the railway location. In the early 1960s the start of with industrial estate Dorregeest (4) North of the old core. It is situated close to the Uitgeestermeer and the A9 motorway. This area continuous to develop until now completely outside the railway location but with excellent connections. Around 1960 the Geesterweg (5) was laid out right in front of the station, West of Hogeweg in the 10 years until 1971 the area around this road is built related to the railway location. The location to the North of the track becomes completely filled in and the following development is North of the location in the southern part of the district 'de Koog' (6) early 80 's the whole area of 'de Koog' is completed, largely outside the railway location. To the early 90 's the mainly building activities are on the 'other' side of the track, the beginning of the quarter 'de Kleis' (7), this is related to the rail. The great distance at which the station was placed to the original core of Uitgeest and the late crossing over the track in the South is to large part of extentions outside of the railway location.



Figure 9: Railway location Uitgeest.

Railway locations in the peat landscape of the Zaan area

The track is placed immediately south of the ribbon of Krommenie in the middle of the peat landscape. The center of Krommenie (1) is situated north of the station on the border of the railway location. It is situated at the crossing road to Uitgeest and the one to Wormerveer. The station is immediately West of the Ribbon, as on the East side is the Nauernasche Vaart (2), an important access for Krommenie. In the period up to 1910 extensions in particular find place at the core towards the Nauernasche Vaart this concerns housing and industry, further expansion from this development along the Canal continue in all the periods to follow, manly industry. From the first to the second world war the further building is mainly around the core and also a bit on the road directly opposite the station (Stationsweg) (3) which is constructed and building at the ribbon southward. Between 1950 and 1960, the area around the Stationsweg is built up to

the Fortuinlaan (4). There is also some small development South of the track, east of the ribbon. These developments are related to the station. In 1960 the new area to be built comes to lie entirely outside the location with Rosarium (5) which is the Northwest. The areas of Noorderham (6) and Zuiderham (7) follow and are completed in the late 1960s. Only as of 2005 the extensions continue with locations south of the track in Saendelft (8). Between 2006 and 2008 the station is replaced 400 m to the West. The link with the existing core is completely lost and the location is now connected to Zuiderham, the field of Fortune Avenue and the new district Saendelft South of the track.

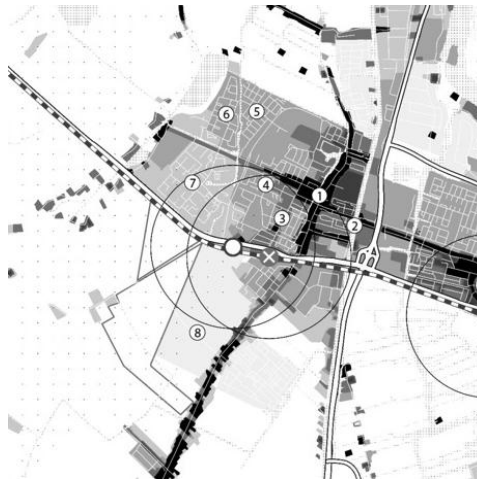


Figure 10: Railway location Krommenie-Assendelft.

Railway locations along the Zaan; the Railway locations of Wormerveer, Zaandijk and Koogbloemwijk

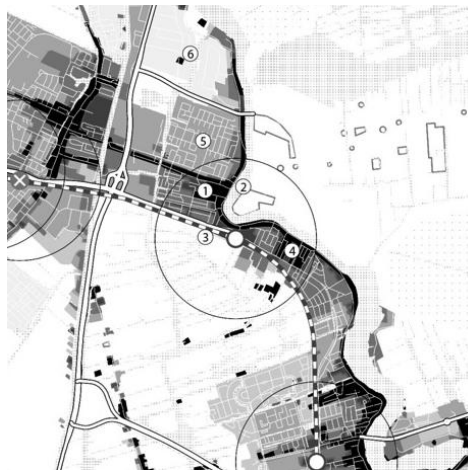


Figure 11. Railway location Wormerveer.

Around 1850 the build in the area lies mainly on the dyke along the Zaan, line-shaped and stretched out, some distance away parallel the track is constructed. On a number of places in the ribbon there are concentrations in development.

The station (A) is located South to the core of Wormerveer (1), which is at the junction with the dyke at the Zaan (2), the road to Krommenie and the ferry to Wormer. The station is located east of the 'Karnemelkssloot' (3), a water connection to the peat landscape of Westzaan. Until 1910 in particular the surroundings of the station and concentration of warehouses (4) on the

Zaan further East are built. To 1940 almost the entire area between the track and the existing buildings is taken, everything in reach or transit. Starting in the mid-1950s, a stand-alone expansion to the North from Wormerveer in the Polder Westzaan which is completed in 1970 (5). This lies entirely outside the location. Only after 2010, the rest of Polder Westzaan constructed with industrial estate (6).



Figure 12. Railway location of Zaandijk and Koog Bloemwijk.

In the area of the railway location Zaandijk (1) and of Koog Bloemwijk (2) the concentrations at the dyke area at: Sluissloot (3) Zaandijk (4), the road to Westzaan (Guisweg) (5), Koog aan de Zaan (6) and at the Mallegatsloot (7). The station of Zaandijk (1869) is located between the Zaandijk and Koog aan de Zaan, exactly South of the Guisweg the connecting road to Westzaan forms. The station serves these three settlements. Until 1910 the building activities are at the Guisweg, the new road to the station and around the existing concentrations. In 1920 West of the track the quarter of Rooswijk (8) was developed parallel to the Guisweg. Until 1940, the area between the track and the Zaan became largely occupied. In 1931 the station of Koog Bloemwijk (2) was opened adjacent to a residential area (9). In the early 1960s from Rooswijk the district of Rooswijk (10) was started this development carries through to 2000. The driving force was the major at that time, it is the first major development West of the track. At the end of the seventies the station Koog Bloemwijk the district of Westerkoog (11) is developed.

Conclusion

Characteristics specific of the location in the field of spatial quality within the territory can cause spatial developments. Mobility provision through infrastructure has the same property. Especially between 1910 to 1940 the station has a rebounding effect for spatial development. Cores with facilities and centralities also have this feature, perhaps to a greater extent than the station. The developments begin here earlier and are larger. The locations where station and core are competitive show that a core with facilities exercises on developments more attraction than the station. By 1960 most railway locations are full and the areas outside it follow. While paradoxically the still undeveloped side of the rail often remains unoccupied. This phenomenon also confirms that the proximity of facilities and other built-up area are stronger than the station. After the beginning of the 60s the developments become more independent. The combination of centrality and mobility provision has a very strong rebounding operation for spatial development. If the distance between core and station is larger this has a negative impact on the

coverage. The trend of building outside of the location is intensified during the 1970s and 1980s. Simultaneously in the 1980s a development starts of opening of stations where rail is close to urban extensions, this shows a starting consciousness about the relationship transit and urban development. In the 90 's starting to occupy the unused side of the track. The shape of the station and its disclosure can affect the spatial development and level of orientation of the future urban territory to transit. The cases of Alkmaar, where a ring road forms the carrier of urban development and the Zaan area where the line shaped rail is the carrier of spatial development compared to show the structure of the infrastructure influences the relation transit to urban development.

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Managing the mark of the memory: a case study on the North Dublin Victorian fringe-belt

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Abstract. *The urban fabric can be regarded as a repository of human life that records past culture and includes historic-geographic changes that have physical manifestations, but that are also underpinned by processes, whether social, economic or political (Whitehand, 1977). Notwithstanding the fact that much of the urban fabric is worthy of conservation, research indicates a general paucity in understanding among planning authorities of urban morphology and the morphological nature of the city that results in weak or inadequate conservation planning policy and systems more focused on buildings and plots than their integral role in terms of urban form in larger urban tissues (Whitehand and Morton, 2004). As a pretext for demonstrating the nature of urban form as an organic whole comprising parts that are interrelated in form and historical process and the failure by decision makers to recognise and appreciate this, the northern intermediate fringe belt in Dublin City is taken as a case study. The study involved a morphological analysis of both the preceding Georgian city and the Victorian fringe belt, examining both the historical processes over the two centuries concerned and the resulting and contrasting urban form. To date, however, in the planning system in Dublin City Council, there is no recognition or appreciation and, thus, management of the intermediate fringe belt. Hence, this clearly identifiable urban tissue that bears witness to a significant period in Irish history is open to insensitive development, especially with concerted urban policies concerned with compaction and densification (Rudlin and Falk, 2009). The likely ensuing loss of significant parts of the urban fabric surely poses a major threat to our future cultural heritage as constituted by the city.*

Key Words: conservation, fringe-belt, Dublin, Georgian Era, Victorian Era, planning

Introduction

Urban Morphology – the solution for urban conservation planning

It has been recognised that planning policy concerning conservation tends to focus on buildings and their immediate settings and not on the city-wide scale (Jokilehto, 2010; Prunty, 2010; Whitehand, 2010a). But, clearly, concern for the historical integrity of the city as a whole must involve the city-wide scale perspective and its interrelated parts (Slater, 1984). Moreover, the problem of the weak relationship between research and practice is widely noticed as well as lack of cross-disciplinary awareness of relevant research (Whitehand, 2012). The consequences, whether potentially or actually, of the present approach is the damage or loss of significant parts of historical city fabric along with the resulting compromise of the associated historical record of city growth regarding form making. The likely ensuing loss of significant parts of the urban fabric surely poses a major threat to our future cultural heritage as constituted by the city

There is in Ireland, currently, an apparent failure among common decision-makers who determine planning to fully appreciate the city in terms of its morphological constitution that includes its historic-geographical significance and involves the study of urban form (Kealy and Simms, 2007).

Fringe Belts

The urban fabric, comprising parts of the city and their spatial relationships, changes and cities expand, so engendering a shifting periphery that becomes a repository of the urban

morphological history in regard to urban pattern and function and effectively recording the stages, physical and social nature and process of city growth. Typically an important integral component at a whole-city scale of such change is the urban fringe belt, whether inner, intermediate or outer. These belts not only demarcate particular eras and geographical regions of urban expansion, but also comprise a particular character type reflecting land use as well as socio-economic state. They are, therefore, culturally significant.

Morphological overview of Dublin: origins and growth

Dublin is the location of the case study of this paper and is used to demonstrate the limitations of current planning policies in regard to conservation at the urban scale. For this reason a brief overview of the origins and early growth of the city is provided here.

The origins of Dublin as an important settlement dates from the end of the 9th Century when the Vikings, spreading across the Irish Sea, first began to use the site as a base for their operations (Haughton, 1949). During the 10th and 11th Centuries, this settlement developed into one of the most important coastal trading station within the Viking trading-network (Simms, 2001).

In the late 12th Century, after the capture of Dublin by the Anglo-Normans, the town reduced in status from a semi-independent Viking kingdom to a medieval English borough under the Henry II. Only a few major medieval buildings have survived (Simms, 2001). The Anglo-Normans brought to Dublin a reliance on the institutions, which supported urban life. They also set about land reclamation, particularly on the southern bank of the River Liffey. The medieval street-pattern has survived to a greater extent, judging by depiction on the earliest surviving maps of Dublin: John Speed's map of 1610 and John Rocque's map of 1756 (Simms, 2001). During this period Dublin began to be dominated by squares and streets forming an urban coherent network of spaces and axes. The 19th Century, however, was marked by deep economic crises, which was reflected in the city fabric, particularly in respect of institutional urban fringe belt on the periphery of the Georgian city.

In the mid-19th Century the Dublin Corporation was established making the first step towards the creation of a single authority with comprehensive responsibilities. However, this body was not given the necessary resources and powers to be able to act effectively to respond to the difficulties that the city was experiencing, in particular the problem of slums between 1800-1925 that revolved around a number of key issues, such as tenement accommodation, overcrowding and moral degradation, the policing, control and relief of the poor by both state and charity organizations (Prunty, 1998). Improvements were characteristically piecemeal, without a broad based integrating mechanism or plan (Prunty, 1998).

The lack of cohesive plan for the city in the early 20th Century continues today at least regarding the historical heritage: 'Dublin must be one of the few European cities where the destruction of eighteen-century and earlier fabric is still accepted as a valid means of urban development' (McCullough, 2010: 28).

The adequacy of planning policy regarding urban conservation is clearly called into doubt in this statement. Rather, it can be deduced that there is an urgent need for a visionary and systematic planning and development approach. A case is made in this paper for an urban morphology-based conservation planning methodology that establishes an appreciation of the past as reflected in the present physical and social fabric and which, more pragmatically, provides tools for both analysis and decision-making for the future.

Case study: North Dublin intermediate fringe-belt

This section will review briefly the historical context of the original city wall with the adjacent extramural zone as the inner fringe belt and the ensuing urban growth up to the Georgian era of

the 18th Century and subsequent decline. The intermediate fringe belt starts to emerge from the late 18th Century and can best be recognized in juxtaposition to its surrounds and in the distinctive process of its formations. For this reason, urban development of the northern part of Dublin City during the booming Georgian and the recessionary Victorian periods, respectively, are paid similar attention. Moreover, given the strategic role played by the Wide Street Commissioners in the shaping of the city, particular attention will also be paid to decision making as recorded in minutes and how their work adapted to the troubled transition period of the end at the 18th Century and the early stage of the 19th Century.

Dublin's Early Fringe Belts: Inner & Intermediate

Inner Fringe Belt – instigated by the City Wall

The city wall was built to function as the primary system of defense. The wall had to ensure its own survival under attack. Generally, it was raised on rough terrain, seeking to maximize the advantages of natural features of defense (Kostof, 1991). Such is the case with the River Liffey in Dublin, which flowed along the northern edge of the city wall. The town plan of Dublin preserves many clues to its morphogenesis which, when analysed together with historic maps and other documentary sources, allows the reconstruction of the medieval street pattern (Prunty, 2010) as well as outer wall street systems. The map below (Figure 1) illustrates the overlap of the medieval Dublin from c. 840 to c. 1540 over a 1939 Ordnance Survey map.

Dublin's inner fringe was occupied by churches of religious orders with their associated lands and buildings, as well as institutions (Prunty, 2010). In the early 1600's migration of refugees fleeing from an economic slump caused by wars and harvest crises, clustered together in 'cottages' or shanties on the fringe area, so presented a serious threat to urban stability and order (Lennon, 2001).

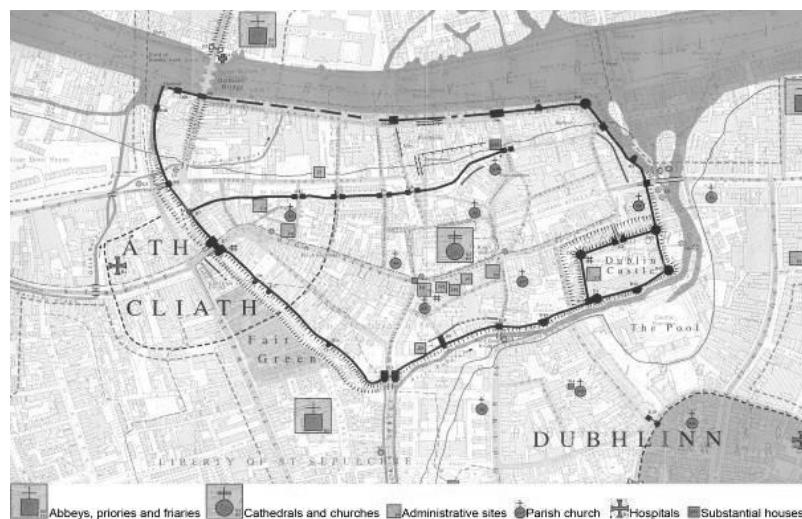


Figure 1. Extract of the Medieval Dublin (c. 840 to c. 1540) map over a 1939 OS map
 (Source: Dublin c.840 to c. 1540: the Medieval Town in the Modern City, Irish Historic Town Atlas, Clarke, 2002)



Figure 4. 1798 William Wilson map (Source: www.dublin1798.com).

Dublin Victorian/Intermediate Fringe Belt Formation

Due to fundamental political change in Ireland at the end of the 18th Century and the beginning of 19th Century, an economic slump occurred. This, in turn, brought urban expansion to a standstill with the consequence of the area at the edges of the city becoming open to institutional development. Hence, fringe belt formation began along the canals. With subsequent expansion this zone became embedded in the urban fabric so establishing an intermediate fringe belt.

Similar to the inner fringe belt, the intermediate belt is associated with fixation lines, in this instance comprising the canals. When compared with the inner fringe belt, however, our case study area tends to be less continuous in space, have fewer contiguous plots with more open ground and vegetation cover and a sparser street pattern (see Figure 5).

The map below (Figure 5) illustrates the approximate position of the original city wall and the intermediate urban fringe belt along and beyond the canals of the city of Dublin in 1948.

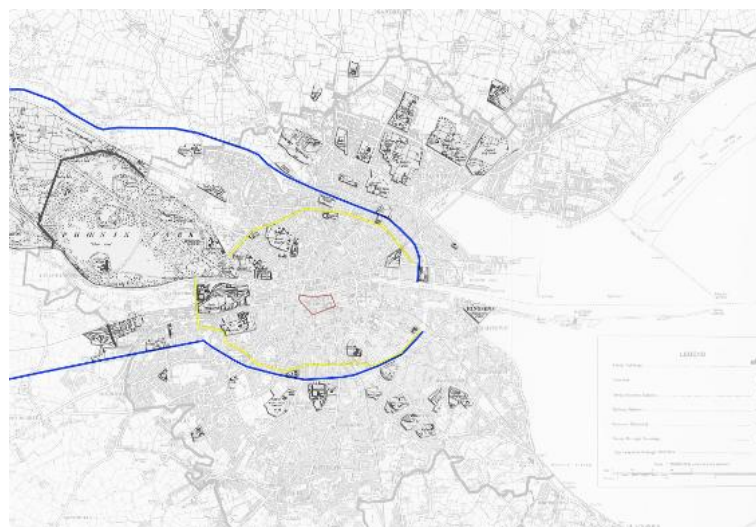


Figure 5. 1948 OS map highlighting the typical fringed belt plot uses (source: Richview Map Library) (blue line – Royal and Grand Canals; yellow line – North and South Circular Roads; red line – original location of city wall).

A more detailed map analysis later in this paper will focus on the intermediate fringe belt with its fixation line and surrounding use patterns, urban tissue, block and plot sizes. However, before examining this fringe belt in detail, it is necessary to understand what preceded it in terms of urban development and its cultural, economic and social context that generated the urban fabric of the 18th Century Georgian era.

Urban development in the North Georgian City as a coherent vision

The 17th Century occupation of Ireland by many who served in Oliver Cromwell's armies could only be achieved through massive confiscations of lands, with the existing freeholders being turned out and transplanted to other areas of Ireland or forced to emigrate. The settling of Ireland by these soldiers and the ensuing peace stimulated the economic development of the country and, so, a considerable level of prosperity was experienced. This was reflected by an increase in building activity throughout most of the country (Loeber, 1973).

The powerful agents of growth of the last quarter of the 18th Century are characterised by different factors. One is the free trade concession won by 1780, allowing the removal of foreign trade restriction. Another significant factor was the economic concessions granted to the Roman Catholics: as Catholics were excluded from politics and from many professions, commerce was their main occupation, which significantly increased the wealth of some. The concessions made in 1778 enabled these Catholics to speculate in buildings and lands and to participate in urban development (Burke, 1972).

Moreover, the independent status of the Irish parliament gained in 1782 made Dublin the place where functions that were previously performed by the House of Lords in London now devolved in the Irish House of Lords in Dublin. This growth determinant gave great prospects of a permanent resident legislature with growing administrative bodies, which, in turn, increased speculative investment in upper class residential buildings (Burke, 1972).

The 18th Century Georgian Dublin City growth pattern, notwithstanding the underlying rectilinear geometry, manifested a disparate structure caused by the power of those who owned parts of Dublin and reflecting a piecemeal individualisation of control as distinct from being based on a coherent overall vision that is determined by, say, a single mind or by the common good. Thus, development comprised speculative terrace housing on a patchwork of small independent land holdings (McCullough, 1989; Sheridan, 2001; Twomey, 2010). Notwithstanding, as explained by McCullough (1989), unity was attained, if not at the city scale, at least in regard to building architectural style materials and elevation classical proportions.

The 18th Century streetscape of Dublin was produced by private landlords who developed large tracts of land, the most noteworthy being the Gardiner family (later Barons and Viscounts Mountjoy) on the north-east side of the river, and the Viscounts Fitzwilliam of Merrion on the south-east. Common practice in street and square planning at the time involved the owner providing a plan of the plot-series layout as a guideline, each plot then being leased for development to architects, builders, speculators or private individuals whose buildings were controlled by clauses in those leases. From the second half of the century the control of such development became concentrated in one planning body – the Wide Street Commissioners who had the power of consent the approval for development or transformations of any part of the cityscape (Sheridan, 2001).

The part-to-whole relationship

The schematic axonometric of Mountjoy Square shown in Figure 3.6, illustrates the typomorphological hierarchy commonly found in Georgian Dublin. Starting at the larger level, this hierarchy comprises an urban tissue (from service lane through plots and square to opposing service lane); square and street/plot series, individual plots and buildings (main house to the

front with a front area, facing the street and square, and coach house to the rear facing a service lane) (McParland, 2010).

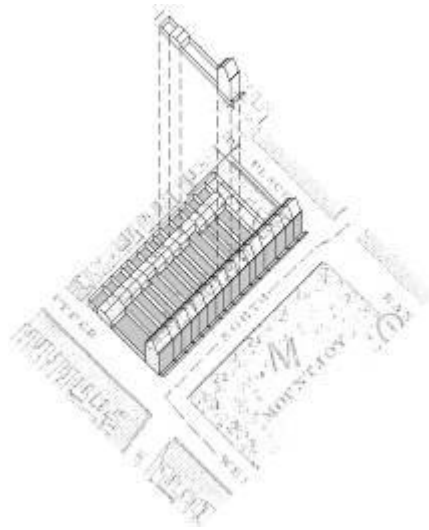


Figure 6. Part-to-whole: a plot within a plot serious on the north side of Mountjoy Square . (Source: Trinity Map Library).



Figure 7. 1875 OS map extract (not to scale). (Source: Trinity Map Library).

This analysis demonstrates the complex hierarchical interdependence of the different levels of which the urban fabric is comprised. It is clearly useful for morphological description but also, as we shall see later in this paper, as a powerful planning tool. As affirmed by Kropf (2001b), this methodological tool also provides a basis for urban character identification: ‘Whatever the element, an entire street or a single wall brick, the design of the element is a matter of both the objects that compose it and the relationship between them’ (Kropf, 2001b: 14).

The Wide Street Commissioners – the main decision makers of Dublin - Late 18th Century (aspirations/rise) to early 19th Century (decline).

In 1749 a parliamentary committee was appointed to find out the causes of traffic congestion on Essex Bridge, which was clearly blamed by the fact that there was no other easterly bridge to

serve the spreading city to the east. In 1757 the House of Commons appointed a committee to examine how best an avenue from that bridge to Dublin Castle might be opened. Eventually twenty-one Wide Street Commissioners (WSC) voted for making a wide and convenient way, street and passage from Essex Bridge to the Castle and subsequently received royal assent on 29 April 1758 (McParland, 1972, 1986). The 1757 Act and the 1758 royal assent empowered the commissioners to summon a jury to value the property needed to open a new street, this property was subsequently bought under their powers of compulsory purchase (McParland, 1972; Sheridan, 2001; Boyd, 2006).

During the first half of the 18th Century development in Dublin is marked by uncontrolled physical expansion and lack of continuity between the old centre and the new surrounding suburban area (Sheridan, 2001). The second half of the 18th Century is marked by a radical change characterized by a concerted drive towards an improved Dublin City, derived in part from Enlightenment principals of civic life expressed in new public buildings. This was realised most effectively in the work of the WSC and, in turn, caused changes in the social, economic, geographic and architectural realm of the city (McParland, 1986; McCullough, 2007).

WSC and the Royal Canal Company Affairs

By the last decade of the 18th Century, the Royal Canal and the Grand Canal together already encircled the city. The attention of the commissioners was pointed to the northern fringe of the city by the works required to the Royal Canal. Although the canals lay outside the circular road, they became part of the WSC jurisdiction after the 1792 Act, which extended their control half a mile beyond the circular road. The resulting encompassing of the city in effect delineated a metropolitan area and, thus, a metropolitan planning authority was created. Thus, for the first time, the development of Dublin could be said to be under the jurisdiction of a single unified authority (Burke, 1972; Fraser 1985; Sheridan, 2001): 'Read the Resolution of the 1st July 1791 relative to the expediency of having a correct Map of this City – and by an Act of this session the powers of this Board be extended for half a Mile beyond the Circular Road.' (WSC minutes book 10: 316).

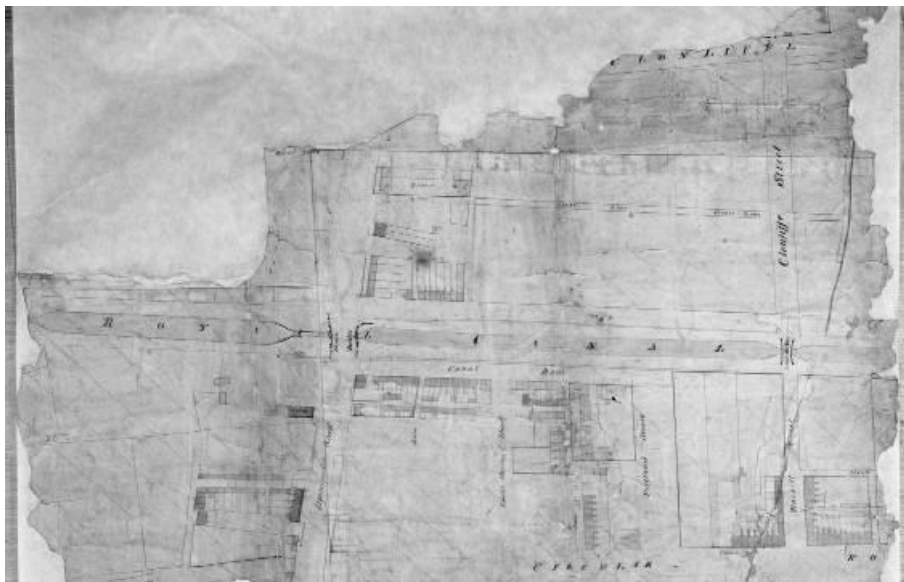


Figure 8. Map of the vicinity of the North Circular Road, showing Drumcondra Road, Binns Bridge (Source: Dublin City Library WSC/Maps/237, date not given).

The following year, on Friday 10th May 1793, (present Right Honorable Lord Mountjoy) the commissioners 'Approved and signed a Map of the Interior Bank of the Circular Royal Canal,

and a short Street leading from said Street called Dunn Street, said bank to be Fifty six feet Wide and the Street Forty feet in width.’ (WSC minutes book 11: 279) (See Figure 3.8)

The WSC’s decline

From the 1790’s money started to run short causing delays in the WSC’s projects and site development progress. As this last decade of the 18th Century passed, an economic and social downturn was becoming more and more imminent, in particular due to the disturbed state of the country with political unrest occasioned by the United Irish rebellion of 1798.

After 1800 complaints of acute shortages become common in the WSC’s minutes. The United Parliament, resulting from the 1801 Act of Union, showed an unwillingness to financially support the commissioners’ work and this duly caused the post-1800’s decline. At the start of the new century, Dublin became reduced to a mere provincial city instead of a capital, as was marked by the various incomplete WSC’s projects. Having been active for over one hundred years, the commission was finally dissolved in January 1851 (WSC minutes book 50: 108-9).

The historical context of the intermediate fringe belt formation

The city suffered severely in respect of its economy, politics and physical development as a consequence of these dramatic changes. Examples of the diminution of the city status made physically manifest are, as follows: whilst Mountjoy Square retained its status during the first half of the 19th Century, it then gradually deteriorated due to the influx of rural migrants escaping and trying to survive to the Great Famine; grand urban plans for the Royal Circus comprising monumental and luxurious residential buildings had not yet been realised and in 1800 there are no signs of it having even begun; and the Circus became the site of the Mater Hospital in 1853. Another significant institutional development during the 19th Century, close to the Mater Hospital, was Mountjoy Prison, built in 1850 (Burke, 1972). During the 19th Century, a limited amount of money was spent in private ostentation whilst more was spent on improvements on urban infrastructures and public facilities as well as on some social housing for the poor that dominated Irish history of the post-Famine era (McCullough, 2007).

Post-Union Dublin lost her resident gentry and peers due mainly the disbanding of the Parliament and the consequent economic slump. The Georgian property of the political and social elite was extended, reutilized and subdivided, especially in the case of larger mansions, most of which were transformed from residential use to institutional use (McCullough, 2007).

Historic context of the Royal Canal Construction

In 1715 an Act of Parliament was passed which proposed to make a considerable number of rivers navigable and to link them with a series of canals. In 1788 the Irish Parliament introduced a scheme to help finance private companies to build canals, make rivers navigable and improve ports and harbours. Under this scheme a series of new navigations emerged in Ireland (Clarke, 1992). Among them was a re-vamped version of the northern river-canal, the Royal Canal, a navigation proposed in 1755. The Royal Canal, completed in 1817, links the River Liffey in Dublin to the River Shannon at Cloondara in Co. Longford (Delany, 1992).

The Royal Canal as a fixation line to the Northern fringe belt

Looking at a Dublin City map from the beginning of the 19th Century, the line where Dublin City officially ended can be identified along the North Circular Road. This line was extended outwards to the canals by the mid-century. In fact, this is confirmed on a map of Dublin City produced in 1837 (Figure 3.9) where the municipal boundary is delineated (purple line)

following for the most part the line of the Royal Canal to the north and the Grand Canal to the south. Accordingly, the two canals provided a clear-cut administrative area.

However, a more complex and less clear-cut form emerges when one traces the real extent of the built-up urban area. The north side of the Liffey, from Arbour Hill to Phibsborough was dominated by open fields, interrupted only by development around Prussia Street and a complex of institutions around Grangegorman. It is not surprising that the streets bordering these institutions typically included low-value houses or cabins (Prunty, 2001).

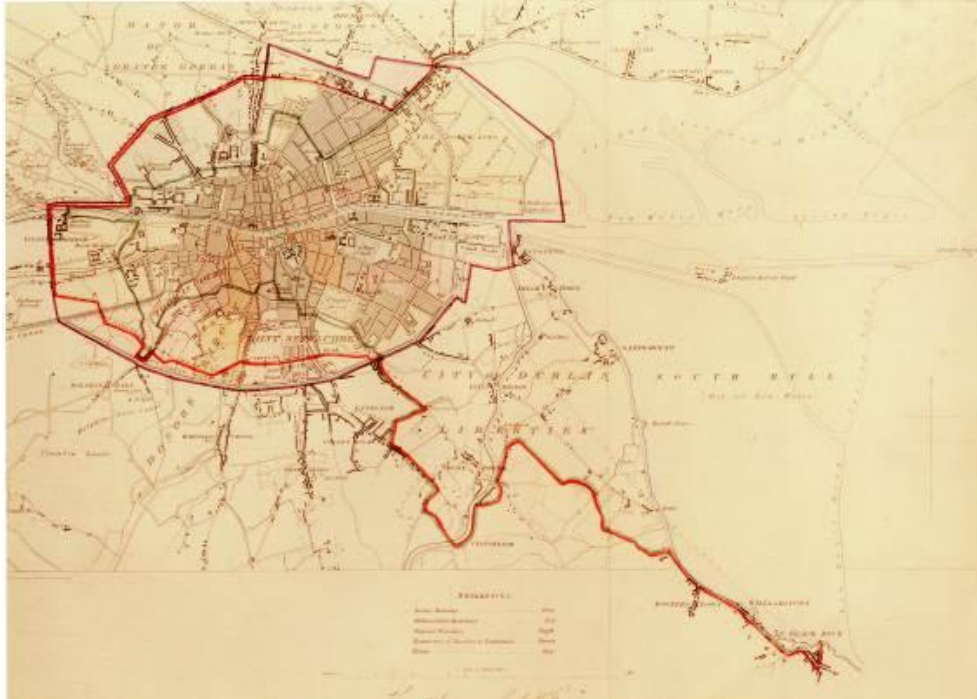


Figure 9. Map of the County of Dublin, 1837, by Thomas Larcom. Red line: Parliamentary boundary; Purple line: proposed boundary; Green line: ancient boundary (Source: Irish Historic Town Atlas).

Morphological development – the institutional fringe

The *History of the City of Dublin* two-volume book, written by Warburton, Whitelaw and Walsh in 1818, describes buildings and urban fabric of the city at the beginning of the 19th Century. A considerable part of the second volume is dedicated to several types of institutional buildings that are referred to in great detail. The location of those institutions tends to be at the edge of the city, thus gradually forming an institutional fringe as commonly emerges during an economic slump. There was a significant number of institutions along the North Circular Road outlined in the mentioned volume as follows:

1. Dublin Female Penitentiary was opened in the year 1813 and in the following year ‘was removed to a new and extensive building erected for the purpose on the North Circular-road.’ (Warburton, Whitelaw and Walsh, 1818; II: 775)
2. Asylum for old men in Russel-place was completed in 1812. ‘It stands on the south side of the Circular-road, near Mountjoy-square, in a pleasant and healthful situation’ (Warburton, Whitelaw and Walsh, 1818; II: 795-6)
3. Widow’s retreat: ‘... excellent institution was erected in 1815, at the sole expense of the Latouche family. ..., situated at the extremity of Dorset-street, in the open and healthy outlet of Drumcondra.’ (Warburton, Whitelaw and Walsh, 1818; II: 784)

4. Asylum for aged and infirm female servants: 'This institution was founded in 1809, ..., in the vicinity of the circular-road, in a situation healthy, cheerful and airy,' (Warburton, Whitelaw and Walsh, 1818; II: 790)

5. House of Refuge: established by a 'pious widow in humble circumstances ... engaged the concurrence of many opulent Catholics, and a spacious house was purchased in Stanhope-street, (Grange Gorman-lane), Forty females whose character and conduct entitle them to this protection, are here supported, and finally recommended to reputable services.' (Warburton, Whitelaw and Walsh, 1818; II: 793)

6. Female orphan house: 'In the year 1790, two ladies, Mrs. Ed. Tighe, and Mrs. Ch. Este, at their own private expence [sic], took a small old house in Prussia-street, and placed in it five female orphans. ... A subscription was opened the following year, which increased so fast that the present extensive building was erected, on the north Circular-road, The situation of the house is airy and healthy,' (Warburton, Whitelaw and Walsh, 1818; II: 849)

7. Newgate prison: this provides an example of a *fringe-belt translation*, that is, the transfer of a land-use unit from an older fringe belt to a more recent one. 'The old gaol in Corn-market (number 7.1 in the map below), called Newgate, from its having formerly been one of the city gates, being small, inconvenient, and from its ruinous state, insecure, it was determined to erect a new prison'. Later in the 18th Century building began 'in the Little Green, a piece of ground in the north part of the city, which was chosen, but we are sorry to add, very injudiciously, for its site, as it was not only insufficient in extent to admit of sufficient yards and other necessary accommodations for the different descriptions of prisoners usually confined in gaols, but environed by dirty streets, and in so low a situation as to render the construction of proper sewers to carry off its filth impracticable.' (Warburton, Whitelaw and Walsh, 1818; II: 1047)

8. Dublin penitentiary: 'The first stone of this large edifice was laid by the Duke of Richmond, in 1812, and it is proceeding rapidly to its completion. It is situated contiguous to the House of Industry, and presents its front to Grand Gorman-lane, which extends 700 feet.' (Warburton, Whitelaw and Walsh, 1818; II: 1061).

The institutions outlined above are mapped in Figure 3.10 below. The majority of these institutions are located along the North Circular Road, thus forming the north intermediate fringe belt.

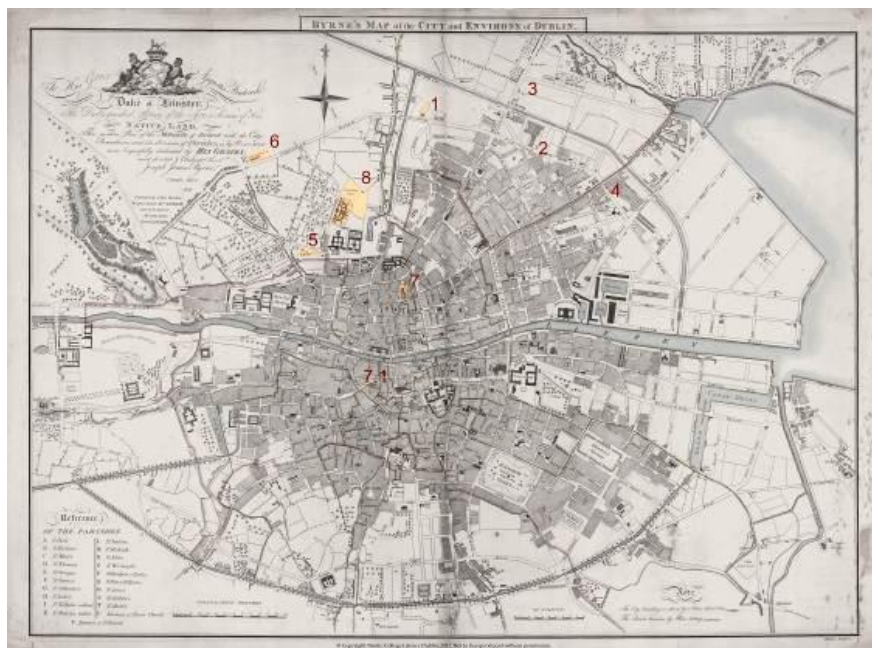


Figure 10. Byrne's Map of the City and Environs of Dublin, date 1819 (Source: Trinity Map Library).

From maps of north Dublin City dating after 1800 and throughout the 19th Century, there is little evidence of high-class residential development (Figure 11 and 12). Rather the predominant development type was that of institutional buildings, most notably, as previously mentioned, the Mater Hospital and Mountjoy Prison as well as the female penitentiary, asylum and orphanage.

The early 19th Century Dublin had inherited urban form and built fabric that varied immensely, reflecting its long and complex history. Street patterns had changed from the packed narrow lanes of the medieval city core to the orderly and uniform set pieces of the previous century landlord speculation on both sides of the river (Prunty, 2001).

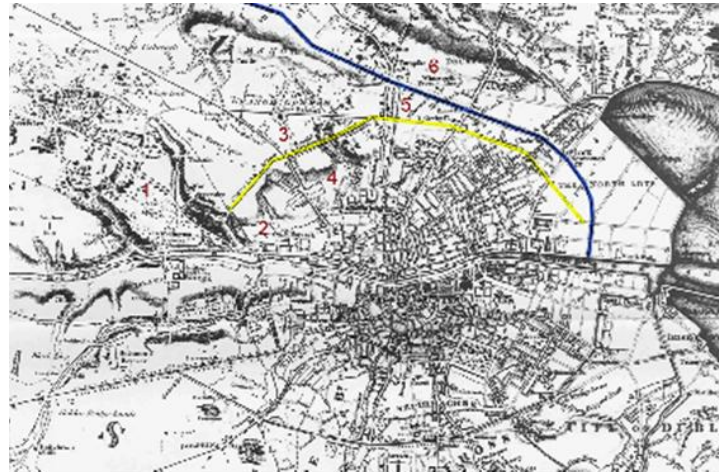


Figure 11. 1821 Duncan Map (Source: Richview map library) (blue line – Royal Canal; yellow line – North Circular Road; 1 Phoenix Park; 2 Military Hospital and Royal Barrack; 3 Female Orphanage; 4 Richmond Penitentiary; 5 Female Penitentiary; 6 Whitworth Fever Hospital).

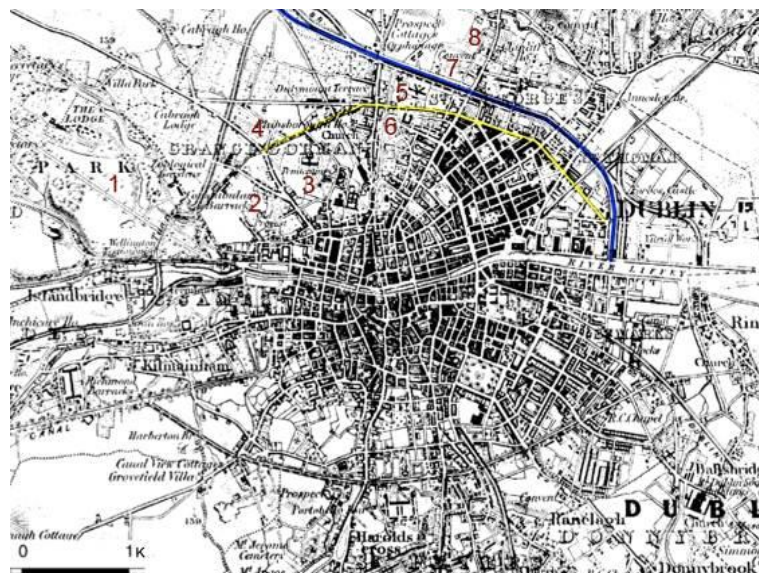


Figure 12. 1860 Ordnance Survey map (Source: Irish Historic Towns Atlas) (blue line – Royal Canal; yellow line – North Circular Road; 1 Phoenix Park; 2 Military Hospital and Royal Barrack; 3 Richmond Lunatic Asylum and Penitentiary; 4 Female Orphanage; 5 Mountjoy Prison and Female Penitentiary; 6 Mater Hospital; 7 Whitworth Fever Hospital; 8 St Alphonsus Convent).

Notwithstanding the complexity the fringe belt form noted above, a diagram is provided below (Figure 13), adapted from the famous JWR Whitehand's 'Fringe-Belt Model', demonstrating an interpretation of morphological urban expansion layers that reflects Irish history.

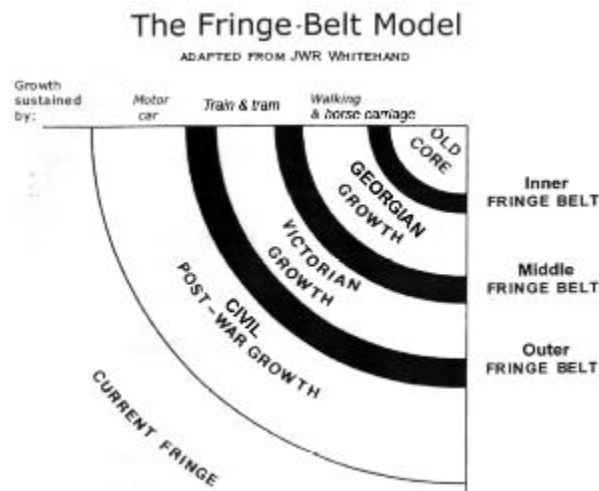


Figure 13. Irish version of JWR Whitehand's 'The Fringe Belt-Model'.

Manifestation of Institutional Expansion in Elevation

A study carried out by the 2009-2010 class taking the Masters in Urban and Building Conservation (MUBC) at University College Dublin (UCD), examining the north Georgian urban area of Dublin. This study included various street facades, one of which being the North Circular Road (Figure 14 and 15). In many instances plot series were mixed, with the original fringe belt pattern comprising relatively extensive plots with open spaces in between (Mater Hospital) facing more continuous compact lengths of terraced housing.

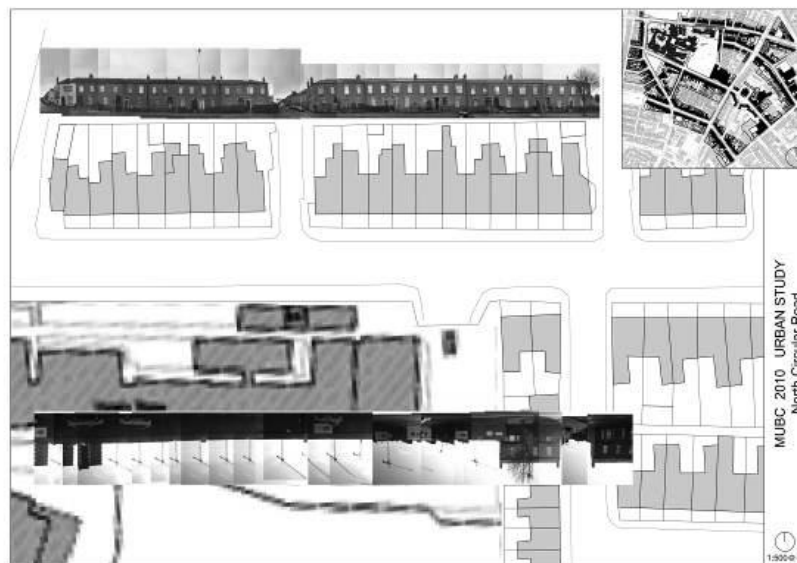


Figure 14. North Circular Road Street Façade (note the northern façade of terrace houses and the southern façade of both terrace houses and the Mater Hospital).

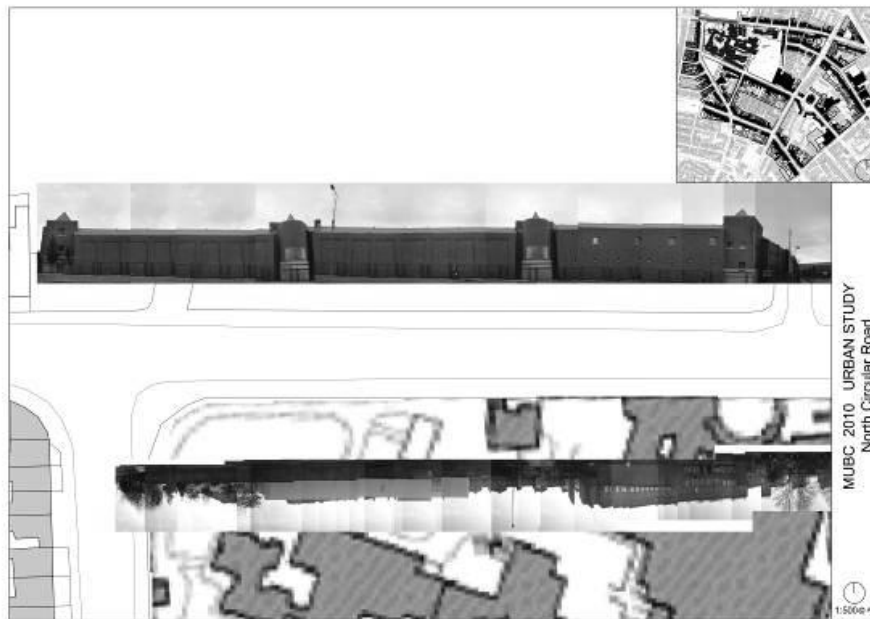


Figure 15. North Circular Road Street Façade (note the northern façade of the Mountjoy Prison and the southern façade of the Mater Hospital).

Urban morphology as a conservation tool - critical review of current and proposed Architectural Conservation Areas (ACAs) in Dublin

Looking at the current Dublin ACAs and the recently proposed ACAs, some points can be considered bearing in mind the Larkham and Morton (2011) study reflecting an overall lack of explicit consideration of morphological concepts of boundary-drawing.

One of the current ACAs is in the Thomas Street area, on the south side of the river. Figure 16 below identifies with red spots the protected structures within this area of the city and with a green line the boundary of the ACA. One can question why the south side of the boundary line outlined with a purple line, along The Coombe Road, was left outside the area given that it has similar morphological characteristics to the other side of The Coombe Road, as is clear from the photograph below (Figure 17). Again the street here is used as the boundary line, which surely makes little sense in terms of the actual constitution and coherence of the urban fabric concerned. Moreover, Cork Street, outlined in blue, is open to serious questioning regarding its design and location considering how it insensitively breaks historical and social links between the north and south of that street, namely the Liberties and Newmarket, respectively.

Boundary delimitations will continue to be an important activity of geographical urban morphologists and urban landscape managers due, not least, to the fact that urban areas undergo continuing change and, thus, require revision from time to time.

In any case, regarding boundary delineation, a thorough understanding of the historical and special structure of townscapes is a prerequisite for successful zoning and management of ACAs and, so, a thorough awareness of morphological regions is key to understanding the richness, community value and identity of the townscape of any particular urban area (Larkham, 1990). Only with such knowledge can the conservation challenge be scoped for present and future generations. Furthermore, such insight helps to identify areas at the urban scale worthy of conservation that comprise buildings and ground plan features that relate to each other historically and physically (Conzen, 1985). Conzen (1985) contends that ‘such ensembles form

the historically most appropriate units for conservation planning within the city' (Conzen, 1985: 75).

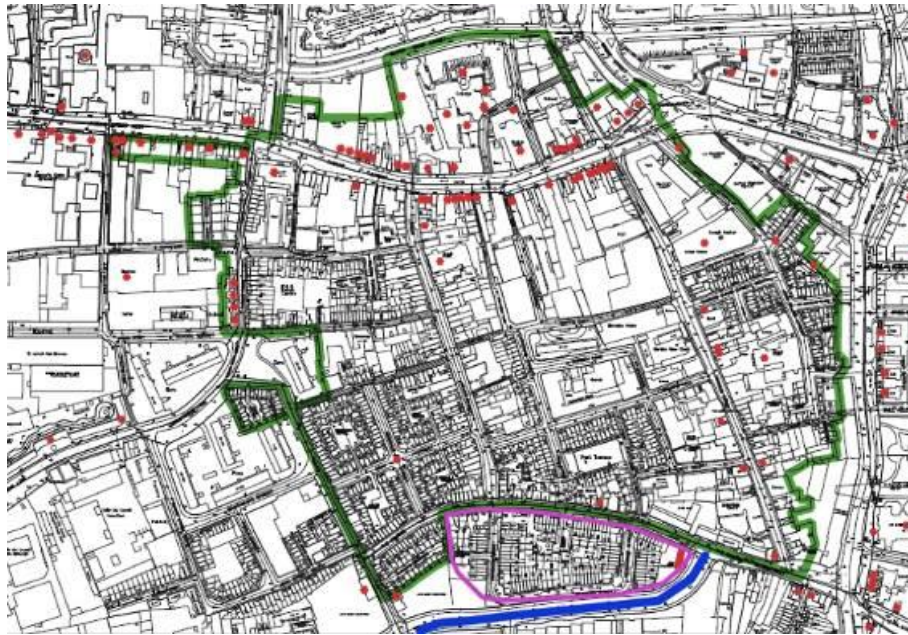


Figure 16. Thomas Street ACA map, boundary line in green, excluded area in purple, Cork Street in blue (Source: Dublin City Development Plan 2011-2017).



Figure 17. Photograph of the Coombe Road looking westwards.

Pressure for change

The lack of formal recognition and protection of fringe belts leaves them vulnerable to erosion and ultimate disappearance. Once a fringe belt is encompassed within the built up area rather than remaining on the urban periphery, it becomes subjected to most of the forces for change at work in any urban area which, in turn, depend in a large part on the existing character of the fringe belt regarding open space as well as the state of the economy regarding pressure for urban infill and densification. Within the compact city discussion, Rudlin and Falk (2009) described the fringe belt areas as an ill-defined space or as a 'shatter zone' where considerable capacity exists for new development. Yet, it is striking that, generally, fringe belts retain their distinctiveness long after they cease to be at the actual fringe of the city. Although their

character inevitably changes to some extent, they tend to remain distinctive from adjacent areas (Whitehand, 1967).

Management of the Dublin intermediate fringe belt

The Dublin case study, the north intermediate fringe belt, is currently the subject of redevelopment proposals in respect of such key plots as Mountjoy Prison, Mater Hospital and Grangegorman area (previous Richmond lunatic asylum and penitentiary). The current Local Area Plan for the Phibsborough Mountjoy is illustrated in Figure 18 below and from this it is evident that the boundary line of the plan is entirely unrelated to and ignores the actual structure of the fringe belt character.

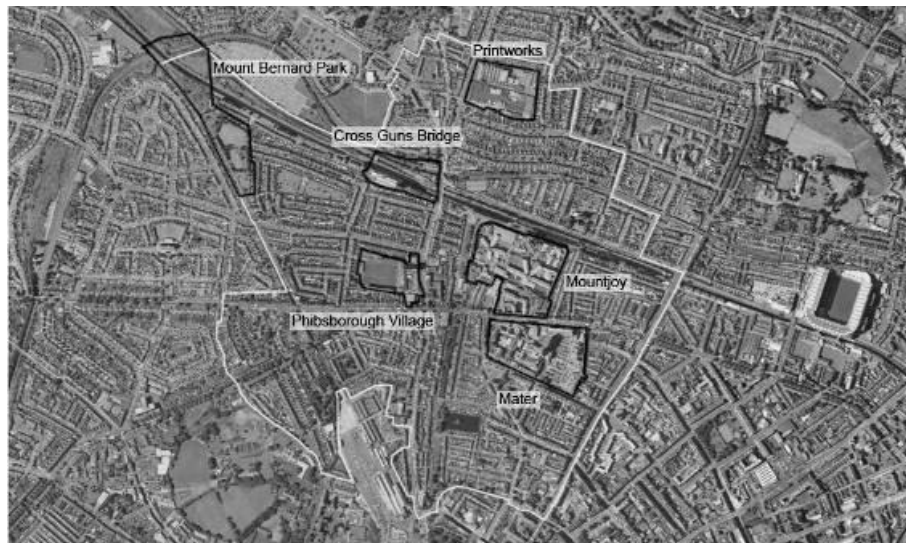


Figure 18. Phibsborough Mountjoy Local Area Plan and key development sites (Source: Dublin City Council Local Area Plan).

It is, however, worth noting that the essential site character of these fringe belt's plots is being retained. Thus, at least along this stretch of the fringe belt, the overall character is not under threat for the moment. Nevertheless, clear unambiguous recognition of the morphological character and its important historical development would provide an important critical basis for planning policy and mapping a vision that could guarantee for posterity more forthright conservation of the character as an integral part of the development of the area under study. The failure in planning to pay due attention to the urban fringe belt as an entity reflects the fact that decision-making has been almost entirely on a site-by-site basis instead of adopting a holistic view of the urban fabric.

Final Remarks

The town plan study of fringe belts, involving historic and geographical components of a city, reveals clear morphological patterns. For reasons of their cultural importance as well as embodying communal memory, these patterns must be recognized, appreciated and managed as urban historic documents.

Besides the morphological significance of fringe belts, they are worthy of conservation for cultural, scenic, ecological and recreational reasons. Moreover, they have the potential of providing a model for the structuring of urban expansion, mediating between historic and new urban fabric. It also might be noted that this morphological phenomenon can prove particularly

relevant conceptually in spatial planning given the current economic recession and consequent stagnation in urban growth. In other words, the past could well provide a model for the future, but for this to occur the urban fringe belt as a historical form type must be fully appreciated.

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New University Complexes as a force of shaping the urban form of the medium sized cities in contemporary Iran, a case study of Najaf Abad

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Abstract. Aim of this paper is to study the effect of the newly emerged factors in shaping a city in Iran. In recent years, with the huge increase in number of the students and the wave of building of new universities across the country, in many medium-sized cities, the main element forming the city changed drastically to the university complexes and other buildings related to them. In this paper, initially, there would be a short description of growth of the urban tissue in the city which has been used as a case study, together with a description of the influence of its historical background in the development of historical tissue. Then the statistical and demographic study of the city will be carried out in order to show the trend of urbanization in the city. A summary of the results will prove that by building the university a sudden increase in the rate of city's growth and area has been started, also due to the price change in some neighborhoods of the city, this growth is much more than the others. It would be shown that the general number of stories of the city buildings and the area of the housing has also changed to make the buildings more profitable to rent, as a huge renting population is added to the city. In general, the city's face has changed from a traditional working-class residential city, to a so-called dormitory-city.

Key Words: factors of growth, change of the urban tissue, medium towns, accelerated growth, dormitory city

Introduction

Najaf Abad is a city in the center of Iran in Isfahan Province, 25 kilometers to the west of the city of Isfahan, which is the 3rd largest city and traditionally most important cultural center of Iran. (Fig-1) Being this close to a very big City like Isfahan, has made Najaf Abad always being overshadowed during four centuries since its foundation in many ways and not least, the study of its urban issue.

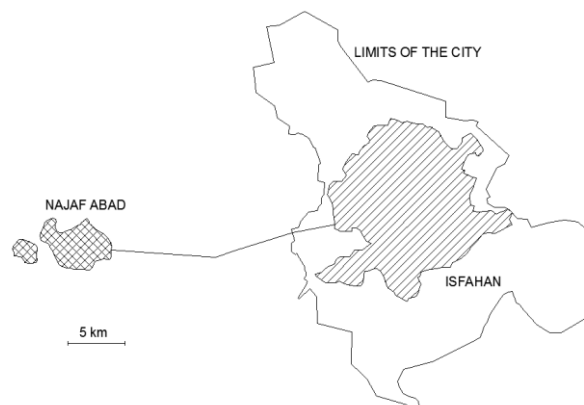


Figure 1. Najaf Abad and its Neighbour, Isfahan

Nevertheless, The urban tissue of this city is a very unique one in Iran, as it is the first city that was built from scratch, as a city and is not outcome of a natural or organic development of a rural area, and the first example of many satellite cities all around Iran, and then a possible role model for many of them. Of many elements affecting the growth and form of a city, one of the most influential ones is the population, as discussed by *Longley et al.(1991)*. The most recent change in population of this city was caused by building a huge branch of IAU (Islamic Azad University) with around 25'000 students which not only changed the city's population as a sheer number, changed the population's desires, needs and requirements and thus changed the lifestyle of at least a portion of the population of the city.

The aim of this Paper is to show the effect of these changes on the urban form of the city of Najaf Abad. The method to do this study would be to investigate the essential urban form parameters in the city in order to attain a better knowledge of the structure of the city, study of its size and population growth, together with the study of the parameters like the city shape in different scales-starting from Macro scale- different densities in different zones, different rate of growth, and finally visiting the city in order to obtain some visual evidences.

Historical Growth and background of city

The city was founded in 1613 by the direct edict of the Safavid court, with some administrative objectives, which the most important one of them was to establish a settlement in the west of the capital to give the region more security and stability. In order to do this and as the city lies in a dry valley, they had to transfer water there. As a very unusual move, it had very unique consequences, and one of these was the very unusual form of the urban issue. As *Bonine(1979)* describes, there are very few variations in the general forms of the city blocks in Iran as they are usually influenced by the same factors everywhere. He suggests that a very influencing factor, particularly in the regions with few water resources is the city's water network shape, specially underground water network (Qanat). In this case as the water had to be brought from somewhere else and the watering network could have been designed in any desired form, it wasn't a factor at all. This effect of water on shaping the city is further emphasized by *Spooner(1974)*.

The fact that due to the lack of water in place there was no rural settlement, plus a flat topography and the Safavid urban preferences was the reason of a very regular plan for the city with a big square which is very characteristic to that period. This center and the general macroform of the city in its three phases of growth are shown in Figure 2.

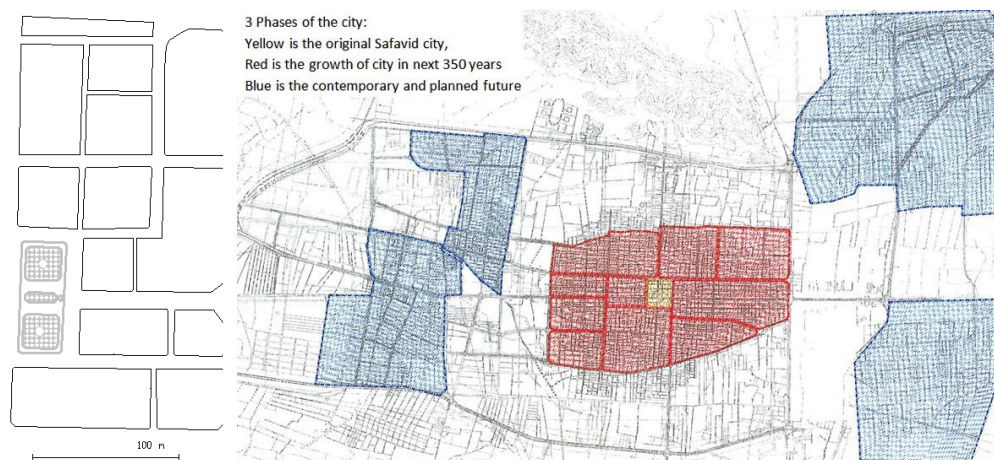


Figure 2. Safavid city center of Najaf Abad, a regular Cartesian tissue and city's development phases.

It is very obvious that this is very different with the usual perception of an Islamic city which is usually described in his way: "irregularity and anarchy seem to be the most striking qualities of Islamic cities", (*de Planho, recited by Bonine, 1979*) or "the organic, irregular plan . . . is universal in the Muslim world, . . . Muslim towns grew so spontaneously and haphazardly as to prevent the development of a systematic street pattern." (*English, recited by Bonine, 1979*). Later the government decided to build the arms factory of the Safavid army there and thus moved the workers and their families there too, therefore increasing the population.

The city has been always in strong and direct relation with its bigger neighbor, Isfahan, If Isfahan was in a prosperous period so prospered Najaf Abad and in the times of decline of Isfahan, it was on the decline too.

In the years after its foundation until the middle of the previous century, Najaf Abad had grown on the basis of an agricultural economy, with a somehow steady and slow growth, at 1950 the process of Industrialization of the region started, causing a rise in the influx of the immigrants to the city and thus making the growth more rapid.

Contemporary Growth of the city

Using the documents provided by the municipality of the city, one can draw the boundaries of the city in the past 60 years, the way it is shown in the (Fig-3). Using the terms given by *Allain (2004)*, in the scale of the Macro form, it can be seen that up to 1983, the city was growing in a single, almost round agglomeration, But the last two phases of city development show significant deviation from a centrally growing city, First, city starts to grow along the north-south road which is its eastern boundary, then new neighborhoods which are not connected to the main body of city appear, and continue growing.



Figure 3. Limits of contemporary Najaf Abad, Growth of the city in last 70 years.

In order to have a good understanding of the city's pattern and rate of growth, it is useful to have a quantitative estimation of its city's population and area growth per year. The Chart shown in Fig-4 represents the city's area by square kilometers in past 70 years and the annual growth rate percentage for the city. It can be seen that with an average annual growth rate of 7.3%, it is growing quite rapidly.

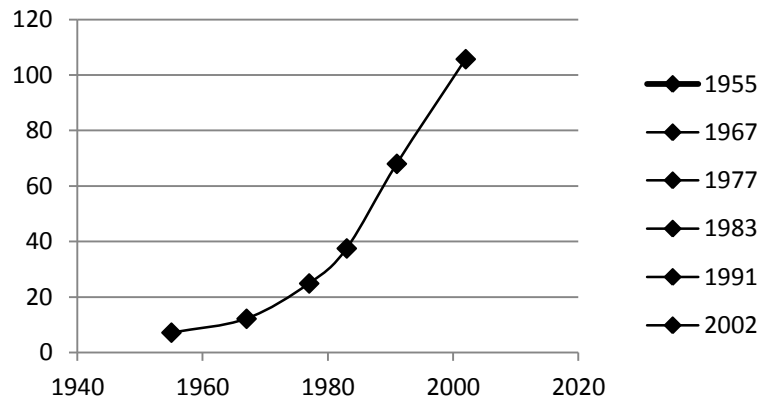


Figure 4. Growth of the city, Total Area by square kilometres.

Here rises an interesting issue, if two later stages of the city growth are considered, it can be seen that in this phases the city is expanding much more in the new neighborhoods, than it is growing by expansion of the initial core areas which are traditionally more pleasant and more expensive areas. In other words, one can reach to the conclusion that for some reason attraction of the new neighborhoods is more than the main core of the city for increasing the urban area. Fig-5 Shows this phenomenon of the satellite area growth.

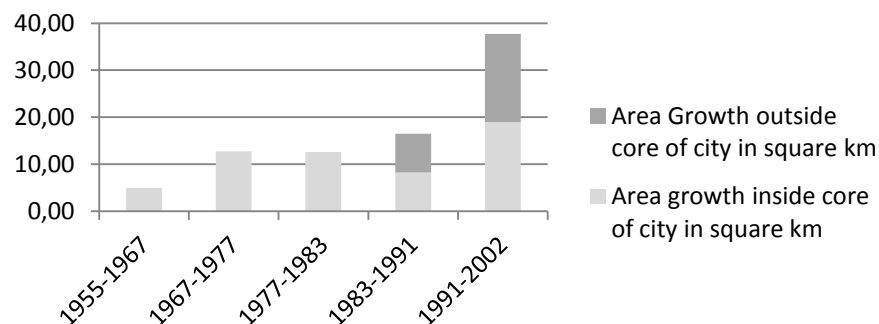


Figure 5. Growth of the main body of the city and he satellite cities.

In order to understand the process of the growth of the city and the change of its shape better, the main elements shaping the macroform of the city shall be considered, Ghahraei(1996) counts four important factors: 1- the mountain on the north which won't let the city to grow northward further than a certain limit. 2- Gardens and fields which used to surround the city, has been transformed to the city tissue, so the tissue follows the arrangement of the old fields which in turn get their shape from the waterways, this element is close to the origin for shaping process described by *Bonine(1979)*. 3- City's position on a main road connecting two important regions of the country-main oil fields of the Khuzestan to the main industrial pole of Isfahan, has been instrumental in redesigning the city as a linear one -along the axis of the road- in the modern period in Iran, which later changed and took its current form. 4: The General slope of the city site, east to west, and equal to 0.1% which is used for water network system has been an adding influence to the orientation of main streets inside the city.

Also it has to be noted that this rapid rate of growth has made the city unable to form any shape of a fringe-belt or a fixation line (*Conzen, 1960*) with green areas and low population around the city.

Study of the Population of the city

Study of the development of the city would be impossible without study of its population. The data available to writers, states that in 1956 city had a population of 30422, and by the start of 2013 city's population had seen a very sharp increase to 246017, which means during a period of less than 60 years, city's population has increased more than 8 times. Fig-6, shows the total number of inhabitants of the city during this period.

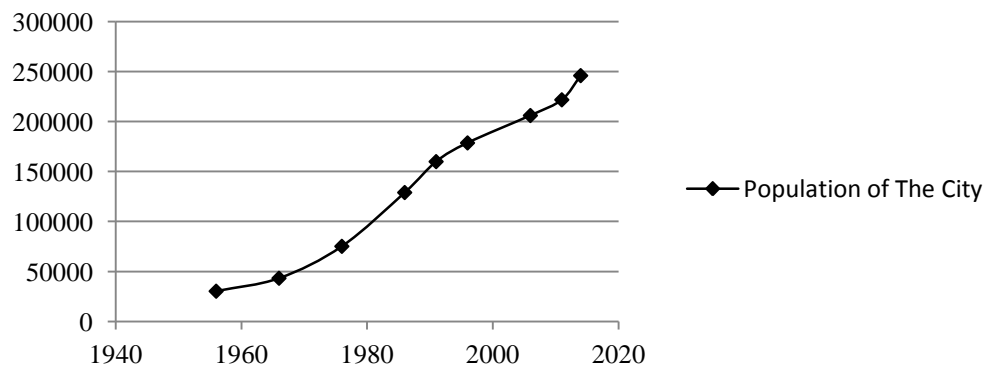


Figure 6. Population of the city

Naturally, this population is not distributed homogenously in the city, Fig-7, shows the density of the population in the city area. In order to make this diagram, a basis of four groups for density is used (*Conzen, 1960*), the limits of these groups are: Low: Less than 5000 inhabitants per square kilometer, Medium: Between 5000 and 10000 inhabitants per square kilometer, High: Between 10000 and 15000 inhabitants per square kilometer, Very High: more than 15000 inhabitants per square kilometer.

Usually one will expect to have the most population in the city center, and to observe a decrease in density by getting away from this center (*Allain, 2004*), but the pattern of population distribution is not this simple. It can be seen that in the old city center, there is an average density, comparing the Fig-7 with Fig-3 shows that the parts with highest densities all belong to the constructions in the past 30 years, (after 1983), it can be also seen that formation of these parts in the main core of the city corresponds to an almost 30% increase of population in early 80's and late 70's (Fig-6). Further development of the main core of the city is in medium density as expected. *Longley et al. (1991)*

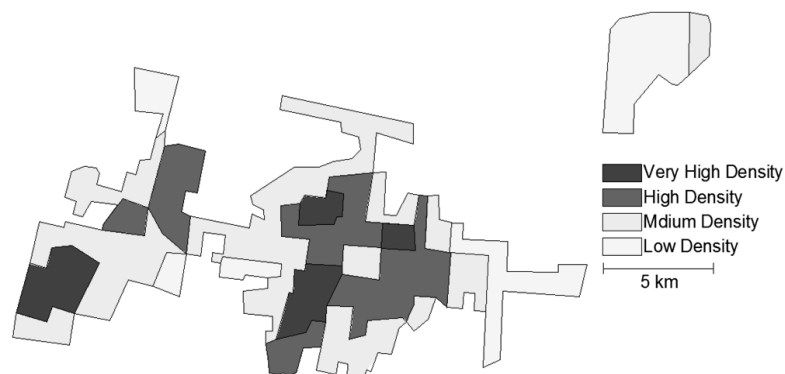


Figure 7. Density of Population in City area (2010).

There are some parts of the city center, which due to their old origin-comparing Fig-7 and Fig-2 shows that this low-density part is the same old Safavid part-, were dedicated to some functions which have remained the same (like mosques), these urban elements together with the municipality trying to keep and renovate the city center in its old shape (Fig-8) has been instrumental in keeping the density in city center low.



Figure 8. Renovation of the city center which keeps its density quite low.

New trend of construction in the city

Now having in mind from Fig-5 that more than half of the growth of city in its last two phases of growth belongs to the areas outside of the city core, and considering the Fig-9, one can reach to a conclusion that city's most recent construction is designed for more population density. This goal can be achieved by two means: Smaller homes and/or more stories for the residual buildings.

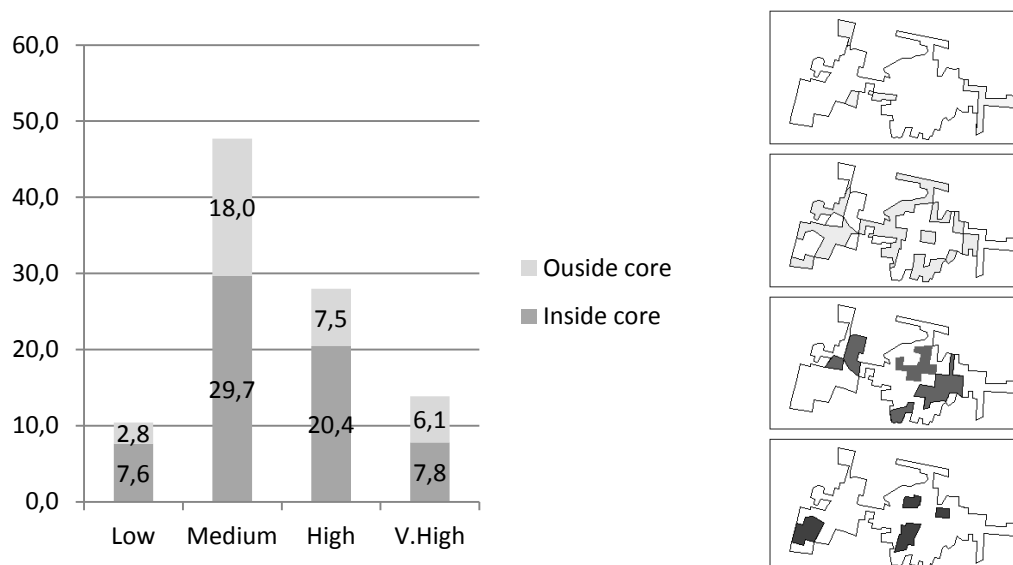


Figure 9. Percentage of different densities in total city area in different parts of city.

This act can be confirmed by two more observations: First, change of form in residential buildings of the city. In order to understand this change of form, one has to look in to the block plans in different areas inside the city, to have a logical comparison two blocks which almost have the same size and belong to the same population density category have been selected.

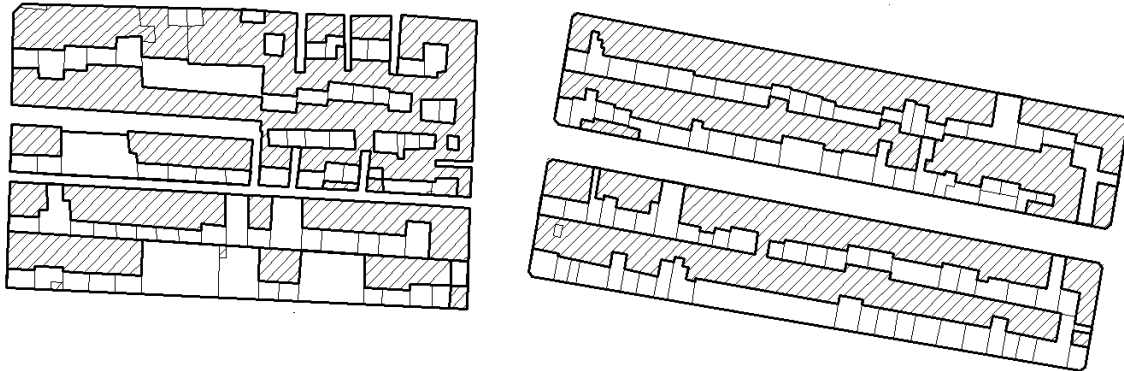


Figure 10. Comparison of two neighbourhoods, before(Left) and after(Right) construction of IAUN.

These blocks are shown in Fig-10. There are some clear differences in these two blocks, which can be listed as follows: (1) The houses are shaping in a much more orderly form, more suitable for larger constructions. Also they almost have the same length perpendicular to the streets. (2) Secondary alleys and central courts are eliminated completely. Remembering these alleys are the spaces that form a pseudo-private entrance to the buildings and the concept of center court just applies to a family and private space, these changes are a step toward de-privatization of the residential spaces. (3) While the coverage area of the building is 59% in the old formations, it has very slightly decreased to 57% in more recent buildings.(Note that the municipality regulations in Iran limits this ratio to maximum of 60%).

Also a very significant change is number of the stories of the buildings. Almost all the city has been in one or two stories, less than one percent of the houses had three or more stories. But in the recent years residential buildings of more than three stories are quite common, statistics of the region shows the demand for buildings with more stories is increasing. In Fig-11, percentages of the buildings with various stories built in the year 2011 in the city are shown, together with the under construction buildings in developing parts of city.

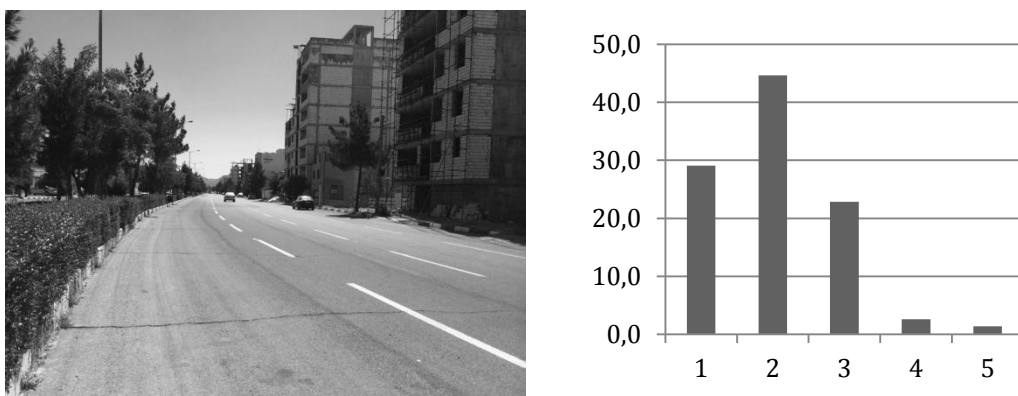


Figure 11. Recent buildings, change of trend in the number of stories.



Figure 13. Demolition of the old one story buildings and building multi-story ones.

Conclusion

Demographic and statistical analysis together with study of the urban macroform and medium scale study of the tissue of the city, shows that a change in the population characteristics and the demands inside a city can have significant consequences on the urban tissue of the city. In the case of the city of Najaf Abad, the building of university complexes has been very instrumental in changing the demography of the city's population and hence its demands.

In Najaf Abad, these consequences can be singled out in three ways: First, change in urban macroform, which happens in two ways, stretching toward the university centers and clustering around them. Second, it impacts the general form of tissue, makes it more regular, and usually in bigger land portions for construction and third, the general shift of the buildings toward multi-story buildings to provide more residential space.

Najaf Abad which has long been a satellite city for Isfahan, now is working as a huge dormitory for the university complex near it, which gives it a dual dormitory function, for the city that it is a satellite for and for a satellite cluster of its own. It shows that the size and importance of two settlements is not the only factor deciding their roles towards each other, functions and requirements inside each of them are important as well.

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Note that all the data needed for statistical studies are taken from municipality of Najaf Abad or the Iranian Center for Statistics, available online at : <http://www.amar.org.ir/>

Urban Black Holes: the rural in the urban as liminal spaces from where to build a new city

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Abstract. *This paper takes an anthropologically informed approach to urban form and to a particular space and its social world: the so called hortas (vegetable patches) in Porto, Northern Portugal. These hortas are small sections of land located along a water corridor that are cultivated outside any legal frame by local neighbours, thus producing informal grower communities. Since the traditional narrative on city growth is one of the urban form expanding while agricultural practices are relegated to other spatial realms, the 'rural' is not expected to be an element of the 'urban'. As such this paper deals with what could be thought of as 'urban black holes': 'the rural in the urban'. Through an ethnographically informed analysis we argue that these hortas are not mere 'survivals' of past stages of the city's evolution and growth, but an essential element of change in today's city where city dwellers take power into the urban landscape starting a new paradigm of urban community life.*

Key Words: Rural-in-the-city; Liminal-spaces; Informal communities; Water-corridors

Introduction

After thousands of years of urban development we still can find places in some neighbourhoods that look very different from what is commonly understood by 'city'. These other places are frequently located in the internal margins of the urban fabric, and although they display strong roots within the urban structure, they are not necessarily tied to 'the constant grey' of the city. They are frequently seen as an urban emptiness, as urban black holes. But in fact, in some instances connectivity and urban growth have forged a rich urban-life setting. This paper analyses two such places.

The sites are two urban hortas located in the city of Porto, Northern Portugal. The Portuguese word hortas comes from the Latin "hortus", meaning garden, and is used to refer to vegetable plots. The cases under analysis are working-class informal community-related grass-roots hortas, as opposed to City Council or urban middle-class environmental-conscious association sponsored hortas. They occupy areas where the built city has stopped developing, probably due to the water corridors that are one of the main morphological elements of these two sites.

We will first describe the morphology of the hortas and their topographical relation to the surrounding city elements. Because the methodology involved in this study is also anthropologically oriented (thus involving direct contact and retrieval of information with the members of these growers communities), a central role will also be given in this paper to the social world that both produces and is produced by the hortas.

Urban vs Rural

What is a city? Lewis Mumford posed this very question in 1937. His answer was that "[t]he city, in its complete sense,... is a geographic plexus, an economic organization, an institutional process, a theatre of social action, and an aesthetic symbol of collective unity" (Mumford, 2003:94). According to Horta (2011) a settlement is a city when it displays demographic

density, social division of labour, social differentiation, public services and a concentration of the secondary and tertiary economic sectors. The first sector, agriculture, is never referred to as an element constitutive of the city. The European industrial revolution of the 1700s and 1800s, with its major impact on the economy, social organization and life-styles of western cities, is the element that more strongly builds the present-day idea of the city as 'a place of work' (Santos, 2014: 113), even if today that work is mostly related to the service economy and not to industry. Thus, presently, the idea of 'city' does not generally entail agricultural practices (Gottdiener, 2014:19). If any forms of agriculture were to be found in urban contexts, they were seen as 'survivals' of past times, as anachronistic practices that time and the inevitable march of progress would make disappear.

In this paper, and as a result of the fieldwork carried with urban grower communities, we argue for a different perspective on and a different understanding of these agricultural practices in urban contexts.

The two sites

The morphology of places is an essential element in the process of constructing the urban space and its social world. Thus, morphological conditions of urban systems create the possibility of specific situations that support the emergence of specific spaces within the urban system. Liminal spaces are one such type of place. The hortas here under analysis are liminal spaces where the essential interaction between humans and nature (the latter taken in a very broad sense) is enhanced. These liminal areas and their social systems tantamount to other places that are protected and stewarded by the local communities that produce them.

The cases presented here will be named Horta A and Horta B. They were both differently shaped by morphology and history.

Case study 1- Horta A

Horta A (Figure 1) is located on one of the edges of the city (the River Douro) being a natural storm water drainage. The verticality of the place and the steep slope contributed to the overall erosion, mainly due to the continued water run-off, washing the topsoil away. The land is the property of one of the city's universities and the growers make use of it with the approval of the institution. The number of growers that constitutes this community is c 15 people. The total area of the cultivated plots is 20 000 square meters. According to the information collected through fieldwork, cultivation has been taking place on this site for over 15 years.

It is understood that horta A is located on the terrain of a former Quinta (agricultural estate). The old retaining walls of rock and stone appear and disappear on the site. This element helps integrate the new agrarian practices with the old infrastructure in a space that claims to be something new (the horta/growers community) in between the remains of old rural-urban city borders and the contemporary surroundings and community. The community garden plots are located around the old terraces in irregular shapes and at different levels. The remaining elements from the past Quinta help to subdivide the space and make it easy for people to define their own individual agricultural space.

The food grown by this community ranges from potatoes, to beans, tomatoes, onions, lettuces, cabbages, spinaches and, in some cases, strawberries. The water has been collected and centralized on the highest point of the urban stream flow and it is currently one of the main morphological elements of the horta: the grower community decided to build a small water retaining structure for that stream (Figure 2: Site A-Water Pond). The work was carried out by them sharing labor, materials and expenses. From the ensuing pond, water is distributed by dug out canals and pipes to each corner of the horta in order to irrigate people's crops.

Accessibility to the horta is limited with only three points of entry (Figure 1) being very well protected (there are gates with locks for which you need keys). Growers say that the land

belongs to the university and as such they feel responsible for what is going on inside the horta. This is the reason they give to the importance they attach to keeping control of the access to the grounds.

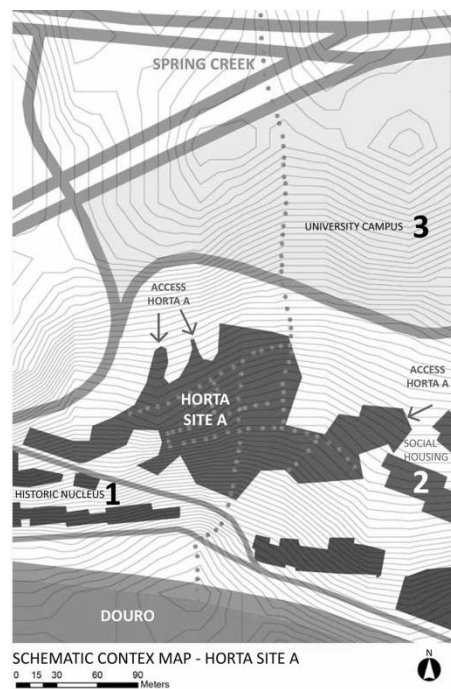


Figure 1. Map of Site A.



Figure 2. Water structures (Site A and Site B).

Case study 2- Horta B

Horta B (Figure 3) is located on a flood plain of a small creek. This type of land formation (ie, flood plains) has been avoided by the development grid of the city due to the unstable ground conditions. The area where this second site is located is an area where the city meets in a multi-scalar way (Figure 3). All the different elements coexist in an extensive open space where the cultivated plots (aggregated in more than one unit) occupy c 68 500 square meters. In this paper we will only be describing a smaller section of the complete area: Horta B, occupying c 19 000 square meters.

Located on a horizontal landscape (the flood plain) there is usually a couple hundred meters or more between the horta and the surrounding elements part of this landscape. Just like in Horta A, rock walls are important elements here that create a unique space and provide a minimal structure for this horta. As a morphological element of the landscape, these walls also provide shade and accentuate the sun's position and thus the temporality of the space.

The small creek that runs through the site brings water from the costal hills (100 m elevation) into a bigger creek that runs through the city all the way to the Douro. The water quality of the creek is extremely poor, being polluted by industrial units located upstream, on the exterior of the ring-road. Using water as the main resource (Figure 2 Site B – Water canal) local people have been growing food produce such as potatoes, beans, tomatoes, onions, lettuce, cabbage, spinach, flowers and some fruit trees. The community of growers of Horta B is constituted by more than 30 individuals (both male and female but, again, with a predominance of the former). They have been cultivating this particular section for more than 12 years. The growers do not know who holds the deeds of the land they are cultivating.

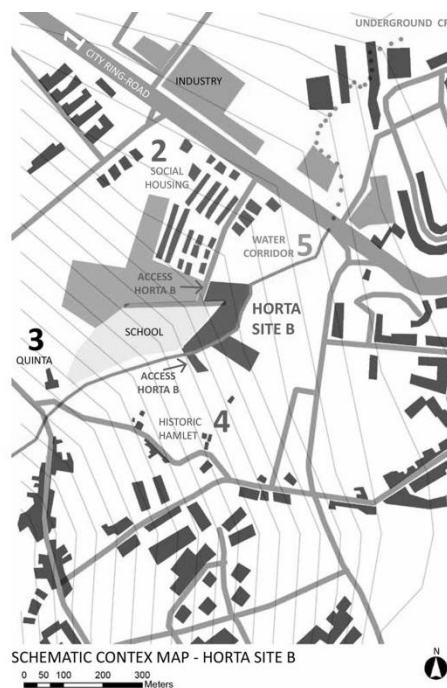


Figure 3. Map of Site B.

Community Space

At both sites the housing community next to the site supports (although not exclusively) the hortas. Some of the growers might live fairly distant from the horta site, but have connections (through family or work) to the first growers of the horta. According to the narratives collected through field work, it is usually the men who take the initiative to start cultivating next to the creek. They also clean and prepare the site for agricultural uses, especially on steep slopes. All the physical activities and the daily chores that these urban agricultural units demand imply a lot of effort and time, but hortas are spoken of by their growers as “doing you good”.

The sense of goodness that growers attribute to the hortas is the main and the most common characteristic in the growers’ discourse. According to them, hortas are keeping people active and consequently healthy and consequently happy. The horta is a source of goodness because it steers men away from the *tasca*, but also because it implies an outdoor, physically active life-style.

The goodness of the horta translates itself also onto the goodness of the food produce grown in them. As the growers say, “the food I buy in the supermarket, god knows where it comes from and what stuff they put on it! This one, I know it is healthier because I grew it myself – and it tastes better too!” So, to the goodness of the activity to one’s health, one adds the

goodness of the produce itself: free from commercial farming practices and associated ‘evils’. An additional goodness of the practice is the contribution it makes to the household economy. However, this element of contribution to the family budget is never presented as the main impetus for the agricultural practices. Growers refer to the reason why they grow food produce mostly because they take pleasure in it, because “it is good for you”.

Besides being inhabited (or having as a morphological element) the openly voiced figure of ‘goodness’, hortas as an urban terrain are also inhabited by (or have as a morphological element) the circularity of ‘the gift’, in the sense Marcel Mauss delineated it in the 1920s. So, what is the object of the gift in the hortas? The most immediately circulated element is the food produce. Growers refer quite often to the pleasure they have in offering some of their produce surplus to family, friends and neighbours. With the economic crisis the country is presently living, this gift of food produce is even more welcome than before. However, none of the growers refers to selling their produce surplus.

The second element that circulates through a gift economy is labour. The pooling of labour is a well-known social feature in agricultural societies. In the hortas, very often growers referred to the fact that if one of the growers is off sick and is not showing up regularly at his/her plot, they will carry out the necessary tasks so as to the crop is not lost. In times of more intensive labour everyone receives help from their neighbour to cultivate their sites.

The third element that circulates through a gift economy is knowledge. According to the narratives collected, some growers have approached the initial growers, not only to ask if they could also cultivate a section of the land (due to the liminal nature of the space in legal terms, they did not know whom to address for such authorization but for those who somehow were already farming the land), but mostly to learn from them how to grow things successfully.

These urban cultivated areas are liminal spaces that are central places to these peoples’ lives. They are places where people interact with the landscape and, most importantly of all, places where they are able to build their own interpersonal space. Elderly people, young women and children have now a space to share their knowledge, to be physically active and where to enjoy leisure time and the beauty of the landscape, of their farmed gardens and of the city.

The hortas as urban black holes

Hortas are liminal but not marginal spaces. They are interactive spaces of exchange in hidden areas inside the urban structure. The hortas are the result of a complex morphology and changing ecosystems. The identity and particular culture of these places are extremely important to the urban dwellers that cultivate them. Local people protect and understand the natural landscape of the area making these places key elements in the urban landscape connecting nature and people.

As far as morphological elements are concerned, on both sites water is the main actor of the natural settlement and responsible for preventing the city from developing the grey in those areas. The cultivation of the landscape requires spreading water in different directions and along terraces. The necessary slowing down, sinking and spreading of water helps both to control the erosion as well as keeping the soil fertile. It also involves the community by implying shared labour and shared water management, as well as giving these city dwellers a place to cultivate.

As Martin Heidegger (1951:2) said, to build is to dwell since “in the word *bauen* we hear three things: 1. Building is really dwelling; 2. Dwelling is the manner in which mortals are on the earth; 3. Building as dwelling unfolds into the building that cultivates growing things and the building that erects buildings... We do not dwell because we have built, but we build and have built because we dwell, that is, because we are dwellers”. The hortas are places of dwelling where exchange of knowledge is constantly happening, where community resilience is produced, where people engage in physical activities and an environmental consciousness develops. The protection of these spaces and their communities is very valuable. The hortas here

presented are a clear example of a social nucleus and a scenario of a unique urban community culture.

The fluidity of time and the challenges that these sites present have taken people to settle in them in a flexible way, away from rigid systems which so often our urban grids produce. It is clearly under the physical/morphological conditions of the place that essential human values are taking root, values that are related to identity and to livelihood and that so often our cities curtail by hiding them among the anxiety and the productivity that the urban promotes. And it is the realization of the latter reality that prompts our questions on our cities of today and their public spaces, on the absence of freedom, flexibility and capacity for transformation that is limiting our ability for harmonious human development.

A lot of our green public spaces, usually named 'parks', are places that promote another type of spatiality not that of the hortas'. In parks there are limited forms of interaction between people that is accompanied by a continuous exhibition of the self to others. Parks as promoters of leisure have forgotten about important human activities of connection between the individual and his/her territory, namely about the incorporation in them of communal activities of subsistence that should be salvaged and protected. The hortas here presented, due to their grass-roots nature are a reflection of the freedom of the human. It is in the hortas, spaces that are usually read as an urban emptiness, that in fact the dynamic exchange between individual and environment takes place. Thus the metaphoric term of 'urban black holes' in the title of this paper.

A black hole in Physics does not in fact refer to an emptiness but to a location of immense energy. The same way, hortas are not an urban emptiness, but spaces in which there is instead a concentration and exchange of energy vital to our survival through time, not as individual beings, but as social communities that belong to a live ecosystem in which we dwell in the Heideggerian sense of the word. And by analysing the hortas as part of Porto urban system, two questions arise: was it the morphology of the place that has promoted those values or were we ourselves who knew not how to build the city under those values? And how does a formal system of territory management embrace an informal system without annihilating it?

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Exploring university morphology. Bergamo as case study

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Abstract. *Universities have a preponderant role in today's societal models especially under the influence of the knowledge economy. They have been in the core of development — economical, social, inter alia — and their role within urban context has changed in order to respond to the third strand of the university mission — that of civic engagement. Whether conceived as autonomous entities or diffused within the urban fabric, universities are a key element in urban dynamics and policies and they are progressively more included in strategic plans and development actions worldwide. Therefore, it has become significant to understand the extent of university integration within urban territories. This paper aims at exploring an analytical framework for university precincts within urban fabrics, understanding the different types of urban insertion and connections established with local and regional players. The focus is placed on the impact of the university precinct at the level of the adjacent urban fabrics, on an attempt to understand the ways universities can relate to their hosting cities, from a morphological point of view. The University of Bergamo, Italy is used as a case study, for the diversity present in the urban insertion of its physical premises.*

Key Words: University precinct; urban integration; campus; knowledge economy; university morphology

Introduction

This paper focuses on universities and their precincts and the role they perform in urban context. It relies on the premise that universities are a key element in urban dynamics and urban policies and that they have the ability to be powerful urban generators, attracting people and flows, and creating urban vitality (Calder & Greenstein, 2001). Their physical settings act, thus, as the first vehicle through which universities can interact with their hosting city.

Within the context of the knowledge economy, universities are progressively being perceived as one of the most influential elements in society, since they impact on city development on several levels (Wiewel & Perry, 2008). They have the ability to change city demographics, to act as economical developers and to impact on several ways on society in general. Besides, universities can contribute to urban regeneration, by directly improving the quality of the urban fabric, and helping to reclaim parts of cities and leverage funds from public regional players. Therefore, it is urgent to understand the full extent of their impact, and to explore university-city relationships.

This paper aims at analysing these university physical settings, on an attempt to understand their impact on the universities' vicinity, and the ability they have to promote synergies and relationships with their urban surroundings.

In order to better explore these matters, the University of Bergamo, located in the north of Italy was chosen as a case study, for its morphological features and insertion in the urban fabric of its hosting city.

This paper is organized in three parts: the first explores the university general context and the key themes involving university facilities planning. The second explores the morphology of Bergamo recurring to space syntax tools, always focusing on the university and its relationship

to the city. The third summarizes an experiential mapping contrasting the results of these observations with the syntactic analysis performed.

Context

It is argued that universities are one of the driving economic forces in contemporary societies (Duderstadt, 1999; Conceição & Heitor, 1999). Their role is not only related to the production and sharing of knowledge, but has progressively developed towards their social involvement and responsibility. Whether conceived as autonomous entities or diffused within the urban fabric, universities are a key element in urban dynamics and policies and are progressively more included in strategic plans and development actions worldwide, thus providing an opportunity for change and new perspectives towards their role in contemporary societies.

Along with the traditional strands of their mission (research, learning and teaching) a third one, that of civic engagement is becoming significantly more important in today's university (Berglund, 2009). This may have substantial implications for the built environment since it approaches academia and the wider community, from simple actions such as allowing the latter to have access and make use of university facilities, to deep mutual involvement and engagement in several activities. Therefore, besides rethinking university-learning spaces at the architectural design scale, it becomes critical to reassess university facilities in terms of their spatial integration within the urban territory, considering both the metropolitan area scale and the city-university interaction. This interaction should be understood as an inevitable component of university collective life (Campos Calvo-Sotelo, 2010).

The research question is focused on how the university precinct turns out to be integrated in the urban tissue.

Nowadays, universities are required to balance between two trends: while it is considered that when conceived as autonomous entities, universities' facilities cause the isolation of academic communities, highlighting ruptures within the urban fabric and originating unsustainable mobility patterns; one can argue that, on the other hand, when universities' facilities are built within the city core, the preservation of their uniqueness and distinctive features may be easily affected by the surrounding environment thus requiring special consideration.

The "campus" should preserve its necessary distinctiveness (Trani & Holsworth, 2010), but also to be open to the city to foster processes of social and economic integration to the community. It is argued that university precincts can no longer be considered secluded places, where non-academic people feel rejected and not welcomed.

Therefore, this work aims at analysing different integration models and their repercussions, in order to better understand to what extent does campus morphology influence the interactions established between the university and the city.

The activities of the university impact their surroundings and wider communities (Alexander, 1965) to the mutual benefit of both society and academia. Therefore, the university precinct must be perceived in its urban dimension, as physical element that acts as conveyor of information, knowledge and an image of higher education, while assuming an important role in the dynamics established between the university and the city where it is embedded.

It is critical to understand the demands that the university requires the city to fulfil, along with the role that the university can play in order to contribute to urban regeneration, by directly improving the quality of the urban fabric and promoting cohesion of social territories.

Methodology

The analysis was performed combining space syntax tools with in-situ analysis, along with student interviews.

It allowed to perceive the city globally, focusing on urban integration aspects, as well as to deeply understand how the university premises relate to their immediate surroundings, and which role they are able to perform in the urban environment.

Depthmap software (Turner 2004) was used in order to build a topological map (axial map) (Hillier and Hanson, 1984), which performs as a base map, considering the scale of the city under analysis. The axial map description operates as a macro analysis of the urban structure. It allows a representation of information on a plane in topological relationship and with measurable horizontal distances, *i.e.* a metric analysis of the catchment area and an angular segment analysis of global integration (closeness centrality) and global choice (betweenness centrality). At same time it has sufficient geographic reference information to identify the location of each university infrastructure.

Along with the syntactic analysis, *in-situ* observations were made, and an experiential mapping of all the university facilities was developed under the scope of the Smarter Citizens research project *i.e.*, a collaborative project between Harvard GSD and the University of Bergamo aiming at developing alternative urbanization models in order to pursue physical, digital and social innovation.

This experiential mapping consists of an analysis based on direct observations by the university users. It draws on the research on urban design qualities related to walkability pursued by the Active Living Research Program of the Robert Wood Johnson Foundation (Ewing et al., 2006), whose aim is to link the built environment to active living. This study relies on the premise that urban design qualities depend on physical features but are distinct from them, and they reflect the general way in which people perceive and interact with the surrounding environment (Smarter Citizens Research Team, 2014a). Therefore, factors as the morphological features and the urban design quality, along with individual reactions influence and affect the way an individual feels about the physical environment. Even though the study focuses on walkability conditions, it allows inferring for other uses of public space, measuring how some physical features of the built environment affect the users behaviours.

In this analysis, five variables assumed to be critical to establish a good walking environment were measured, in order to provide a broad perspective on the areas surrounding the University locations in Bergamo: imageability, enclosure, human scale, transparency and complexity (Smarter Citizens Research Team, 2014a). A 5-minute walking distance was considered, according to the city's morphology and the walking culture of the students and city dwellers.

Bergamo and the University

Bergamo exemplifies a typical mid-sized European city, with its 120.000 inhabitants (approximately 500.000 in its surrounding area). It was developed from upper town (*Città Alta*), an urban settlement located on top of the hill, which is surrounded by Venetian walls dating from the 16th century. *Città Bassa*, downtown, was developed mostly from the second half of the 19th century, after the construction of the railway and train station, located in the southern part of the city (Comune di Bergamo, 2008). *Città Bassa* was developed through the existent *borghi*, the smaller urban settlements adjacent to the upper town, although located outside its walls. These areas vary in type, number of inhabitants and architectural styles, and they represent a part of Italian urban culture (Comune di Bergamo, 2011).

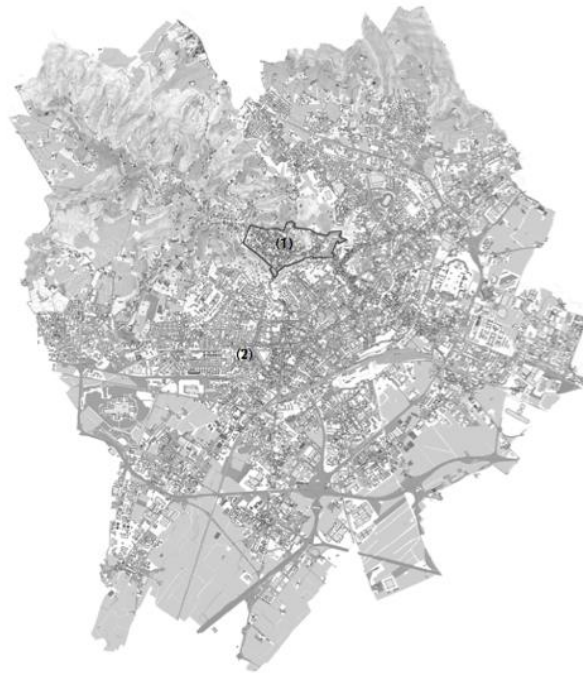


Figure 1. Bergamo urban mapping (Smarter Citizens Research Team, 2014b) (1) Città Alta . uptown; (2) Città Bassa – downtown.

The University, *Università degli Studi di Bergamo*, dates back to 1961, even though it only achieved university status by the end of the 1960s. Nowadays it hosts approximately 15.000 students, among its six departments (*Università degli Studi di Bergamo*, 2013b).

The university is spread within the city in several different locations, both in *Città Alta* and *Città Bassa*, and also in the outskirts (*Università degli Studi di Bergamo*, 2013a). Different locations host different areas of study, for the four main locations of the university. Thus, all the locations within *Città Alta* are dedicated to the Humanities, while in *Città Bassa* is located the Economy department. Finally, the Engineering department is located in Dalmine, a smaller city situated about 10km from Bergamo. The university is also a partner of *Kilometro Rosso*, the technological park, owning one of its buildings. In this facility, most of the areas are only used for research but some of the spaces are available for specific purposes, even though there are no regularly scheduled academic activities.

In the upper town, the university occupies 7 different locations, spread around the main areas of the centre. Most of these host academic spaces within. Students travel around to attend classes, which can be seen as an opportunity or a threat. On the one hand it allows for more dynamism within the area, caused by students presence in different places during the day, but on the other hand requires more resources and can provide distractions from the academic environment.

In *Città Bassa*, the university location hosts more functions and provides more services, thus being used not only by the students who attend classes there, unlike what happens in *Città Alta*.

Both the university premises in *Kilometro Rosso* and the Engineering campus in Dalmine, are not going to be considered in the framework of this paper, since only university premises located within the city's boundaries and hosting academic areas were considered.

The dispersion of the University is a defining feature for Bergamo, and can be perceived both as an attractor and as a negative feature while characterizing the university. On the one hand, the dispersion allows the university to reach more areas of the city, and to interact with different environments. On the other hand, the university is not perceived globally, and it does not become clear to both city users and students themselves what is the role the university is

playing in urban context. Its premises are unknown and disconnected, even though located in some of the most central and important areas of the city.

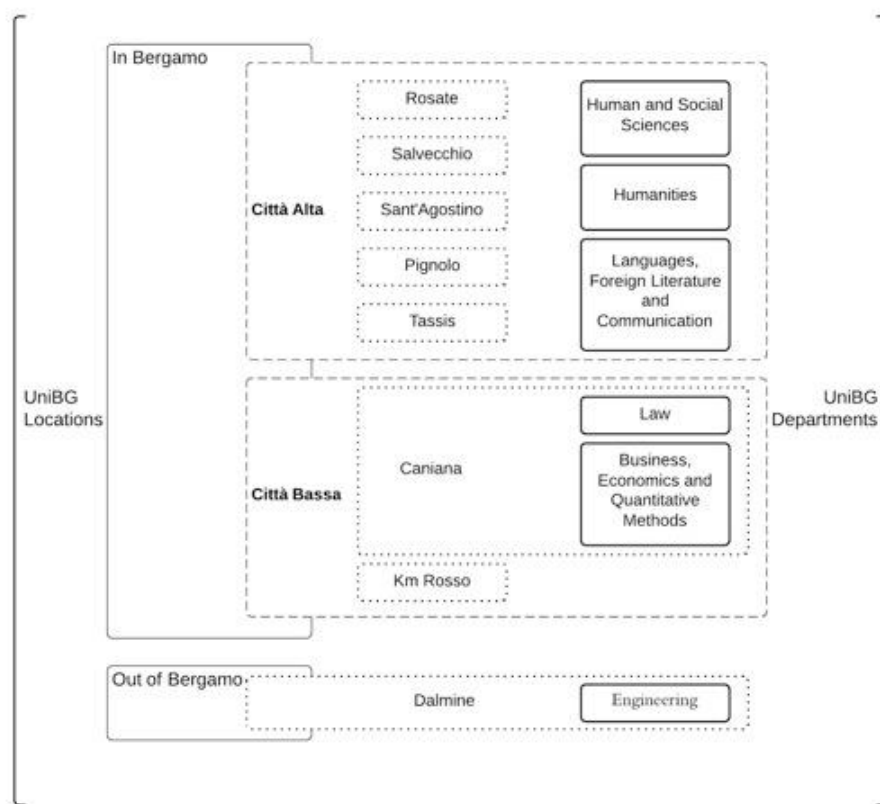


Figure 2. University of Bergamo spatial distribution and organizational structure.



Figure 3. University locations in Bergamo (1) Città Alta, (2) Caniana – Città Alta; (3) Kilometro Rosso – Città Bassa.

Axial analysis

The city fabric shows strong morphological differences between *Città Alta* and *Città Bassa*, which can be easily recognised in the axial map. As can be observed in the picture, the upper town shows relatively low values for integration, which are consistent with the perception of the territory obtained through the empirical observations. One of the justifications for this fact might be the topography of the area, mountainous and steeper on the northern side of the hill where *Città Alta* is located, opposed to the flat land in which *Città Bassa* was developed through the *borghi*.



Figure 4. Integration HH Bergamo, with the university locations.

Nevertheless, *Città Alta* presents a historically and culturally rich environment, very propitious for the location of an academic institution. The area's lack of integration is resolved through the use of cable cars, which increased global integration of the whole system by approximately 25%. However, this increase only affects pedestrian accessibility.

In *Città Bassa*, however, the university's premises are located in one of the most integrated axis of the city and are easily reached by any other street in the urban system.

Experiential Mapping

The experiential mapping consists of an analysis built on direct observations by a group of 13 students from University of Bergamo involved in the Smarter Citizens research project. This group includes students with different backgrounds and from different areas of study,

This experiential mapping analysis was based on the research on urban design qualities related to walkability pursued by the Active Living Research Program of the Robert Wood Johnson Foundation (Ewing et al., 2006), whose aim is to link the built environment to active living. The analysis does not focus specifically on the university buildings, but instead on the

whole area on a 5-minute walking distance from them. This approach allows a better understanding of the integration and the morphological features of the surrounding environment of the university. It allows also recognising some aspects of the university's urban insertion and connections. A scale from 0 to 2 was used to quantify all of the variables, 0 being the lowest level, and 2 the highest (Smarter Citizens Research Team, 2014a). Thus, the university facilities and locations with academic functions were evaluated for the above-mentioned criteria: (1) Imageability – as the quality that makes a space memorable and recognizable (Lynch, 1960), depending on how the physical elements and their arrangement are able to draw attention, arouse feelings and create a lasting impression; (2) Enclosure – the degree to which the public space is visually defined by vertical elements (Cullen, 1961), such as buildings, trees, walls, among other elements; (3) Human scale – referring to elements that are perceptible to humans while walking in a specific area (Ewing et al., 2006). These can be materialized in different textures and elements, but matching human size and scale, as well as rhythm and speed of dislocations and movements; (4) Transparency - the degree to which people can see or perceive objects and activities beyond the edge of a street; (5) Complexity – the visual richness of a place (Apopod, 1990 apud Ewing et al., 2006). A place complexity depends on the variety of elements and articulations present on the physical environment.

For the university locations in *Città Alta*, the 5 premises with academic functions were analysed, and the result is summarized in the picture and table below.

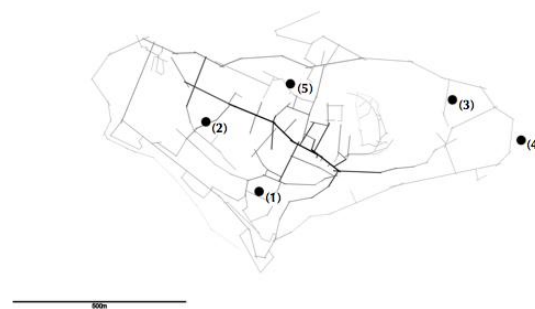


Figure 5. Locations of the experiential mapping – Città Alta (1) Rosate; (2) Salvecchio; (3) Sant'Agostino; (4) Pignolo; (5) Tassis.

Table 1. Experiential mapping summary - Città Alta

Criteria /Location	Imageability	Enclosure	Human Scale	Transparency	Complexity	Total Score
Rosate	1	1	1	1	2	6
Salvecchio	1	2	2	1	2	8
Sant'Agostino	2	0	1	2	2	7
Pignolo	0	1	2	1	1	5
Tassis	1	2	1	0	1	5
Average <i>Città Alta</i>	1,2	1,2	1,4	1	1,6	6,4

As can be perceived from the axial map, the majority of university facilities are not located in highly integrated areas. Within the limits of the upper town, though, because of the small scale and proximity among the facilities, this fact would not be problematic, if the university was able to make up for the lack of integration with other strategies, such as improving its visibility and imageability within the public realm.

From the experiential mapping, we can perceive the importance that is attributed to features such as the complexity and the human scale of the urban environment, which is consistent with

the urban fabric and the historical morphological characteristics of the area. Nevertheless, the imageability evaluation of the university shows, in general, low values which seems paradoxal. A possible explanation would be the visual richness of the whole area, which creates difficulty in the recognition of each individual building. Moreover, this evaluation is dependent on the students' perception. It is relevant to mention that none of the students who engaged in the project comes from architecture or any related field of studies.

Also, if compared to similar analysis in different cities, it might show different results, since the whole city performs very well for most of the chosen variables.

As far as *Città Bassa* is concerned, the university presents a different type of physical setting, behaving as a campus-like structure within the urban fabric. It doesn't consist of isolated dispersed buildings like in *Città Alta*. It is a clearly defined precinct, comprising two different buildings. Thus, for the experiential mapping, in order to enrich the analysis, four locations around the campus were chosen: (1) Caniana, as the main entrance and more representative informal meeting space around campus; (2) Lower San Bernardino, the area where most shops and services are located, therefore extremely used by students; (3) Upper San Bernardino, where the library is located, and also restaurants, cafes and bars, making it a highly frequented area; (4) Moroni, the area around the secondary campus entrance, which, in comparison to the other three described areas, is less used and visible from the premises and hosts less services and commercial activities.



Figure 6. Locations of the experiential mapping – Città Bassa (1) Caniana; (2) Lower San Bernardino; (3) Upper San Bernardino; (4) Moroni.

Table 5. Experiential mapping summary - Città Bassa

Criteria /Location	Imageability	Enclosure	Human Scale	Transparency	Complexity	Total Score
Caniana	2	0	2	2	1	7
Lower San Bernardino	1	0	1	2	1	5
Upper San Bernardino	1	2	1	0	2	6
Moroni	0	1	0	1	0	2
Average	1,0	0,8	1,0	1,3	1,0	5,0

Globally, these locations show lower values in all the attributes, even though they are more integrated than all the university locations in *Città Alta*.

The principles of the educational campus (Campos Calvo-Sotelo, 2009), establish a comprehensive framework of analysis for university precincts. Analyzing the University of Bergamo under this scope, it becomes clear that some of the traditional physical features are not present, or do not assume the necessary importance. As far as utopia, integral planning and spatial harmony are concerned, the university does not follow the principles, for most of its facilities occupy previously existing buildings. Nevertheless, it would be possible to solve this lack of spatial harmony, if there was a coherent unifying strategy among all of the university premises.

The learning community is not sufficiently encouraged, and the dispersion of the facilities works in a negative way towards this objective. Also the affective and intellectual embracement is not attained through the physical premises, diminishing the impact of the university physical settings on obtaining a strong learning community. The university also needs to improve the morphological features with impact on its visibility and legibility.

Regarding the incorporation of nature and art within the university premises, there is sufficient offer within *Città Alta*, and the university users are able to benefit from it, despite the lack of integration and connections between university and city. Besides, the rich cultural and historical settings present a stimulating learning environment, while represent and enhance the city's and the university's collective memory. Notwithstanding, in *Città Bassa* there is a lack of both artistic and natural landscapes, and the university premises are not fulfilling this need.

Conclusions

The combination of space syntax tools with direct observations has proven a suitable method for analysing university-city relationships, for it allows understanding simultaneously the impact of integration, morphological features and university dynamism on the creation and improvement of synergies between the two entities.

Bergamo presents a very peculiar university environment, with its diversity in morphologies, insertion types, connections, urban fabrics and relationships established between different entities. Nevertheless, the relation between the university and the city should be improved, reinforcing the presence of university users within the social and urban context. A more synergetic environment would be valuable to foster innovation and improve the knowledge creation, sharing and acquisition.

The dispersion of the buildings and locations of the university of Bergamo can be perceived either as a threat or as an opportunity. On the one hand, it can cause the dispersion of the academic community, decreasing the serendipity and the amount of interaction opportunities and chance encounters on an interdepartmental basis. Also, it creates impractical mobility patterns and raises management difficulties. Nevertheless, the need for the academic community to access different locations and premises could help creating positive flows of movement that would benefit the whole city, as long as there were better connections and attractor areas among different university premises, for “(...) *the learning campus is one that maximizes the probability of chance encounters, and encourages lingering once an encounter - whether by chance or by plan - takes place*”(Kenney et al., 2005, p.39). Considering that, in the case of Bergamo, the whole city is the campus, success may rely in the creation of attractors among the different university locations for “*the true success for a city or town lies in the creation and maintenance of a network of spaces that support a variety of uses and users*”(Space Syntax, 2006, p.4). Thus, the scattered facilities offer opportunities for better integration and creation of synergies between the university and the city as long as there is the necessary will to do it.

Acknowledgments

This paper was carried out on the framework of the author's PhD research, funded by FCT – Fundação para a Ciência e a Tecnologia. We would like to thank the whole Smarter Citizens Research Team for their cooperation and contributions, specially Katia Passera, from the University of Bergamo and the students who engaged in the One Univer[city] project, namely Egle Carobbio and Stefano Terranova.

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Aging as an agent of change in the way how we occupy our territory

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Abstract *The aging of population characterizes the contemporary societies and promotes changes in the way how we are occupying our territory. Today, Portugal stands as one of the most aged countries in Europe with an aging index of 127,8%¹³⁰ - which means that for every 100 young people (0 to 14 years old) there are 127.8 citizens with 65 or more years old. In parallel, there is a marked imbalance in the occupation of our territory: with a high concentration of population in coastal regions (especially in the metropolitan areas of Lisbon and Oporto) and depopulation in the inner - characterized by an elderly resident population. In the inner regions, begins to be frequent to find a numerous unoccupied houses, or even entire abandoned towns. This fact can be seen as an opportunity and not just as a problem. We propose to analyze the potential that these territories may provide in the implementation of resident systems dedicated to the needs of the elderly people, like Home-Villages, and the way of these kind of structures can contribute to the revitalization of depopulation territories; concealed with other structures (a motor for local development) which can potentiated the fixation of young people and promote a intergeracional territory. Through a case study, that summarizes a proposal for intervention, structured in a review of the territory, which aims to revitalize the Pessegueiro town, in Alcútem (Portugal) - unpopulated, with a significant unoccupied housing structure and with an aging resident population.*

Key Words: assisted living, territory revitalization, home-villages, spatial equity, living in old age.

Introduction

Portugal is one of the most ageing countries in Europe. According to data released by PORDATA - referring to the year of 2012 - we know that about 10.5 million inhabitants, less than 15% are young people¹ and over 19% are elderly². If we compare the data on the elderly population, released by the National Institute of Statistics - INE, it is clear that in 1990, there were about 68 elderly people per 100 youngsters, in 2000 that number was higher than 102 and in 2011 increased to over 127 elderly. Current projections indicate that by 2050 the ratio should be of 243 elderly people per 100 youngsters; however the worst-case scenarios indicate that this ratio could reach 398 elderly people per 100 youngsters.

There is a double aging situation affecting the Portuguese population, characterized by the increasing number of elderly people and the decline in births. Between 1981 and 2012 there was a decrease of approximately 41% of births and an increase of over 78 % of the number of elderly (Tables 01 and 02). These figures tend to escalate, the latest projections of INE, indicate that between 2000 and 2050 there should be a decrease of 5% to 58% of the young population, and simultaneously an increased between 63.2% and 76.5% of the elderly population.

¹³⁰ PORDATA – Aging indicators according with 2011 Censos in Portugal., <http://www.pordata.pt/Portugal/Indicadores+de+envelhecimento+segundo+os+censos-525>, Survey conducted in December 2013.

Table 1. Total of births in Portugal (1960-2012). Source: PORDATA

c	1978	1981	1991	2001	2011	2012
213,895	180,690	152,071	116,299	112,774	96,856	89,841

Table 2. Total of elderly population in Portugal (1980-2012). Source: PORDATA

1960	1978	1980	1990	2001	2011	2012
-----	-----	132,638	1.372,543	1.705,274	1.992,034	2.020,126

Another factor characterizing the Portuguese population is related to its distribution in the territory. The 2011 Census revealed a high concentration of population in metropolitan areas (Lisbon and Porto) and depopulated rural areas, with low percentage of young people and high percentage of elderly people.

Against this backdrop, there is the need to find solutions in order to minimize the depopulation of rural areas, where demographic ageing is presented as an agent that characterizes the occupation of territory.

Case study: Monte do Pessegueiro

Approach

We present an intervention proposal in the territory - within architecture and project – for the revitalization of Monte do Pessegueiro³ by implementing infrastructure for the elderly population, similar to the Retirement Villages concept.

Retirement Villages seek to oppose the isolation of elderly people and promote a sense of community life. Integrating housing with trade, health services, household and personal care. In view of this optimization model and aiming to revitalize depopulated areas, the Retirement Villages may, also, come to include units for local development, in such a way to generate jobs and the consequent establishment of young people.

The decision to choose this village focused on the analysis of specific factors: According to the 2011 Census, Alcoutim was the municipality to registered the highest population loss (22.6%); About 44 % of the population is elderly; It has a significant number of unoccupied housing; Presents distinguishing characteristics in the territory, on a local and regional scale; Topographical conditions are favourable for the adaptation of the territory to the mobility needs of the elderly; There are small local industries, handicrafts and agricultural potential, which if expanded may generate employment; •It is nearby villages, that are also, facing a depopulation process (some already completely depopulated). This situation may enable the implementation of a housing "network" for the elderly - and thus promote greater use of the necessary infrastructures for its functioning.

The proposed intervention was established according to five elements of analysis: territory occupation; characterization of the population and housing; enhancing and restrictive factors for the revitalization of the territory. The occupation of the territory exposes local features and links with the region. The characterization of the population is based on data from the INE and Câmara Municipal de Alcoutim [Town Hall of Alcoutim]. The characterization of housing was established through fieldwork held in July 2013, and through the characterization present on reference works on local architecture, such as: *Arquitectura Popular em Portugal* [Popular Architecture in Portugal] [Sindicato Nacional dos Arquitectos – AA (1ª ed. 1961) National Architects Union - AA (1st ed.1961)] or *Arquitectura no Algarve* [Architecture in the Algarve] [Comissão para a Coordenação e Desenvolvimento Regional do Algarve (2005) - Algarve Regional Coordination and Development Commission (2005)]. The identification of enhancing and restrictive factors deems the existence or necessity for the implementation of equipment or

enhancing structural elements for development and the identification of elements that may be restrictive for its dynamics.



Figure 1. Pessegueiro, Alcoutim.

Territory Occupation

For the Algarve region, Orlando Ribeiro (1991) identifies two periods of territory occupation: an old one that resulted into clustered housing; and a modern one, that resulted into detached buildings. Alcoutim still bears the mark of the first period. Pessegueiro, maintains regional population cluster characteristics: a group of clustered houses, with access directly from the street – which arise organic and spontaneously, according to the land's topography.

The resident population is, mostly engaged to agriculture and livestock for subsistence that marks the territory: the presence of fields reaching the limit of clustered housing and small buildings, next to the houses, destined for animals or tools and agricultural products storage.

Resident population

Alcoutim has registered the greatest population lost in Portugal over the last decade. At the time of the 2011 Census there were 2,917 individuals residing in Alcoutim – along 576.57 km² - in five parishes, formed by the 106 population centres referred to as "montes [mountains]"⁴. Pessegueiros is inserted in the parish with the highest number of residents and approximately 40% of its population is elderly (Table 1). Martim Longo recorded, in the last 20 years, a significant loss of population: in 2011 1,030 individuals lived here, this represents a decrease of 25.6% compared to 2001 and a decrease of 35.1% compared to 1991 (Tables 3, 4 and 5).

Table 3. Resident population, population with 65 or more years and accommodation in Alcoutim - 2011 Census INE (ed), *op.cit*, tabela Censos 2011_Idosos_FREG.

Designation	Resident population	Resident population with 65 or more years old	Total of individual s who live alone or with individual s with 65 or more	Total accommodation	Total of accommodation only with individuals with 65 or more years	Total of accommodation with just one person aged 65 or more years
Alcoutim	2.917	1.282	919	3.508	623	336
Parish Alcoutim	921	385	249	1242	172	97
Giões	256	134	104	311	74	45
MartimLong	1.030	415	303	1.044	198	97
Pereiro	213	102	78	396	55	32
Vaqueiros	497	246	185	515	124	65

Table 4. Resident Population - Martim Longo (1991 - 2011), *op.cit*, tabela Censos 2011_Idosos_FREG.

Year	1991	2001	2011
Numer of Inhabitants	1.586	1.384	1.030

Table 5. Population density - Martim Longo (1991 e 2011).

Year	1991	2001	2011
Parisch Total Area	11,8hab/km	10,3 hab/km	7,6 hab/km

Housing Structure

In Pessegueiro you can find presences of the Algarve vernacular architecture, characterized by rectangular plans, ground level houses – scalable architecture, i.e., prepared to undergo successive enlargements, according to the needs of the household, without introducing façade changes⁵ - the buildings are made of schist masonry (exposed or whitewashed). Schist is also used to line the interior and exterior floors. The access openings are mostly of wood and in existent windows there is often the presence of exterior wooden shutters. The single or double sloped roofs, of lime mortar tiles, cane thatched, connected together and to the elements of the roof structure, commonly referred to as "encaniçado"⁶.

Enhancing Factors

Alcoutim is an aged village and its housing structures abandoned. The revitalization of the territory can only happen with the presence of young people. Thus, it is necessary to promote economic development to maximize the improvement of quality of life of its residents. The introduction of housing structures for the elderly is presented as a potential enhancing factor, that should be interrelated with other infrastructure.

Enhancing factors for the economic development of Pessegueiro: The “Campo Experimental de Opuntias”⁷ bakehouse – plants for a multiplicity of uses, profiteering fruits, ironwork, gastronomy, or firebreaks for forest conservation; the dam besides being used for irrigation may promote structures for water sports, construction of a river beach or natural swimming pools, for the benefit of local residents and as a way to attract tourists.

The interrelation between Pessegueiro's and the surrounding villages infrastructure's could generate the revitalization of the area through actions such as: restoration of cultural heritage to promote housing for elderly and intergenerational; renovation of the road system: requalification of pedestrian passages and road routes; parking areas, resting areas; implementation of qualified and differentiated equipments and services for the elderly; implementation of services and trade (banks, post office, tourism office, trade of crafts and local gastronomy); development of small industries, related to regional products (development of existing industries, crafts and gastronomy; planting, harvesting and processing banyan); establishment of young people (job creation, tax benefits, family support, schools, sports and social assistance); generate economic and tourism development (inn/guest house; river beach, natural swimming pools, rural tourism, senior tourism).

Table 6. Monte do Pessegueiro.

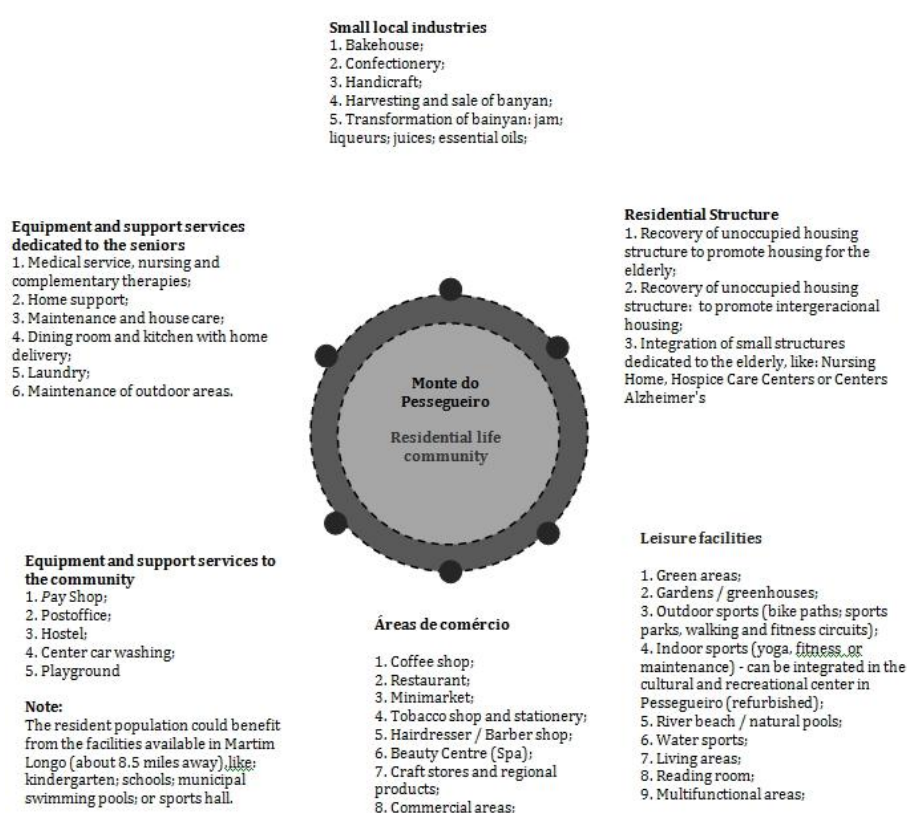


Table 6 presents examples of possible structures that could be introduced in the implementation of a Retirement Village in Pessegueiro, as a community of housing structures dedicated for elderly and, simultaneously, promoting the community's revitalization.

Similar actions where, for example, implemented in Luberon (French Provence), despite gathering different urban characteristics from Alcoutim, presents similar problems, i.e.: aging and isolation of it's population; (e)migraton of young people and consequent low birth rates; lack of commercial, business and service activities; lack of job opportunities; unoccupied architectural heritage; lack of social and economic development perspectives; significant decrease of local taxes' collection; degraded infrastructure. In this region, after analyzing the identified problems, 77 small villages and towns assembled and promoted the revitalization of the area, established by exploiting the economic potential offered by the region and

implementing small measures to improve the quality of life of the elderly population – turned into intergenerational measures, which served as a lever for the establishment of young people with consequent economic development. Joining efforts led to the revitalization of the territory, this situation could be applied in Alcoutim, for it faces similar problems.

Authors like Schittch (2007), Huber (2008), Cisneros (2012) classify housing for elderly as one of the main challenges for architecture and territory planning. However, another challenge in designing structures is preventing them to become "ghettos", even if the same should be enjoyable in regards to architectural space quality. I.e., enclosed spaces, dedicated to people whose only common reference is age. Following this concern, Burton, Bosman (2010) and Steinfeld (2013) warned about the risks of segregation that some of these structures, however well-intentioned, may produce. They also assert that most people prefer to age in places where they can establish a close relationship with the concept home, a part from the image of institutionalization. They further state that, smaller structures - based on the principles of community life and the principles of universal design - may be more attractive both to residents as to the purpose of attracting new residents, of varying ages.

Restrictive Factors

Pessegueiro indicts isolation if compared to close urban centres: Faro and Vila Real de Santo António, probably one of the main factors that has contributed to its depopulation. This implies, for example, the distance to central hospitals exceeds one hour.

Isolation may be presented as a restrictive factor for revitalization. However, there may be other, demographic, social, cultural or economic factors, as well as issues related to the right of ownership of unoccupied housing. It would be necessary to, in line, implement further measures including: development of existing industries and implementation of new units, promoting employment; tourism units; sports and cultural development; agricultural development; creating tax benefits for companies and residents; creation of a social support network to cut across age differences and the needs of the population - Table 7.

Table 7. Proximity relations between Pessegueiro and next reference localities

	Distance ⁽¹⁾	Time ⁽²⁾
Martim Longo	8,5	10 min
Alcoutim	38	45 min
Faro	69	01h : 45min
Vila Real de Santo António	64	01h: 10 min
Ayamonte (Spain)	65	01h: 10 min
Almodôvar	41	01 h
Beja	93	01h: 45 min

(1) Approximate distance in Km

(2) Mean time to perform the calculated route - distance traveled by car.

Land Surveying - data analysis

According to the Municipal Master Plan of Alcoutim - PDMA, Pessegueiro enters into urban land area, endowed with the possibility of building construction intended for "housing, trade or services and installation of public or private equipments"⁸. That is to say that, it meets urban conditions for the elderly housing structure installation.

We have identified 33 unoccupied housing, organized in a street continuous alignment. The majority is badly preserved, for being closed for some time; only a small percentage is well

maintained. This may indicate that with time we may lose part of the architectural heritage (unique and assembled) - Table 8.

Table 8. Conservation Stage of vacant houses in Pessegueiro – survey in 07.2013

	Units	Percentage
Good	2	6,0%
Reasonable	8	24,2%
Bad	16	48,5%
Ruin	7	21,3%

As regards to the outside walls building system, most of them maintain the traditional exposed schist masonry, whitewashed or the combination of these two finishes. Occasionally we verify recent changes, construction changes, with the introduction of painted brick masonry or lined with ceramic materials, or even, coated ceramics, or construction of an additional floor – Table 9.

Table 9. Characterization of exterior walls finishing systems – survey in 07.2013

	Units	Percentage
Exterior walls in exposed slate masonry	8	24,2%
Exterior walls in traditional whitewash finishing	12	36,4 %
Combination with above to finishing	12	36,4%
Others	1	3%

Another feature of the region is the absence of windows, which is verified in 28 of the 33 referenced houses, when there is window aperture, it is most likely to maintain the original wooden frames - Table 10. As regards to doorways, most of them are original, made of wood with one layer and small sized - with a width varying between 75 and 80 centimetres and height between 1.75 and 1.85 metres - Table 11.

Table 10. Characterization of windows – survey in 07.2013

	Units	Percentage
wooden frames (original)	4	12,1 %
wooden frames (original) and other (aluminum)	1	3,1 %
Without windows	28	84,8%
Other	0	0%

Table 11. Characterization of access door – survey in 07.2013

	Units	Percentage
Original in wood	25	75,8 %
Replaced in wood	2	6 %
Aluminum	2	6%
Iron	3	9,1%
Without access door	1	3,1%

The need to provide large spaces - to promote the versatility of space - presents itself as a major factor in housing restoration and adaptation. If we consider the gross construction area identified we verify that most of those houses have a reduced floor area; thereby, we must consider to combine to units for the construction of a single unit with suitable dimensions and space - Table 12.

Table 12. Characterization of gross Building area (Approximate values) – survey 07.2013

	Units	Percentage
Less than 50m ²	12	36,4 %
Between 50m ² and 75m ²	15	45,5 %
Between 75m ² and 100m ²	4	12,1%
More than 100m ²	2	6 %

Twenty houses have terraces (to the rear; along the common main entrance to different houses, or both). We identified three sites with three or more unoccupied houses that share a common outdoor terrace area, which may allow the creation of residence and community areas (Figure 2).



Figure 1. Pessegueiro, Martim Longo – Alcoutim, Unoccupied houses – Survey in 07.2013. Scale 1:2.000.



Figure 2. Pessegueiro, Martim Longo – Alcoutim. Unoccupied houses. Photographic survey in 07.2013.

Synthesis

We can conclude that, from the referenced houses, the majority maintains features of local architecture, but are badly preserved and require significant intervention. However, it is possible to follow their structural and constructive nature and simultaneously endow the space with the desired versatility. Building elements such as walls, roofing and interspaces can be restored and integrated within the new habitability concept. The ratio between street and housing in some cases may require an intervention to remove existing barriers.

Proposal

To promote the revitalization of the territory by implementing a housing structure of community life - based on the structural principles of the Retirement Villages - which can simultaneously promote the restoration of unoccupied cultural heritage, and its adaptability to mobility needs, we hereby present an intervention proposal.

This proposal was formalized in a summarized form in a previous study and synthesizes the exposed concepts.

Image presents the different functional spaces and their interrelations. It is visible the importance of vegetable gardens in the structure of the village, since they are considered as very important for the local population - essential for the maintenance of physical activity and healthy eating (affordable). Support spaces for the resident elderly population – medical and nursing services, maintenance services, meals - were located centrally.

Image identifies new construction proposals, as well as some buildings the use of which may be altered or reclassified. Parking spaces should be considered, organized and allowing easy access to the houses, services, trade and industries.

The fact that the village is "torn" by the National Highway may be a concern to the pedestrian level crossing, since residents of the West side (higher concentration of population) have to cross this road in order to access different services.

The urban structure of Pessegueiro is characterized by the absence of pavement, and should remain so, because this feature undo's the gaps (architectural barriers) – occasionally verified, at the entrance of some houses, a situation that can easily be reversed. The streets may maintain, or restore, regional features with schist flooring, as long as prevention of the danger of falling is ensured (without variations in heights between stones and slip-resistant finish). The arid aspect of outdoor spaces can be minimized by introducing small notes of green spaces, residence and community areas for residents.

The proposed interventions adhere to the principles set by the Universal Design and space use concerns - some of which are reflected in national legislation. Among these, we can list: elimination of physical barriers, such as stairs; placement of switches at a height of 90cm maximum of 120cm; placement of sockets to a minimum height of 45cm; Proper sizing of the spaces to allow its versatility (possible changes in furniture arrangement); allow visual contact with the outside, at the level of the individual when sitting (between 80 and 120cm minimum height from the floor); Use of devices with correct ergonomic dimensions suitable for use by all individuals (doorknobs, taps, supports, etc.); and good placement of equipment in order to enable its use without additional effort (such as dishwashers, washing machines, furnaces, etc.).⁹

Case scenario A presents a small housing, with an approximate gross construction area about 43,00m², badly preserved, inserted in an inhabited building, near one of the community ovens. Given its dimensions, it could only be used as a Studio, one bedroom (double or single), a bathroom and a small private outdoor terrace covered or not. Constructed with exposed schist masonry, precisely whitewashed near the access opening. This house is characterized by the absence of windows, only a small wicket envisages a mark on the facade. The access openings (main and rear facade) do not satisfy the minimum dimensions (height and width) considered as necessary and comfortable, in a living space that respects the principles of universal design, therefore needs to be resized. It is also necessary to regularize both the ground floor level with the interior floor, so as to eliminate any architectural barriers. Another important element for the construction of a comfortable and cosy living space is the introduction of natural light. This can be achieved through the introduction of glass doors with wooden frames (at the access openings), duly protected with wooden shutters – characteristic that respect the design and constructive system of the original door – in order not to change the architectural characteristics of the houses.

Case scenario B presents a set of two houses, also very small (with gross areas inferior to 50m²), interconnected to shape a one bedroom house. This house enjoys two outdoor terraces: one private, at the rear, and the other one is common area, along the main access, marked with shading elements and residence areas. This case scenario includes the interventions mentioned for the case scenario A, especially with regards to the dimensions of the access openings; removing steps at ground floor level; levelling interior floors; provide the rooms with natural lighting; creating wide and adaptable spaces to the various needs of its users.

Conclusion

The depopulation and aging of the rural regions of Portugal is not a modern problem, in a territory marked by inland regions and rural environment. Different rural areas watched their youngsters (e)migrate; schools, health centres, courts, public and private services and local trade closing, generating lack of opportunities; consequently more people abandoned those rural areas.

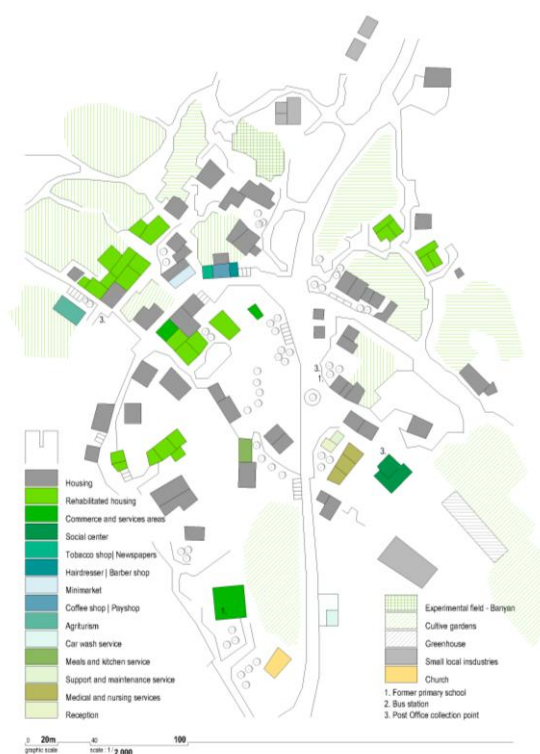


Figure 3. P essegueiro, Martim Longo – Alcoutim. Intervention in the territory: Urban Structure. Scale 1:2.000.

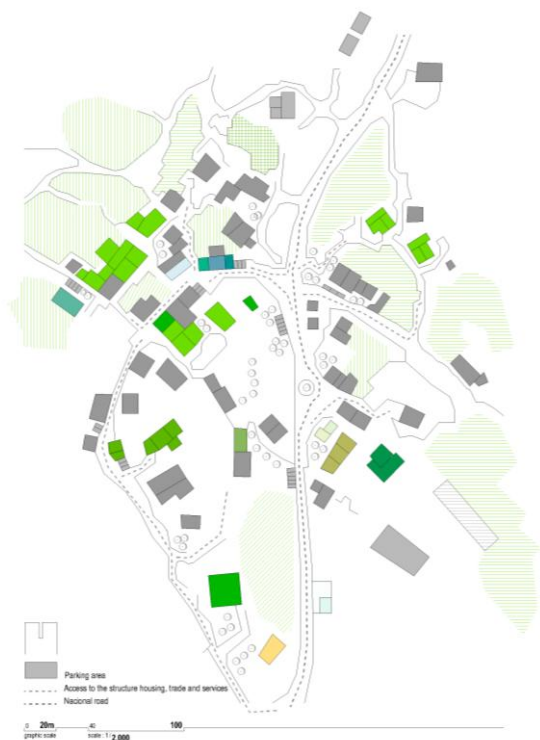


Figure 4. P essegueiro, Martim Longo – Alcoutim. Intervention in the territory: Urban Structure – identification of new constructions, new uses and redevelopment of the existing uses. Scale 1:2.000.



Figure 5. Pessequeiro, Martim Longo – Alcoutim. Intervention in the territory: Road Structure and parking area. Scale 1:2.000

Is depopulation a consequence of an aging population? Or is aging a consequence of depopulation? On one hand, young people abandon rural areas looking for opportunities, on the other hand, the lack of youngsters leads to a non-investment (public or private) for this investment is not feasible (lucrative).

In Portugal, inland regions interior will always be different from the coast regions. Different, in regards to the undertaken economic activities or, urban characteristics. These differences may be positive, since they can generate differentiated infrastructure's in the inland regions and promote a balanced revitalization of the territory. Housing structures for elderly people - developed according to a model of community life, like the Retirement Villages – may be one of those infrastructures.

These arise from the response needs in providing quality housing for local elderly and simultaneously the establishment of others, who wish to return to their origins, but seek

differentiated spaces and services; these may also attract other individuals (national or foreign) that intent to spend their retirement in a rural environment. This population increase brings new job opportunities, providing the establishment young people, whom also need different support structures. That is to say, taking one of the characteristics that mark the rural areas, aging population, and we may achieve the answer to another problem: depopulation, by transforming the aging population into an agent for change.

Notes

- ¹ People between 0 and 14 years old.
- ² People with 65 years old and older.
- ³ Parish of Martim Longo, Municipality of Alcoutim – Algarve
- ⁴ http://www.cm-alcoutim.pt/portal_autarquico/alcoutim/v_pt-PT/menu_turista/concelho/freguesias/
- ⁵ José Manuel Fernandes and Ana Janeiro (2008) “A casa popular do Algarve: Espaço rural e urbano, evolução e actualidade”, Comissão de Coordenação e Desenvolvimento Regional do Algarve, 87 http://www.ccdr-alg.pt/ccdr/parameters/ccdr-alg/files/File/upload/Publicacoes/Recentes/Casa_Popular.pdf
- ⁶ AA (1988) “*Arquitectura Popular em Portugal*” Sindicato Nacional dos Arquitectos
- ⁷ Banyan
- ⁸ PDMA – Chapter II: Use and transformation of the soil; Section I: Urban soil; Sub-section I: Spaces class; Article 9: Strong use of urban soil
- ⁹ RIBA (ed.), *A Guide for Assisted Living: Towards LifeHome21*. 1sted. London: Royal Institute of British Architects, 2011, p.36-67
- ¹⁰ The proposed measures considered necessary are expressed, both for case scenarios A and B, at the Intervention Proposal General Description, text include at the correspondent images.

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FIFA Confederations Cup Brazil 2013 and urban conflicts in Belo Horizonte, Minas Gerais, Brazil ¹³¹

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Abstract. *June of 2013 will be remembered in Brazilian history. The main reason for that could be the Confederations Cup held by FIFA and also the victory of the Brazilian team in such tournament. Nevertheless, between June 15th and June 30th of that year, the spotlight turned to the popular manifestations, protests to show disapproval of the perverse socio-spatial segregation processes that inform the history of the country. In order to hold the event, a major transformation of the structure and image of the six host cities – including Belo Horizonte – was necessary. However, it is important to emphasize that these changes are part of a larger process that indicates a concept of city which reinforces the capitalist basis of the property market and consolidates the historical process of social exclusion. In response to dissatisfactions accumulated over many decades, there have been several urban conflicts during FIFA Confederations Cup Brazil 2013 that turned the city into an arena and an object, in order to expose government's mistakes and claim rights. We remark that, when using the key concept "Urban Conflict" we mean any confrontation or dispute relating to infrastructure, services or urban life conditions which involves at least two collective actors and/or institutions (including the state) manifested in public space. This research is one of the subject areas of the Urban Conflicts Observatory. The main objective of this research is to analyze the urban conflicts that happened in Belo Horizonte during the FIFA Confederations Cup Brazil 2013, according to data and studies developed by the Urban Conflicts Observatory of Belo Horizonte.*

Keywords: Urban Conflicts; FIFA Confederations Cup Brazil 2013; Belo Horizonte.

Introduction

The Confederations Cup 2013, just like the 2014 World Cup, demands the fulfillment of a long list of requirements and recommendations made by the International Federation of Association Football (FIFA), ranging from technical issues related to the host stadiums and their surroundings (easy road access, proper public transportation and hotels near the airport), infrastructural issues (transport and telecommunications) to budget issues (the local government and the country's football federation must bear the costs regarding infrastructure). Therefore, many public works were started and planned in preparation for the events. An institutional arrangement was made, with new organizational departments and organizational committees at the national, state and local governments, and also partnerships with private companies (Alvares *et al.*, 2013).

These major sporting events have led to the transformation of the games host cities in Brazil. Football stadiums went through great improvements, since the government was aiming to meet the stadium requirements made by FIFA, such as expansion of their seating capacity, improvements in infrastructure, fire systems, among others.

¹³¹ This research is funded by UFMG (Universidade Federal de Minas Gerai), FAPEMIG (Fundação de Amparo à Pesquisa do Estado de Minas Gerais) and CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico).

Moreover, urban plots were dismembered to set new systems of public transportation and to expand the existing ones. Families were expropriated to make room for the construction of public works related to the events, being these areas, in most cases, interesting in the housing market.

It is emphasized that the occurrence of such mega events in the country, as well as the transformations they brought, are part of a larger context that involves new ways of thinking cities. Hence, these new local-global relations would be leading cities towards the adoption of policies and practices that would ensure their integration into the globalized world.

“We notice that the worldview that is imposed, in contemporary times, is covered with a kind of economic rationalization and the logic of the market begins to dominate consciences and permeate new discourses that arise. An arsenal of keywords and/or key concepts, to begin with the so-called globalization, an established belief that is often justification for thoughts and attitudes, and also means maximum growth, productivity and competitiveness appear in recent times as background of a context where the business/commercial realm is practically imposed to the most diverse discursive fields, also gaining strength in practice performances that refer to space in general”. (Gonçalves, 2005, p.42).

However, we can observe the engagement and the work carried out by groups that resist the current processes in progress. Among them, the Popular Committees of the Cup and the Olympics and its National Articulation (ANCOP) stand out, since they contributed prominently to build a collective consciousness about the fact that those mega events are a burden for the Brazilian population, as they lead to the deviation of resources from priority sectors (Vainer 2013).

Against the backdrop of the new perception of the events that were being developed in the country and bringing up dissatisfactions accumulated over many decades, there have been several urban conflicts during FIFA Confederations Cup Brazil 2013 that turned the city into an arena and an object, in order to expose government's mistakes and claim rights. We remark that, when using the key concept “Urban Conflict”, we mean any confrontation or dispute relating to infrastructure, services or urban life conditions which involves at least two collective actors and/or institutions (including the state) manifested in public space. This research is one of the subject areas of the Urban Conflicts Observatory under the leadership of ETTERN laboratory of the Institute of Research and Urban and Regional Planning – IPPUR, of the Federal University of Rio de Janeiro - UFRJ. One component of this network is the Centre of Urban Conflicts of Belo Horizonte, created in 2006. With this paper, we aim to analyze the urban conflicts that happened in Belo Horizonte during the FIFA Confederations Cup Brazil 2013, according to data and studies developed by the Urban Conflicts Observatory of Belo Horizonte.

The Confederations Cup 2013 in Brazil

The Confederations Cup is an event held every four years by the International Federation of Association Football (FIFA) and was held in Brazil in 2013, between the 15th and 30th of June. It was supposed to be an experimental event, prior to the hosting of the World Cup 2014.

The cities chosen to be the hosts of the event were Rio de Janeiro, Fortaleza, Recife, Brasília, Salvador and Belo Horizonte, whose major works and projects are briefly presented below.

Rio de Janeiro, city whose governor considered the Confederations Cup 2013 a rehearsal for their major projects for the World Cup, failed in his intention. The Cup happened and the only public work that was completed in time for the occasion was the Maracanã stadium, which cost twice what was anticipated in the original budget (from BRL 600 million, the budget was brought to BRL 1,049.00 billion, according to the state government). Besides, this stadium, that held the final match of the Confederations Cup and will also hold the final game of the World Cup, had a test match canceled and was inaugurated on the eve of the competition. The intention to expand the stadium capacity to 200,000 people was also not achieved, as it was reopened with a maximum capacity of 78 thousand supporters (Estádio, 2014).

The other public works anticipated in the original Responsibility Matrix of the Sports Ministry were postponed until the competition of 2014, for example, Antonio Carlos Jobim International Airport, the Galeão, whose improvement works were not finished by the beginning of the Confederations Cup and had its privatized services started only in September 2013. The new expected delivery date, according to the city of Rio de Janeiro, is the month of April 2014 (Portal Da Copa, 2014).

The Bus Rapid Transit (BRT) in Rio – Transcarioca – a project that involves the construction of an express corridor connecting Barra da Tijuca to the international airport, was 85% complete by the time the Confederations Cup started.

Rio de Janeiro wasn't even able to conclude its projects related to tourism in the city. The evaluation of the Brazilian Hotel Industry Association of Rio de Janeiro (ABIH - RJ) showed that only 70% of the 33 thousand vacancies of hotels in Rio would be filled during the Confederations Cup, and that the host capacity of the hotels will be increased for the World Cup, with over 10.000 new vacancies (Associação Nacional De Transporte Público, 2014).

In Fortaleza, also a host city, there were many pending projects by the time of such event, particularly related to mobility in urban environments surrounding Castelão Arena. In front of the stadium, the biggest of the public works (an overpass that was supposed to connect two major avenues) was shut down during the event. In a statement, the Ministry of Cities asserted that some of these great works will not be ready for the World Cup 2014 (MOBILIZE, 2014). The main urban mobility work in Fortaleza is the Light Rail Transit route (LRT) that has not been completed yet, and also the BRT along with its four projects, totaling 20 km and that will lead to the expropriation of 144 families to give space to a line of 3 km; the works of the Mucuripe port and the airport of Fortaleza, Pinto Martins, were also delayed when the Confederations Cup started (Mobilize, 2014).

In the city of Recife the numbers were around USD 918 million, according to the Responsibility Matrix. The works involve the Caxangá Corridor, that will become the main access of public transport by bus to the Pernambuco Arena, besides other projects related to buses, road transportation and the remodelling of Gilberto Freyre International Airport of Recife and also the port (Portal Brasil, 2014). The Pernambuco Arena was not complete during the games of the Confederations Cup and is still in the works, according to Portal da Copa 2014.

In Brasília, public works regarding urban mobility and improvements in Juscelino Kubitschek International Airport and the Mané Garrincha National Stadium were proposed. At first, a Light Rail Transit route would be built in the Federal capital, but the work was stopped due to irregularities concerning public bidding and ended up being removed from the Responsibility Matrix.

The city of Salvador had expected investments of BRL 172.00 million (Responsibility Matrix, 2010), which would be distributed between urban mobility works and improvements on the airport and the port. By the time of the Confederations Cup, a major part of such public works was delayed and/or unconcluded. We observe, therefore, that the cities were not fully prepared for the event.

Besides these five cities, Belo Horizonte hosted the FIFA Confederations Cup, whose projects and conflicts that occurred during such event will be presented below.

The Confederations Cup 2013 in Belo Horizonte

In the city of Belo Horizonte we can highlight some projects related to mega-events (Image 1), namely: the improvement of the Magalhães Pinto Stadium – Mineirão (1), the expansion of the International Airport (2), the creation of the Liberty Square Cultural Center and the revitalization of Savassi (3), the implementation of the BRT (Bus Rapid Transit routes), the transport corridor linking Pedro II avenue to Carlos Luz avenue, linking Route 210 (between Via do Minério and Tereza Cristina avenue in the west region) and linking Route 710 (connecting Andradas avenue to Cristiano Machado avenue) and Boulevard Arrudas to Tereza Cristina (Alvares *et al*, 2013).

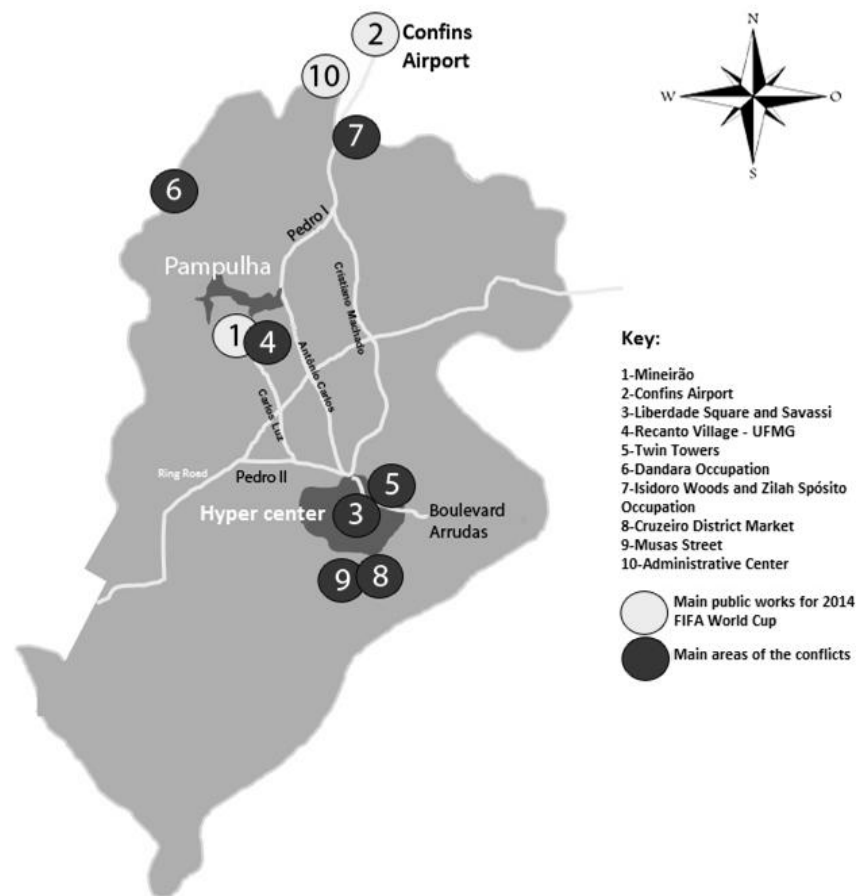


Figure 1. Location of the main projects in Belo Horizonte and conflicts due to the World Cup 2014 mega-event (source: Authors, 2014, based on Alvares et al, 2013).

The remodeling of Mineirão Stadium was completed on 20th December 2012, after two years and ten months of stoppage, with an expense of BRL 666.3 million. The Stadium is a preserved historical heritage of Belo Horizonte and therefore its original design, inaugurated in 1965, was not modified. However, some significant changes were made, for example, in its outdoor area, which currently contains an esplanade of 80.000m², called "Mineirão for All", with capacity for 65,000 people. The "New Mineirão" has better uses than before, since it now contains panoramic restaurants, 58 bars and snack bars, luxurious locker rooms, high definition screens; the field was lowered by 3.4m to improve its visibility, but its internal capacity decreased from 64,000 to 62,170 covered seats and 98 loges (Portal Transparência, 2014).

The BRT - Bus Rapid Transit implementation works were initiated on important roads of the city in 2010 but were not completed during the Confederations Cup, estimated period for the completion of such project. The construction of the BRT caused major detours and traffic problems, besides the expropriation of residents, especially in the vicinity of Pedro I avenue, which caused dissatisfaction among the population of Belo Horizonte.

Since the connection that the BRT would enable – between the center of the city and the Confins International Airport, located in the north of the Metropolitan Region (40 km far) – was not performed in time for the Cup, supporters who hoped that the city would be able to welcome visitors and provide quick and economic system of transportation were distressed. It is noteworthy, however, that the biggest losers were the inhabitants, workers and everyday users

of public transport and roads majorly affected by the works. The increase of time spent in traffic was significant and the delay in completion of those works made the situation worse.

Thus, the solution to a system with insufficient means of transportation to serve the supporters of the event was to facilitate the use of buses for those who would watch the games at Mineirão Stadium and issue decrees creating holidays, mostly because of the protests made by the population to show their dissatisfaction with the occurrence of the events in Belo Horizonte.

Regarding the promised subway expansions, its project began with surveys on routes throughout the city, but nothing was done besides that.

In order to stimulate the hotel business, Belo Horizonte established the Urban Operation (Law n. 9952/10), a "stimulus to the development of health infrastructure, cultural tourism and business, to meet the demands of the World Cup" in 2014. Thus, the city, that had 17,920 vacancies, was expected to increase that number to 31,240. The laws regarding such operation, when setting quite permissive urban parameters, fostered the construction of buildings considered out of the current context of Belo Horizonte, since minimum bedrooms were offered on abusive prices (Jornal Estado De Minas, 2014).

The dissatisfactions accumulated over decades, the changes aforementioned, as well as other modifications in the urban landscape of the state capital generated a remarkable grievance among the population and, consequently, several urban conflicts, manifested during the Confederations Cup.

Urban conflicts manifested in Belo Horizonte during the FIFA Confederations Cup 2013

There are several groups and residents who have been "affected" by the Cup and the public works it demanded. In line with other movements in other host cities, by the end of 2010, the Committee of People Affected by the Cup in Belo Horizonte (BH-COPAC) was created, as a way to group the various people and groups negatively affected and articulate their demands. COPAC-BH is part of the National Articulation of Popular Committees for the Cup, which comprises all Brazilian host cities and released, in December 2011, the Mega-events and Human Rights Violations in Brazil dossier, denouncing a number of systematic violations perpetrated by governments and their partners against population at three levels (Alvares *et al*, 2013).

According to Álvares et al (2013), arbitrary actions have been reported in the blogs of local committees (as for Belo Horizonte, the <http://atingidoscopa2014.wordpress.com/>) and at the Portal da Copa (www.portalpopulardacopa.org.br). In June 2011, along with the "Freedom March", different groups that compounded COPAC - BH protested in downtown Belo Horizonte against the social impacts caused by the Cup, requiring – among other things – an end to evictions and expropriations, as well as demanding popular housing construction rather than hotels.

The timing of the occurrence of the Confederations Cup ended up encouraging mass outbursts of protests throughout the country. Most of them were connected to COPAC and questioned the social impacts caused by the realization of the Confederations Cup 2013 and the World Cup 2014.

In this period, the Urban Conflicts Observatory of Belo Horizonte researched 134 conflicts, dated 13 of June 2013 to 31 of July 2013. This data collection was done by consulting the electronic newspapers: O Tempo online, Portal UAI - Estado de Minas, Portal PBH (DOM – Diário Oficial do Município), Portal globominas.com - MGTV and Portal Alterosa. The conflicts spread throughout the city, as it can be seen in Table 1. Among the chosen areas (Table 2), 28% of the conflicts occurred in the city center and 17% in the Center-South

Region¹³², where most part of the public agencies of Belo Horizonte are located. In addition, big public parades of protest occurred significantly throughout the city (15 %), starting in distant districts, heading to the center and neighborhoods of the Center-South Region and ending at the City Hall, in the central area.

Table 1. Areas of the conflicts, June and July 2013 (source: Authors, 2014).

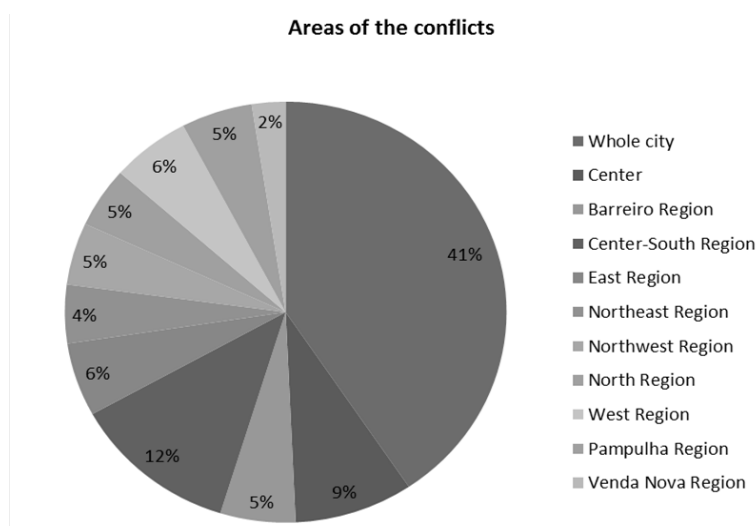
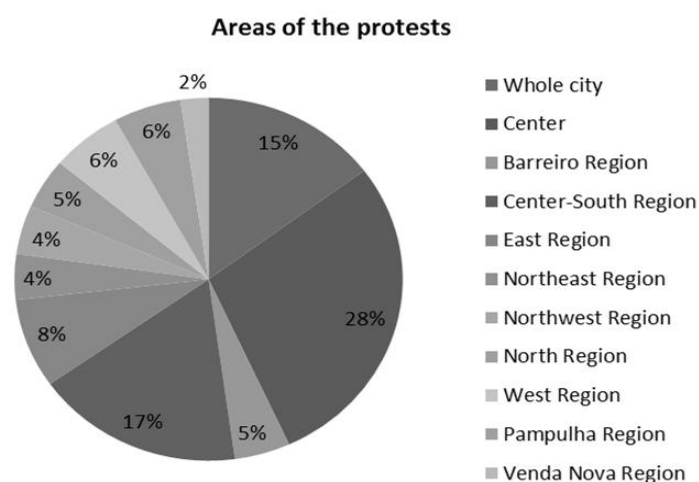


Table 2. Areas of the protests, June and July 2013. (source: Authors, 2014).



Most protesters demanded the repudiation of the abuse of political power and also the explanation, by the authorities, of alleged misuse of public funds and corruption schemes.

Based on Table 3, we notice that the majority of conflicts (27 %) had multiple objects ("other"), regarding the dissatisfaction related to the government's implementation of projects and public works for the Confederations Cup according to FIFA rules, instead of those related to education and health. The protests with multiple objects were eventually criticized and led to the discussion regarding the protesters "lack of focus".

¹³² Belo Horizonte is divided into nine regional administrations (Barreiro, Center-South, East, Northeast, Northwest, North, West, Pampulha and Venda Nova), according to their geographic positions and occupation history.

Claims concerning transportation (18%) were also recurring subjects during the Confederations Cup. Protests to demand the increase of the half fare bus pass program gathered a number of protesters since the outbreak of such protests in June.

The outrage began after the government's assertion that the half fare bus pass program would serve 95,000 students, when the actual number would not reach 8,000. Students demanded meetings with the mayor, requiring plebiscite on free fare in the city.

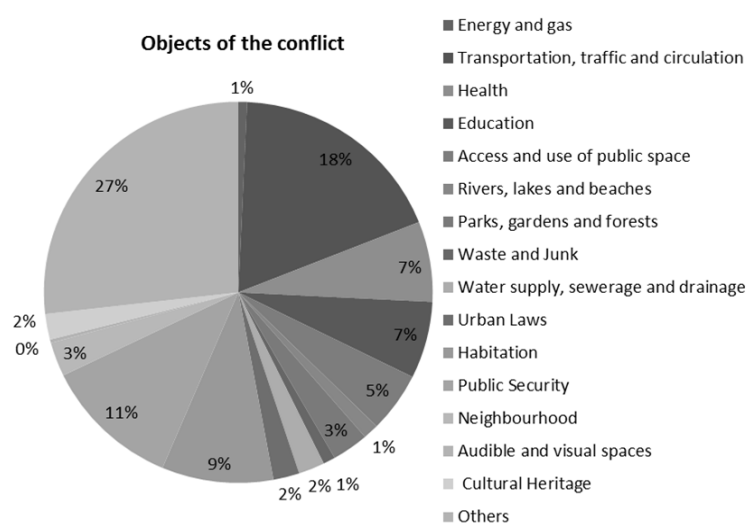
Furthermore, movements were organized to discuss the public transport systems in the capital and to discuss bus fare costs.

The grievances of employees of private and state companies were also expressive. Workers of the BRT (Bus Rapid Transport) public works, for example, made several stoppages and threatened to go on strike to demand better working conditions.

Health issues were also widely questioned (7%) and, as one of the responses, the Federal Government released the More Medical Doctors Program, for which foreign doctors were recruited to work in the country, especially in areas where medical services are scarce and lacked professionals or urban infrastructure.

Issues regarding education were also widely questioned (7%), ranging from the infrastructure of public schools to the increase in the number of schools vacancies and wider recruitment of qualified teachers. Along with the discussion related to education, there was a discussion concerning the share of GDP that is spent on education and also the proposition of increasing the share, which is currently 7%, to 10%.

Table 3. Objects of the conflict, June and July 2013 (source: Authors, 2014)



Concerning the mobilized groups (Table 4), most of them are "residents or neighbours" (24%). Therefore, remarkable are the protests of squatters – who questioned their rights in order to evoke a response from the Local Government – as well as the new land occupations and squats that happened during this period.

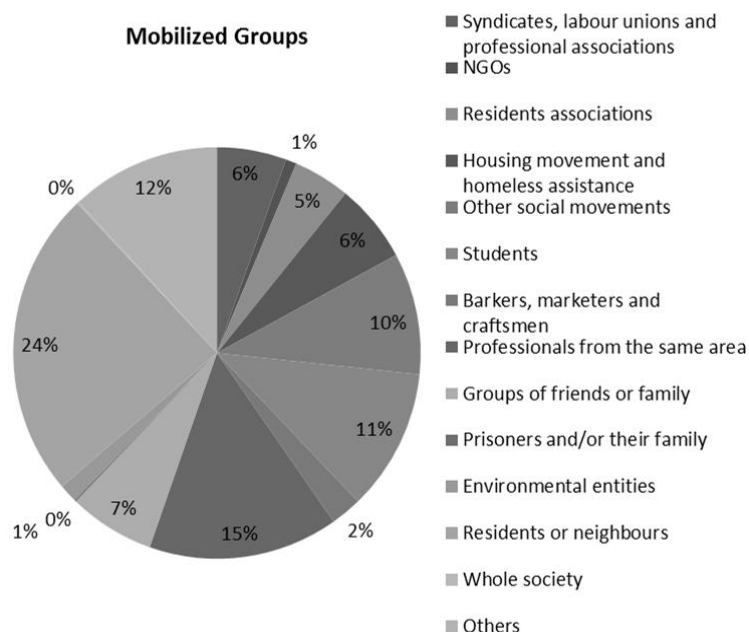
Professionals from the same area (15%) also joined to protest for better working conditions and some peculiarities in each area: the Organic Law for Police Officers; the return of fare collectors on Sundays and holidays, concerning the demands of bus drivers; the complaints of the Brazilian doctors related to the More Medical Doctors Program and the work overload of health professionals; public transportation vouchers and overtime work concerning waste collectors; salary increase and guarantees required by employees of banks; among other issues that arouse during this episode of massive dissatisfaction.

The number of students who went to the streets to protest was also significant (11%), since they showed a politicized attitude and outrage at the events that occurred in the country.

What draws attention in Table 4 are the "Other Social Movements" (10%) that include the population and the citizens as a whole, in addition to other types of movements and appearances of other existing and not recognized associations. Included in this category are people who were expropriated, either due to the BRT, to another public work made by the Municipality or because they were expropriated from areas which are interesting in the housing market.

We also emphasize the meaninglessness of the Syndicates, labour unions and professional associations (6%). In fact, we noticed protests characterized by little premeditation and euphoric outburst, in a certain way, as well as the rejection of partisan organizations.

Table 4. Mobilized Groups, June and July 2013 (source: Authors, 2014)



Regarding the means of protest (Table 5), 21% of the outbursts occurred as parades, especially in the aforementioned areas. Another significant means of protest was the closure of public roads, totaling 17%.

It is noteworthy, however, that the most common mean of protest was the outbreak in public squares (23%), drawing the attention of people who were passing by strategic locations of the city and encouraging the participation of people who were often unaware of the causes of such protests.

Depredation was little used, totaling 2% of the means of protest, but reverberated in society. Repression by the police force was significant and the protesters themselves repudiated depredation, understanding that such actions disqualified them and emptied their speeches, always full of claims.

Table 6 indicates to which institutions the complaints were made. The majority, 40% of the complaints, was directed to the Local Government, which explains the protesters choices to make outbursts in the Center and Center-South Regions, since the City Hall is in the center of Belo Horizonte, such as other public facilities where population claimed their Objects of the Conflicts. 13% of them were directed to the State Government, mainly due to the public works on roads and other structural changes, and 11% of the claims were directed to the Federal Government, which can be related, above all, to the problems in the housing programs, deemed ineffective and inefficient.

"Whole Society" represents a percentage of 11% and sums up the widespread outrage and generalized dissatisfaction, which were amplified in the given period.

The total of 7% concerning the Private Company as target of the claims represents the union of professionals from the same area, calling for improvements in working conditions, and also by users of such companies demanding the improvement of the companies' services and questioning the price of the service and the treatment given by companies.

Table 5. Means of Protest, June and July 2013

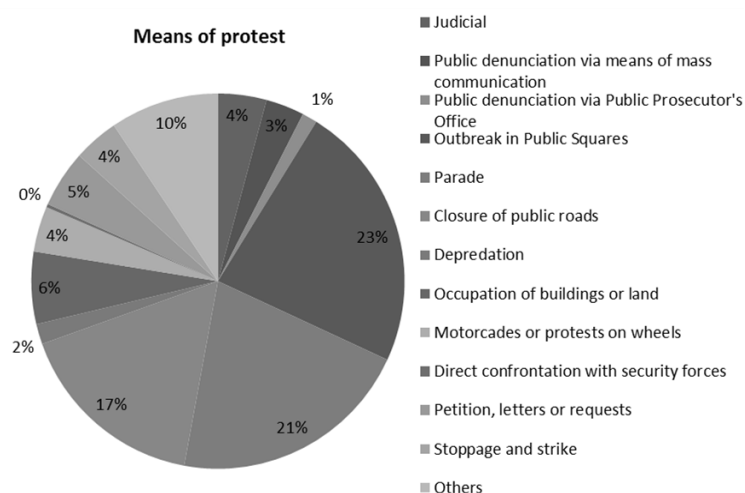
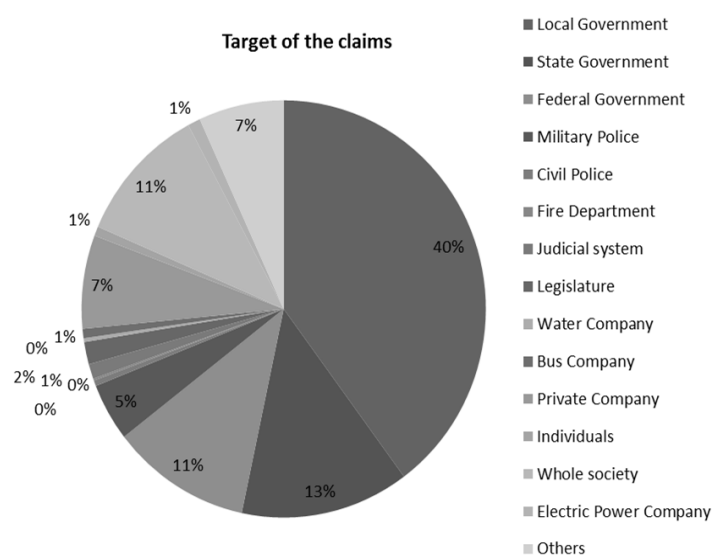


Table 6. Target of the claims, June and July 2013 (source: Authors, 2014).



Conclusion

Understanding the conflicts manifested in a area involves understanding the context that led to their emergence.

In recent times, Brazilian cities, often based on the adoption of international standards, have been seen as productive platforms and economic vectors, being designed within the construction and reproduction of competitive advantages and development of strategies that will ensure them a favorable position amongst the global intercity competition space. These ideas can be related to a neoliberal scenario and can be translated by the "urban entrepreneurialism".

Interventions related to communication or other activities connected with the global economy (information, quality of public services, culture, accessibility) are gaining space within the contemporary context and are, in most cases, nothing but specific interventions (which indicates that the general plans are little emphasized) of monumental or symbolic character - huge visible works that can be turned into spectacle. We can notice that the urban policies should be instruments capable of placing the city in the best possible way to seize opportunities, identify and promote its main attractions, according to the current propositions.

Ergo, the mega sporting events - the FIFA Confederations Cup 2013 and World Cup 2014 - fit into the picture, since they provide visibility to a country and its host cities. To attract investment, tourists and capital - that is the justification for such events.

However, it is noteworthy that the huge urban projects which are conceived and executed based on new planning models and also to meet the demands of the mega-events, in Brazil, have been reinforcing the capitalist basis of the property market and consolidating the historical process of social exclusion.

Increasingly, public spaces generated by such interventions are presented as spaces which are not accessible to a major part of the population - for example the Stadiums that cost billions and the prices of the tickets, which are not compatible with the reality of most residents. Also worthy of notice is the incentive given to the hospitality industry in Belo Horizonte, in disregard of the real needs of the city. Another example can be the public funds spent in spectacular public works for the Cups if compared to the neglected sectors of health and education in the country. Our current projects end up promoting a kind of urban "sanitization" in social terms, i.e. expelling groups that occupied certain areas of the city to distant places, far from the areas which are interesting in the market and that are only revalued after the urban "regeneration" or "renovation".

It is clear that these models that emerge in recent times, supported by the idea of the inevitability of competition between municipalities, present themselves in a convincing and hegemonic way. One should, however, consider other possibilities that are presented in the same context. In this sense, to evidence and understand the conflicts and events that took place in Brazilian cities, intensified during the 2013 FIFA Confederations Cup, can help to change the course that the aforementioned socio-spatial issues are taking in the country. Describing and enhancing the conflicts of a city are means of listening to what the city has to say. What happened in Brazil in June and July of 2013 brought to the surface some issues related to historical and recurring problems and showed the negligence, by the government, of one of the most fundamental rights - the right to the city. After all, for whom is the Cup? Who wins and who loses? For whom is the city?

Therefore, we must rethink the city based on concepts such as minimization of social exclusion and, considering the importance of citizen participation in the processes of management and planning, this path can be longer and more complex, but fairer. Pondering the particularities and historical and cultural realities of each place can expand the possibilities of effective and efficient action and may also contribute to the disruption of the historical process of reckless use of formulas and ready models.

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Urban morphologies of alternative spaces: a case study of Tehran

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Abstract. *For the past century, Iran has been characterized by an intense social polarization: on the one hand, those who claim a traditional, “Islamic” lifestyle, on the other those who champion a modernization akin to Westernization. This paper examines how the two forces have played out in shaping the physical spaces of the capital city, Tehran. The urban transformation of Tehran initiated in 1934 aimed, among other things, to restrict the cultural activities and public life of a traditional urban class in favor of a Western-oriented elite. The Iranian revolution of 1979 attempted the reverse: with similar procedures but with different outlooks, the revolution reinserted traditional culture into the public sphere and marginalized non-traditional subcultures. Both after 1934 and again after 1979, particular urban settings have played a key role in the form of “alternative spaces” that enabled the marginalized social group to preserve the vitality of their lifestyle. Using a case-study approach, this paper examines the ways specific aspects of urban morphology have contributed to the formation of these alternative urban spaces. Through a parallel analysis of Tehran’s Grand Bazaar and Ekbatan housing estate, this study posits that urban boundaries shaped by physical structures have been a significant factor in the formation of these alternative social spaces. The outcomes of this research shed light on the interrelationship of physical and socio-cultural landscapes in socially contested cities.*

Key Words: Iran, public spaces, social transformations, Bazaar, Ekbatan.

Iran’s cultural dichotomy

Iran has experienced two cultural upheavals in the past 100 years: a radical “modernization” in the 1920s and 1930s, and the Islamic revolution of 1979. Both led to vast transformations in the structure and use of public spaces in the capital city of Tehran. It was Shah Reza Pahlavi (1921-1941) and his son Mohammad Reza Shah Pahlavi (1941-1979) who forcibly modernized Tehran through both cultural and economic reforms as well as physical changes, including a new Western-style matrix of streets superimposed onto the old urban fabric. After the Islamic revolution in 1979, the new government, promoting a more traditional society based on religious values, shifted this social and cultural framework to limit the manifestation of a Western-oriented lifestyle in public spaces. Both conditions resulted in the polarization of the city, a strengthening of spatial dualities and the marginalization of certain groups in society.

Several studies have been dedicated to the spatial conflicts and territorialization of public spaces, both in the pre-revolutionary and post-revolutionary time periods (Mowlana 1978; Abrahamian 1982; Keshavarzian 2006; Amir-Ebrahimi 2006). Often the focus has been on the socio-economic processes that result in the internalization of public activities, or manifestations of resistance in public spaces. However, the role of spatial factors has often been neglected in these studies.

We aim to contribute to this body of work through focusing on the socio-spatial processes in the city. In this, we have studied Tehran’s conflicting conditions based on a parallel study of morphological, social and cultural transformations since the 1920s. We have investigated urban boundaries that segregate space in the city of Tehran from a socio-spatial point of view, in order

to explore the paradoxical relationship between governmental powers and people's actions in public spaces.

This paper focuses on the process of spatial segregation and internalization as a reaction to governmental control in two different and even contrasting historical and spatial settings: the Grand Bazaar of Tehran during the Pahlavi period, and a large residential complex named Ekbatan in the years after the 1979 revolution. We argue that the spatial segregation of these structures from their urban context blocks the homogenizing and controlling power that dominates the rest of the city, allowing the formation of an alternative socio-cultural landscape. Thus, despite significant variations in their mechanisms, these urban zones have become the spatial manifestation of the conflicting dualities that shape the power struggle in Iranian society.

Before 1934, the structure of Tehran was comparable to that of other traditional Iranian cities: surrounded by defensive walls, and with a bazaar that ran through residential neighborhoods, connecting a southern city gate to a citadel located in the north (Figure 1).



Figure 1. Map of Tehran and the Old Bazaar in 1859. Arrows shows the gates. Bazaar connects the main streets that are connected to Tehran's gates Source: Author reproduced from the Map of Tehran in 1859 Available from <http://geographyscience.persianguig.com/Map/>.

Transformations in the Pahlavi era dramatically changed the face of Tehran. In 1937, the walls and the twelve main gates of Tehran were demolished to open the city for future growth (Madanipour 1998). A matrix of wide and straight boulevards was superimposed onto the traditional urban fabric, destroying some parts of the Grand Bazaar (Figure 2). Replacing old narrow streets, these new boulevards gradually became the main channels of transportation in the city, as well as providing a backdrop for a new urban life. Through linking a series of squares, the new street network accommodated an increasing number of cars and facilitated the flow of traffic within Tehran (Mirgholami & Sintusingha 2012).

Parallel to this physical transformation, widespread socio-cultural changes were under progress. A new Western-oriented consumerist life style started emerging in Tehran, while religious spaces were replaced with new institutions. Reza Shah's reforms provided a basis for secularization in Iranian society, a lifestyle that required new public spaces (Abazari et al. 2007).

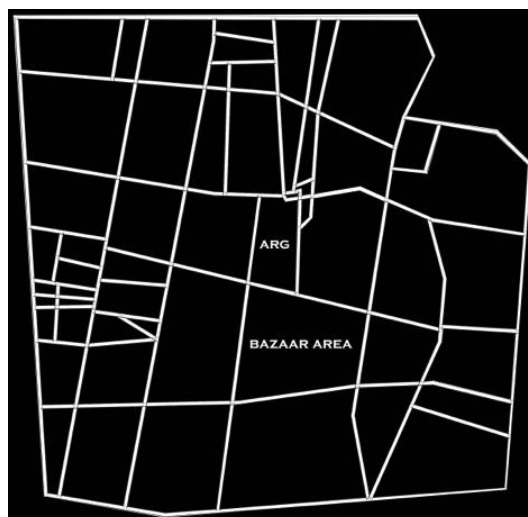


Figure 2. Map of Tehran 1944, reproduced by Author from: <http://nimrouz.com/blog/?p=618>, Accessed on May 14, 2014.

Secular institutions defined new zones for social life through providing public spaces. Through offering new forms of sociability and entertainment, these spaces implied a rejection of traditional lifestyles. At the same time, new activities expressed Western cultural components that were in conflict with the values of a traditional society. The hierarchical network based on social structures and public-private relationships in cities was replaced by a gridded network of streets that created homogeneity through connectivity (Madanipour 1998). The public realm, which was previously concentrated in the bazaar and its vperipheral urban structures, became a widespread network of orthogonal streets distributed across the whole urban fabric, and bordered by new commercial venues on both sides.

Social, political, cultural and urban transformations shaped a polarized public sphere in society. A fresh lifestyle started emerging under a new capitalist mode of production, as well as growing relationships with countries abroad. Exposed to modern ideas and cultural products, a new urban class was seeking a new identity. This was contrasted by traditional parts of society, who were following their own culture and beliefs. The foreign ideas, products and cultural manifestations brought in by the Shah were perceived suspiciously, and rejected unless confirmed by major clerics. These rejected a significant part of the new activities and products that were being promoted as part of a modern lifestyle as “immoral” and “non-Islamic”.

After the revolution of 1979, Iranian society saw a return to traditional values as a basic theme for cultural policies. “Modernity” and “secularity” were replaced with “Islamic” in public spaces. While cities did not face major physical changes, new policies limited Western cultural products, encouraged women to concentrate on domesticity and motherhood as their main responsibilities, and ended cultural secularization by bringing religious values back to the public realm. Rules and regulations were established to reinforce new codes of appearance and behavior in public spaces including traditional dress codes for women, separation of men and women in public spaces, prohibition of music and dance performances, and the prohibition of alcohol.

The cultural policies critically changed how people used public spaces, especially in large cities. The new codes significantly limited the continuity of the modern life style that had taken shape during the Pahlavi years. Spaces for non-traditional forms of interaction, including bars and clubs, were closed. Major urban spaces, such as squares, streets and parks, became a stage for implementing new codes. The controlling power was being transmitted through the urban network into the public realm of the cities, where even without the presence of police people were expected to respect the new rules (Amir-Ebrahimi 2006).

This controlling power shaped a paradoxical condition for public urban spaces, in which the most integrated urban spaces, i.e. those with the highest visibility, were at the same time those that were the most controlled. This paradox significantly changed the relationship of public to private life in society: home, as the most private space with private ownership, allowed freedom, while urban spaces became a stage where control would be exercised over one's behavior and appearance. In this sense, the meaning of visibility, usually associated with security, shifted to represent the insecurity of constant control through the moral police, neighbors, and community (Amir-Ebrahimi 2006).

The Grand Bazaar

The bazaar in Iranian society is a traditional market with small, individually run stalls, but was traditionally also the area for extra-familial sociability, public life and urban activities (Ashraf 1988). The bazaar usually consisted of a number of covered linear streets, interspaced with enclosed courtyards, small squares, and cross roads. This system provided access to major public buildings located within the bazaar, including mosques, public baths, cafes and gymnasiums. For this reason, the bazaar also played a significant role in the structure of Iranian cities. Tehran's bazaar is comparable to that of other Iranian cities, and to this date it contains all the original components of a traditional bazaar.

In Iran, the bazaar is recognized as the main core of the city. It is the extension of major streets in the city, which can be read in the continuity of the urban street system. Its central location in Iranian cities has a significant role in the formation of the bazaar's distinctive role as the center of social activities. The bazaar acts as an axis that connects different segments of the city through its linear structure.

Passing through the gates of the bazaar marks a major sequence within the city, that of moving from a publicly owned street to a seemingly privately owned and controlled urban structure. In this sense, the bazaar creates a paradoxical situation: it is the most sociable and the most integrated part of the city, while at the same time being owned and controlled by *bazaaris* (merchants who work in the bazaar), and protected by gates. The bazaar thus becomes a pseudo-public space in which activities, behaviors and appearances are highly controlled. Through their daily use of the spaces that comprise the bazaar, the merchants who work there have complete control over the behaviors and activities that take place in this space. The *bazaaris'* traditional outlook is reinforced by clerics, whose close relationship with *bazaaris*, allow them to have a significant role in controlling public spaces.

The transformation of Tehran in 1937 included ideas for controlling the urban fabric through the ease of access for troops; however the bazaar remained intact and, to an extent, untouched by this policy. Yet the attempted integration of the bazaar into the larger urban network became, for Iran's traditional society, an attempt to merge them into a Westernized lifestyle that was in contrast with their culture and beliefs; the attempted control over the space of the bazaar was thus perceived as an attempt to create a homogenizing network that would allow the government to flow its power into all segments of society.

The urban transformations of 1937 changed the spatial role of the bazaar within the city. The urban matrix shifted the public realm to the new streets.

The urban grid plays a major role in the patterns of use in a city (Hillier et al. 1993). Based on the space syntax theoretical framework, theory of natural movement investigates the relationship between pattern of using urban spaces and the spatial layout of the urban grid. Using space syntax's axial-line analysis, we show the change in the bazaar's integration level and changing role into the urban fabric before and after the transformation. The axial line analysis of the Tehran map of 1859 reveals that the city's urban core matches the location of the bazaar. The main axis of the bazaar have the highest integration value ($R_n = .81$), while other highly integrated lines are located on further streets of the bazaar. The integration value of the bazaar is much higher than the mean integration level in 1859 Tehran (which is $R_n = 0.51$) and

reveals the relatively central role of the bazaar in the urban structure of Tehran at the time (Figure 3). The urban transformation of 1937 shifted the core of the city from the bazaar to the new matrix of streets. After the transformation, the bazaar's degree of integration ($R_n = 1.59$) became less than the average degree of integration ($R_n = 1.64$). The urban integration has been shifted from the bazaar to the new major streets in the city, including Boozar-jomehri (later Panzdah-e-Khorded) ($R_n = 3.03$), Shapoor (later Hafiz) ($R_n = 2.89$) and Pahlavi (later Vali-asr) ($R_n = 2.96$) (Figure 4).

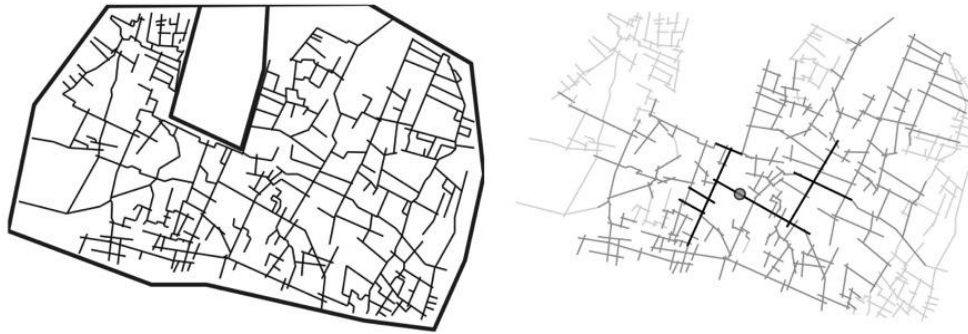


Figure 3. Global integration map of the City of Tehran based on the map of 1859. Main axis of Bazaar is marked by a circle. Source Author Reproduced from <http://geographyscience.persianguig.com/Map/>.

The other reason that the bazaar became more segregated within the city was the fact that without major destructions, the narrow and irregular streets of the bazaar were not compatible with the new vehicle-based transportation system in Tehran. Supported by clerics and traditional social groups, the *bazaaris* resisted the demolition of the bazaar, and any attempts at major reconstructions remained ineffective. Thus, movement within its spaces remained pedestrian-based and separated from the urban transportation system.

Despite its declining economic significance, the bazaar as the core of public life found a critical new role. Resisting external pressures, the bazaar gave an alternative space to traditional segments of society, allowing them to keep the vitality of their rituals, culture and belief. Without access to the new mass media, traditionalists relied on the bazaar and its subsidiary spaces as a channel of public communication (Mowlana, 1979). The bazaar was thus promoted from an economic center to the powerful basis for spreading cultural values of the traditional parts of society.

Urban transformations turned the bazaar from the spatial core of the city to a segregated shell protecting its spatial, economic, cultural and social structure from the life of the streets beyond. Urban transformations in the old urban fabric were a tool for integrating these areas into the larger socio-economic system promoted by the government and other modernizing forces within society. The coherent space of the bazaar protected the network of public buildings and religious spaces that functioned as the cultural and intellectual center for traditional elements of society, and provided space for the traditional rituals and beliefs that were being promoted inside the bazaar.

The bazaar's significance for traditional parts of society was also symbolic. The city's new public spaces, through their resemblance to European streets and through offering new forms of sociability, were perceived as a break from the past and as advocating "modernity", "connectivity" and "engagement with a developed world." In this system, the bazaar found symbolic meaning as the dynamic continuity of traditional values and meanings.

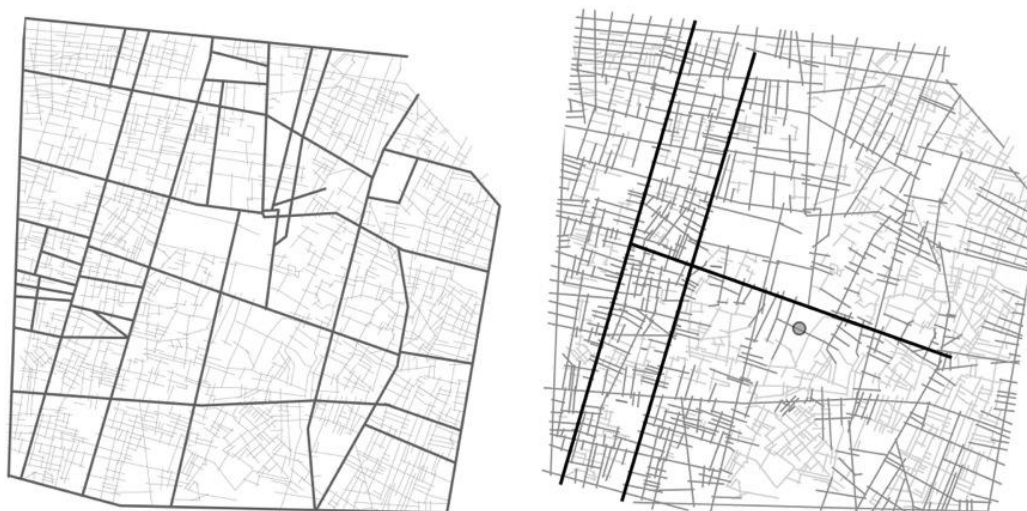


Figure 4. Global integration map of the City of Tehran based on the map of 1944. Main axis of Bazaar is marked by a circle Author from: <http://nimrouz.com/blog/?p=618>.

Ekbatan housing estate

The revolution of 1979 established restrictions over public appearances and behavior. As the rigidity of these codes declined somewhat after 1989, the rigorous distinction between the private and public realm of life shifted, and a new type of public space emerged that, while still controlled, allowed people to express themselves and act with a higher degree of freedom than in the city's most visible public spaces. This new type of space was usually privately owned yet open to the public, with less control over patrons' activities, appearances and clothing. Shopping centers, coffee shops, cultural centers, art galleries and restaurants were among these spaces.

Residential complexes in Tehran are the largest privately-owned spaces that are open to the public. In this study we focus on Shahrak-e-Ekbatan, the largest residential complex in Tehran, to investigate the role of urban boundaries in its spatial segregation from the city. A community planned as several building phases by American architect Jordan Gruzen in the 1970s, our analysis concentrates on Phase I of this complex.

Ekbatan's segregation from the urban fabric has created a space able to allow alternatives to the current top-down system of social control. Bordered by Mehrabad International Airport to the south, Ekbatan is bounded by highways to the north, east and west. The first phase of Ekbatan includes ten distinct blocks straddling a linear market place. This configuration is bordered by a row of trees, which has shaped a green belt around Ekbatan.

The spatial relationship between Ekbatan and its urban context depicts the relationship between residents and the city as a whole. Vehicular access to Ekbatan is possible only through two entries, one from the south and one from the north. The highways surrounding Ekbatan have completely disconnected it from rest of the city; pedestrians are not able to access the complex from outside (figures 5 and 6).

Vehicular traffic within the complex is limited to a single peripheral street that circulates around the complex and provides access to parking. The vehicle access to Ekbatan is possible through two entries from southern and northern highway. Ekbatan is not accessible from outside the region for pedestrians. Figure 7 is an axial line analysis map that shows the degree of integration between Ekbatan and surrounding areas. As can be seen in the axial analysis, the most integrated street is Nafisi Street, located between Ekbatan Phase I and a complex called Shahrak-e-Bime. Interestingly this street was blocked for so many years by a wall to prevent access from Shahrak-e-Bime until the wall was destroyed in 1997. This street was blocked by a

wall until 1997 to prevent access to Ekbatan from Shahrak-e-Bime. Despite this, Ekbatan remains spatially segregated from the surrounding city, and with its large size, the segregation of Ekbatan has shaped a hole in the urban fabric.



Figure 5. Three phases of Ekbatan from “Tehran.”, $35^{\circ}42'31.99''\text{N}$ and $51^{\circ}18'30.59''\text{E}$. Google Earth.

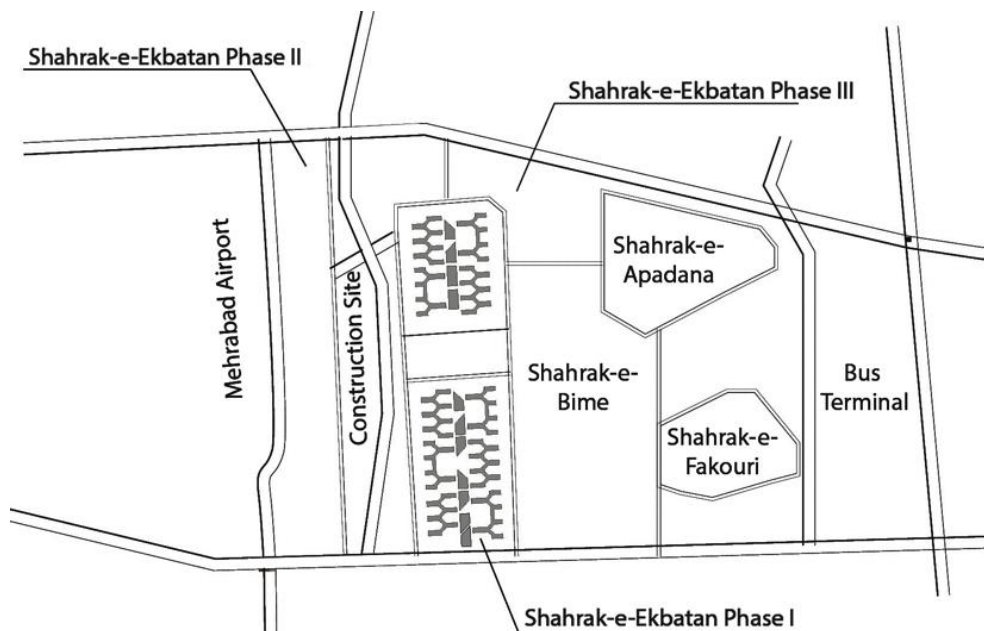


Figure 6. Ekbatan phase 1 is bounded by highways. Source: Author reproduced from “Tehran.”, $35^{\circ}42'31.99''\text{N}$ and $51^{\circ}18'30.59''\text{E}$. Google Earth.



Figure 7. Global integration map of the City of Ekbatan. The street between first phase and Shahrak-e-Bime is the most integrated street which is blocked by a wall, Source Author reproduced from “Tehran.”, 35°42'31.99"N and 51°18'30.59"E. Google Earth.

A layering of space has intensified the disconnection between Ekbatan and the city. Ekbatan's space configuration is based on striation, with transitions from the surrounding streets to the central market associated with crossing several layers of space. Layers provide a set of boundaries that decrease the spatial and visual connections between Ekbatan and rest of the city. These layers shape a shell for Ekbatan and create a visually and physically segregated “inside” (Figure 8).

Through its physical segregation, Ekbatan blocks the flow of movement from the surrounding urban network. Inertia caused by boundaries minimizes social exchanges between Ekbatan and rest of the city. In essence, Ekbatan is a micro-city separated from the main body of Tehran, which has allowed the complex to reject external surveillance and control. Socio-spatial barriers between Ekbatan and the surrounding city have developed the concept of “strangers” and “outsiders” among the residents in Ekbatan; residents use these terms to describe non-residents who use the open spaces of Ekbatan. Residents consider the exclusion of “outsiders” as the main aim behind the formation of a controlled world of familiar people, images and settings that contrast the anonymity and chaos of the uncontrolled world beyond Ekbatan's walls. Residents of the complex consider public spaces a part of their living environment, and the presence of police forces in Ekbatan is considered a violation of their private domain.

The boundaries of Ekbatan not only exclude outsiders but also limit the connection between the residents and the surrounding city. This border has created inertia against going outside Ekbatan, reinforced by the local availability of amenities such as shops and parks, or institutions such as schools and clubs. Thus the immobility of people within Ekbatan, as opposed to the “otherness” of people moving in the surrounding metropolis, has resulted in the locality of activities and relationships. More significantly, limitations shaped by these boundaries are a means of extending individual control over public space. The anonymity of the metropolis is substituted by familiarity and local social surveillance. Adjacency of living areas and public spaces has shaped the residents' high levels of control and dominance over the courtyards.

Residents recognize courtyards as the extension of their territory. In contrast with governmentally sanctioned external control, which Ekbatanis consider a form of restriction, local surveillance is considered as a means of security.

The proximity of public spaces and residential units, as well as the strong social bonds among residents, brings about their dominance over the public spaces. The moral police sent by the government usually avoid interfering in these spaces. In observing behavior taking place in Ekbatan, one sees that activities and appearances are much less hindered in these spaces. Women can be seen without head coverings in public spaces, people walk dogs, otherwise prohibited under Islamic law, and social interactions between unmarried young men and women are common.

The relative exclusion of external controlling forces within Ekbatan has made possible activities that are rarely seen outside. While the hijab¹³³ is mandatory in Iran, women can be seen without Hijab. While taking pets out of home is illegal in Tehran, pets are an impartible part of the activities in Ekbatan. Ekbatan is well known for its subcultures influenced by Western culture. Ekbatan is the origin of *parkour* or free-style running and a major site for *parkour* festivals in Iran. The complex is also known for its graffiti artistry. Concrete walls of Ekbatan are a safe canvas for graffiti artists to show their work. There is a concrete wall in Phase III of Ekbatan which is called “free wall”; it has become a favorite place for graffiti artists. Not surprisingly, a significant number of Western-style underground music groups also work in Ekbatan.

Conclusion

This work has investigated public spaces that, through their spatial segregation, have shaped a socio-cultural landscape different from the rest of Tehran. The two spaces discussed have created “alternative spaces” within two different regimes. While the role of the bazaar, as the core of the urban fabric and the main center for public activities, changed due to the urban transformations and rapid growth of Tehran, Ekbatan was originally imagined to be a segregated, self-sufficient complex. Both the bazaar and Ekbatan create urban voids in Tehran’s transportation network, further increasing their isolation. Both spaces are not accessible by car, while pedestrian and visual access is controlled.

The interrelationships between a top-down system of control and these urban boundaries are different in the two examples studied. Tehran’s bazaar has been symbolically and functionally merged with the public life of the city’s traditional society. The bazaar includes significant public institutions, and administration is provided through the traditional powers of *bazaaris* and clerics. Consequently, the bazaar has remained structurally and semantically engaged with traditional life. Segregation of the bazaar during the Pahlavi era provided an opportunity for preserving the continuity and vitality of a traditional lifestyle within the bazaar. Offering an alternative space inside the city, the bazaar rejected the homogenizing world being shaped outside, and offered traditionalists a controlled environment.

Ekbatan is also secluded from the city through physical borders. Rather than providing a socially controlling environment, however, the complex offers a more liberal environment than that of the city beyond. External control forces are blocked through a lack of vehicular access, creating a basis for a higher degree of freedom compared to the rest of the city. Both the bazaar and Ekbatan have created the opportunity for an alternative system to exist within the greater society. In this, the duality of Iranian culture has existed over time.

¹³³ *Hijab* is a veil that covers the head and chest, which is particularly worn by a Muslim female.

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Revisiting urban morphological classics

‘The future has an ancient heart’ is the title of a book written in 1956 by the Italian writer Carlo Levi. I mention it as inaugural metaphor of our session: the classics of Urban Morphology can be considered as the foundations of a building under construction, which will be much firmer and more cohesive than us (who are the builders) we will be able to recognize and focus our cultural debts with the masters who anticipated, with their studies, the complex problems of the urban form. In this respect the language barriers are a severe limitation to the international circulation of the texts of the pioneers of Urban Morphology, who as ‘classics’ should be read, summarized, commented and compared in a systematic way in their chronological sequence, regardless of the language in which were written. It could think out to put in them in a critical anthology, to be published in the future as a further step for the growth of our discipline. Moreover *Urban Morphology* in his collection has already hosted a series of articles aimed just to document the different national traditions of urban studies that preceded the ISUF establishment. Vitor Oliveira in his summary article (Oliveira, 2013) there has provided the references, which I here enclose as useful starting point for this project (which could be called ‘Critical Anthology of Urban Morphology’) to bring to completion in next few years.

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Comparative notes on Saverio Muratori and Ludovico Quaroni's urban projects: typology-morphology vs intuition or Piacentini's gymnasium?

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Abstract. *This study attempts to throw light on the different approaches to urban design between Saverio Muratori and Ludovico Quaroni, with particular emphasis on the way in which the two architects interpreted the idea of morphology and typology and the relationship between these two concepts, with its origins in the lessons they both received from Marcello Piacentini. The idea of 'typology' for Quaroni¹³⁴ was not to be confused with 'type', in the enlightened sense of the term (investigations of which are legitimate only in the case of monuments), even though, as Quaroni maintained, «the word 'typology' has been confusingly replacing 'type'¹³⁵, perhaps because of the word's aura of scientific fascination». For Quaroni, 'typology' meant simply the study of 'building typologies' and was not to be thought of as a generative process or a 'form-creating form' that was understood a priori – as Saverio Muratori would put it.¹³⁶ Quaroni in his writings usually talks of the 'successful achievement'¹³⁷ of a given building-type, as the result of a spontaneous process of a given urban civilisation. Rarely does he mention the idea of 'morphology-typology', identifying it as an interconnected problem to be examined 'in order to formulate correctly a design process' as is the case, on the other hand, with the Muratori-Caniggia school.¹³⁸ The paper includes some comparative notes on certain of the residential districts designed or built by the two architects, in particular the INA-Casa 'La Loggetta' district in Naples, and the INA-Casa at Magliana, Rome, 1956-57 by Saverio Muratori, and the Casilino residential zone of Ludovico Quaroni, 1963-64.*

Key Words: Saverio Muratori, Ludovico Quaroni, morphology, typology, Rome School of Architecture.

In modern Italian architecture, the work of both Ludovico Quaroni and Saverio Muratori had an important role in defining the relation between architectural typology and the form of the city. The relationship between the two architects has often been described as being fraught by bitter animosity and academic competitiveness; this was demonstrated to a large extent when they both took part in important design competitions at the end of the 1950's, and even more so when they both taught in the Faculty of Architecture in Rome in the sixties. Yet younger critics of architecture saw this apparent conflict as a sign that their opposed ways of thinking and different ways of envisaging architecture derived from their divergent educational background in radically distinct cultural, political and architectural principles.

¹³⁴ Esposito G., Quaroni L. (1996), *Il progetto per la città*, (Edizioni Kappa, Rome), 200

¹³⁵ The rhetorical figure of metonymy: to use in place of an object a word which is a logical extension of that object – type instead of typology

¹³⁶ Muratori S. (1963), *Architettura e civiltà in crisi*, (Centro Studi di Storia Urbanistica, Rome), 1963, 124.

¹³⁷ Esposito G., Quaroni L. (1996), *Il progetto per la città*, (Edizioni Kappa, Rome) 1996, 185

¹³⁸ Petruccioli A. (1998), *Exoteric, Polytheistic, Fundamentalist Typology*, In *Typological Process and Design Theory*, Akpia, Boston, 9. For a full-scale coverage of the schools, themes and protagonists of the so-called 'morpho-typological schools in architecture and geography, their roots in the Enlightenment (Nicholaus Louis Durand and Etienne Louis Boullée), and their differences – the French school (Marcel Poete, Pierre Lavedan – J. Castex, P. Paerai, J. Depaule), the English (M.R.G. Conzen) and Italian (Saverio Muratori, Gianfranco Caniggia vs Aldo Rossi, Carlo Aymonino)

The well-known designs that they created, in competition, for the Cep residential zone at the Barene di San Giuliano in Mestre in 1959 became almost emblematically an icon of their antagonism, of their wholly different way of imagining and designing cities. However, the urban design projects briefly described in this paper also include the *Villaggio La Martella* at Matera (1951) by Quaroni, the residential district *INA Casa 'La Loggetta'* in Naples (1953) by Muratori, the *INA Casa 'Magliana' I-II* (1957) by Muratori, Quaroni's design for the *Edilizia Economica e Popolare del Casilino 23* in Rome (1964), as well as, naturally, the various designs for the Barene di San Giuliano (1959). I have decided to examine these projects, which are well-documented with drawings and in some cases with photographs, because I feel that they enable us to reconstruct the progress attained by the two architects in their most productive years as regards their different achievements, and also the possible reciprocal influences between them. I believe this owes much to their common educational background, to the fact that they both belonged to the same generation of Italian architects who, since the 1930's, cast doubts on the dogmatic axioms of 'rational' modernism and preferred to speculate on the relationship between tradition and modernity, and on the formative processes of ancient cities compared to those of modern ones.

On closer inspection, both Quaroni and Muratori, even though they arrived at an interpretation of urban phenomena that was based on a different sense of the values involved, always conceived of and worked towards a better form of modern city, and held in their minds, openly or almost unconsciously, the idea of the city that had been handed down to them by their teacher Marcello Piacentini: a city of comprehensive monumentality, which was ensured by the design of the whole, its architectural richness consisting of monuments and 'small town' buildings fused together into a continuous fabric of architectural systems that complemented each other, and that, from the viewpoint of their teacher Piacentini, guaranteed that the entire urban organism was a programmed whole. Yet Piacentini had worked in a historical period and on projects whose themes were completely different from those undertaken by his two best pupils. The judgement of history that has up till now been passed on our two architects means that their ideas and projects deserve an ideologically less specialist outlook than they have so far been given. However, what is primarily needed is a critical and academic perspective that is more open to other academic systems – non-Roman, non-Italian – which for some time now have been observing and studying Italian architecture in a much more attentive fashion, seeing that no major Italian critic (Ernesto Rogers, Manfredo Tafuri and Bruno Zevi are long gone) is capable of using his own, *home-grown*, authoritative interpretation to mediate between Italy and the international critics.

All the preconditions are in place. The recent historical importance given by European and North American critics to Italian architecture from the thirties to the sixties is well documented. I need only cite one instance which points to a potentially new way of thinking about Italian architecture and architects. These are the words spoken by Eric Mumford in 2002¹³⁹ at a conference entitled *Urban Design: Practices, Pedagogies, Premises*, held at Columbia University, exactly two years after the death of Bruno Zevi, the oldest member of the great Italian critics of modern architecture: "Postwar Italian architects developed positions, which in different ways advocated the importance of architecture's relationship to the city and to historic urban culture, themes that continue to resonate in urban design down to the present. In Rome, Bruno Zevi (1918-2000) and Ludovico Quaroni (1911-1987), later joined by the young Manfredo Tafuri (1935-1994), advocated an organic and populist approach to the design of modern cities in which the neighbourhood or "quarter" assumed particular importance." In these few words, the irreconcilable ideological differences between Zevi, Quaroni and Tafuri were dismissed as nothing more than a thin coat of paint over the strong collective identity of modern Italian architecture. They are mentioned only as 'different ways', which did not hide the

¹³⁹ Mumford E., Framing paper delivered for the conference "Urban Design: Practices, Pedagogies, Premises" at Columbia University on April 5-6, 2002. File available at: <http://www.arch.columbia.edu/files/gsap/imceshared/Briefing%20Materials.pdf>

common intention of our twentieth century architects to express ‘an organic and populist’ concept of the city and its design. I am sure that not only Ernesto Rogers (the theoretician of the Italian neo-liberty style), but also Saverio Muratori, had Eric Mumford known them better, would have been included in his list. Naturally, by accepting Mumford’s perfunctory judgement of the heated debates that enflamed any discussion on Italian architecture within Italy itself to the point of almost destroying its vitality, the new critical perspective could start by finding a more cogent definition of the two adjectives ‘organic’ and ‘populist’ used by Mumford as describing the more progressive Italian viewpoint as seen from outside, as he was doing. Because it is actually in the debate on the significance of the *organic* in architecture that Marcello Piacentini, Bruno Zevi, Saverio Muratori and Ludovico Quaroni came together and disagreed with one another, as Lucio Barbera has also revealed in his essay *Ludovico Quaroni e Saverio Muratori, between dialogue and silence*¹⁴⁰; and it is precisely about the meaning of *popular*, in other words the popular culture of the city, that the four architects directly or indirectly disagreed. Piacentini recognised the people of modernity in the mass of the middle class that settled in the new cities, and who made their bonds with tradition the lifeline that helped them face modernity; Zevi fled from any kind of extreme or cathartic political ideology and believed it was each individual’s aspirations towards freedom that acted as a catalyst for the freedom of the urban population and of his own architecture. Muratori looked to the evolution of the culture of building and living, that which was thus anthropologically *popular*, within the processes of nature, the most important philosophy of history and architecture. Quaroni saw the fascination of cities not as a product of the overlapping of dominating, formalist or rationalist cultures, but as being due to the dialogue between these and the adaptive capacity for continual constructive inventiveness of a people without architects, who throughout history countered the restrictions of the dominant way of thinking by finding ever new ways to express the truth of their existence, which is and will always be our own.

Starting from that short quote from Eric Mumford and from my own concise observations, I am convinced that *a study carried out in a different spirit* on Quaroni and Muratori’s academic and design practices, as well as on the differences between them as regards urban design, could be a valuable Italian contribution for everyone, also – perhaps above all – in the non-Italian context.

Returning to the particular aims of my paper, I should remind anyone who is not Italian that in Italy, Quaroni and Muratori are figures (without any critical limitations, along the lines of star architects competing with each other) that are usually mentioned in association with the now mythical open competition for the Cep residential neighbourhood at the Barene di San Giuliano in Mestre in 1959, in which each of them took part as leaders of different groups. An experience that brought to a head their divergence as urban designers, began twenty three years previously. In 1936, the Italian architectural world had come to admire the two young architects who were participating together in the open competition for the plan for Aprilia, a new town on the agricultural land that was created when the Pontine Marshes were reclaimed. Their design did not win, but it was selected by the Milan Triennale for the 1936 exhibition. Pippo Ciorra reminds us that it was their design for the Aprilia Plan, and the different and contrasting designs for the Barene, that are both, after all these years, astonishing in their ability to renegotiate the relationship, or the “indirect dialogue with the urban formulations of the great master of the modern, [...] establishing form as the principal instrument of urban design”¹⁴¹. In between these two experiences, which without a doubt can be seen as important examples of design, we have the project that Saverio Muratori, Ludovico Quaroni and Francesco Fariello developed in 1939 for the *Piazza Imperiale* for the *Esposizione 42*.

¹⁴⁰ Barbera L.V. (2014), ‘Quaroni-Muratori between dialogue and silence’, in Barbera L.V. (2014) *The Radical City of Ludovico Quaroni*, (Gangemi Editore, Roma)

¹⁴¹ Ciorra P. (1989), *Ludovico Quaroni, 1911-1987. Opere e progetti, Documenti di architettura*, (Electa, Milano), 6-7

Piacentini's gymnasium

The professional relationship between Saverio Muratori and Ludovico Quaroni had never been the subject of detailed study before the recent essay by Lucio Barbera – who was an ‘eye-witness’, as pupil of both of them at different times and in different ways – entitled *Quaroni-Muratori between dialogue and silence*¹⁴². Barbera’s study was encouraged (one might say commissioned) by the organising committee of the Convention of Studies on Saverio Muratori of 2011 recently published¹⁴³, and was presented in its first draft during this itinerant convention on Muratori in May 2011. What follows are the issues that emerge from Lucio Valerio Barbera’s study that are relevant to our purposes in this paper. First of all, the joint experience in the 1930’s of the youthful studies shared between Saverio Muratori, Ludovico Quaroni and Francesco Fariello, classmates in a faculty dominated by Marcello Piacentini. Barbera reports a rather difficult confession made by Quaroni: “between ’37 and ’40 they called us “the Dauphins”. Barbera reckons that this ‘ironically regal’ title was, on the one hand, due to Quaroni’s presence in the group, and ‘his never-mentioned though well-known Piacentinian “ascendance” had made him, in the eyes of many, the principal heir to a formidable professional and political position. Yet that nickname used in the plural – “the Dauphins” – revealed that there had been, perhaps, a shift in its meaning; the three were not simply the “Dauphin’s group”, but each stood out and distinguished himself for some recognisable individual quality – they were only twenty-six or twenty-seven at the time. I am certain that the young Muratori, with his capacity, or better yet his absolute necessity to make each act of design the consequence of lofty philosophical principles, undoubtedly stood out as a singular young individual with a tendency toward the theorisation of architectural composition”¹⁴⁴.

The Muratori-Quaroni-Fariello group, then, developed a series of projects for competitions, among the most important of which were the design for the *Aprilia Plan* already mentioned, the competition for the *Preture unificate* (1936), the *Opera Nazionale Combattenti* (1936) and the *Piazza Imperiale* project for EUR (1938). The detailed list of the competitions and works can be found in the section *Regesto delle Opere* in Pippo Ciorra’s book on Quaroni.¹⁴⁵

It was a period of real communal training; Barbera continues in his essay, trying to find useful clues to the ‘singularity and diversity’ of the two architects: ‘They constructed a very exclusive “time and space of self-education” [...] that generated lines of research that each would pursue in his own right over time [...] Despite the scale of the distance and growing mutual rivalry that developed over the years, we must not forget that in cultural terms they were linked by a common root and by a number of shared underlying convictions. These latter included the conviction that Rationalism, often in its German incarnation, served as an extraordinary demonstration, with touches of elegance, of the necessity of overcoming *the crisis of a determinate moment in a determinant space*. Making it a universal language meant making it a “style” among others, though it was intellectually comfortable and very economical to build. The post-war birth of the so-called “International Style”, in Italy loaded with political meaning – rationalism as the “style” of democracy – appeared to support their claims. Their point of view was derived from an even more profound conviction: that history is a continuum in which fractures and dramas can be overcome only if, beginning precisely with them, we start out once again with a greater understanding of the city in history, calling on all that we identify in it as significant values, processes and forms to model the city of the future. As part of this vision, at a certain point Quaroni and Muratori, so young at the time, appeared to confront also the problem of technology, in order to test the possibility that their vision could synthesise it, utilising in

¹⁴² Barbera L.V. (2014), ‘Quaroni-Muratori between dialogue and silence’, in *The Radical City of Ludovico Quaroni*, (Gangemi Editore, Roma)

¹⁴³ Cataldi G. (ed) (2013), *Saverio Muratori Architetto*, (Aion, Firenze)

¹⁴⁴ Barbera L.V. (2014) op. cit., 223

¹⁴⁵ Ciorra P. (1989), 163-168

favour of the modern city less its incomparable productive efficiency as the new idea of beauty that accompanied it.¹⁴⁶

The urban culture of Europe in that period reached the young Quaroni and Muratori through the filter of Piacentini's view of it; he used to teach wonderful lessons on European cities furnished by photos – his book, *Architettura d'Oggi* is an example – and up-to-date maps, but above all backed up by his incomparable direct knowledge (for his day) of the cities of Europe. Even when he became a professor emeritus in the fifties, Piacentini was still giving introductory lessons on the historical design and the form of European capital cities and their architecture (*Edilizia Cittadina*, town building, was the term he used) almost as if such didactic exercises were the lifeblood of his cultural outlook and of that of future Roman architects.. Piacentini was of the opinion that cities were the expression, and at the same time the *bedrock of culture* and the laboratory, of the development of architecture; modern architectural research derived its strength and its sense from the historical character of cities, as had always been the case throughout history.

Let us look at what he wrote in his book *Architettura d'Oggi*¹⁴⁷ in 1930 regarding European and Italian architecture, particularly the Roman variety: “Modernism in Italy became bogged down in simplifying theories, without taking the plunge. Rationalist and ultra-modern formulas are only now beginning to interest some of the younger architects, especially in northern Italy, but these ideas have an imported feel to them, and cannot yet be adapted to our particular climate. Our form of modernism instead is reattached to the entire evolution of Italian architecture and reflects the character and traditions of our regions. *Among the Romans, as is only natural, a broad sense of solemnity predominates*; for the Milanese, a greater reserve, a finer circumspection. *The Romans remain in touch, in a very free fashion, with ancient architecture, taking their inspiration from the ruins of the Empire, and reconnecting with sixteenth century art, with its wide surfaces, heavy protuberances and splendid profiles. Nor is there always an order to these massive forms. Their tutelary deity is Sangallo* (author's italics)”.

Baroque Rome, neo-realist Italy

Piacentini's words reinforce the idea that in that period there was in Rome a widespread and specific method of envisaging the form and the architecture of the city, rooted in history in its materials and appearance; but Rome was no exception. Piacentini maintained that the different European cities, regarded as primarily ‘cultural areas’ or a significant variation of such, were each characterised by a specific way of organising space and creating architecture that derived from a stable evolutionary process, taken up by and strengthened by becoming the dominant mindset of the local ruling classes, and in the case of capital cities, the national ruling class. This was a way of conceiving and organising the city that was to be respected or renewed or even invigorated by modernity, as Saverio Muratori would say at a later date. One certainly cannot hide the fact that for Piacentini, the elements of architecture (building materials present on site, climate, housing styles, social culture, relationship with natural and planned (urban designed) morphologies) were only vaguely and misleadingly defined as ‘spiritual identities’ of the local culture, or even merely as ‘Italian’, and other similar convoluted simplifications. However these few lines, where Piacentini traces a chain of natural evolution and reproduction from the remains of ancient Roman architecture through the early and late Renaissance to the threshold of the Baroque, describe the material and cultural (or ‘spiritual’, if we include all his categories) landscapes on which the main ‘Roman’ exponents of the Baroque era modelled themselves, and on which, therefore, the major exponents of modern Rome should continue to model themselves, in their own way. We should bear in mind that Piacentini was born at the end of the nineteenth century, and for him, the Rome of the popes, which commissioned and created much

¹⁴⁶ Barbera L.V. (2014) op. cit., 228

¹⁴⁷ Piacentini M. (1930), *Architettura d'Oggi*. Re-print 2009, Mario Pisani (ed) (Libria, Melfi), 36

of the Mannerist and Baroque architecture of the city, had lasted until just a few years before his birth. The exedras, both large and small, of the temples, the villas and the ruins of the baths that emerged from the landscape of the *horti urbani*, the idea of axial roads, tridents, symmetrical squares or squares with dynamic central spaces, ellipses, the idea of lines converging on an actual or virtual centre point or points – all these, originating in Rome, had certainly had an effect on most of the greater or lesser capital cities of Europe and had become the most lasting and recognisable components of western city culture. For Piacentini they had to continue to be a point of reference and an inspiration for the new generations of Italian architects, the precious grounding of modernity. This was the basis of his teaching, and Quaroni and Muratori, in the accustomed fateful dissension between master and pupils, reacted against it but also absorbed it while trying to supersede it with their own new youthful ideas. Each of them, in attempting to reject Piacentini's teaching, chose two different paths that led to the same end: the repudiation of rationalist and internationalist orthodoxy. Setting aside here the problems that they themselves would have seen as problems 'of style' rather than 'of architecture', in the post-war years, their interest in urban design pointed them towards the world of small Italian towns, situated in the arduous morphology of the Apennines, beset as they were with economic difficulties from ancient times. For each of our architects, this interest came about in different ways¹⁴⁸. Briefly, for Muratori, concentrating on these valuable places that seemed to best exemplify the strength, rationality and overall organic nature of 'natural' architectural processes, created an opportunity and a field for analytical research into the 'true state' of humanity within nature. For Quaroni, on the other hand, the same truth was to be learned through intuitive impressions, through the power of suggestion, by means of an ability to identify with and creatively reproduce the wealth of an urban and environmental complexity that no analytical or systematic process could ever replace. Here we should take a quick look at Quaroni's deeply felt belief about the value of intuition as a major tool for understanding and modifying reality. He used to say to his students (who sometimes would have preferred a more systematic or rationally organised form of teaching) that intuition was a form of reasoning of a higher order, a granule without size that contained the entire complex repository of our cognitive processes, which, if expressed in linear fashion or even in the most intricate of three-dimensional frameworks, demonstrate the transience and insufficiency of all reductive simplifications. And so, in the very years in which Muratori was starting to build his monumental system of 'scientific' interpretation of the relation between man and nature, in other words, of architecture, Quaroni resurrected the expressionist intuition of Bruno Taut, publishing for the first time in Italian his *Die Stadtkrone*¹⁴⁹, the City Crown, with a marvellous introduction, which I advise everyone to re-read.

Quaroni and Muratori

But at the end of these journeys of research that were so different, the arrival points as regards design seem to me, living two generations after the two architects' confrontation, to converge on one another to the point where they overlap in certain of their basic premises; I would say that they appear to coincide 'even more strikingly' if I consider those who have made each one of our architects the founder-figure of their own monolithic 'party', totally closed off to outsiders. On the other hand, for both Quaroni and Muratori, the spark that lit their independent research came from the short-lived yet intense enthusiasm of Italian neo-realism that almost unanimously assailed the thinking and aroused the interest of educated, professional, artistic youngsters who emerged after the second world war. For both of them, this experience, after initial experimentation, proved to be inadequate, and so, without changing the focus of their attention (the connection between building and organism, between the individual and society, and

¹⁴⁸ Cfr. Barbera L.V. (2014) op. cit., 219

¹⁴⁹ Taut B. (1919), *Die Stadtkrone*, (Eugen Diederichs)

therefore between an inhabitant and the urban space he inhabits), they moved from the poetry of the small ancient towns, which they saw as models for the new residential neighbourhoods to be built on the city outskirts, towards the search for an overall picture of the city, seen as a physical, and above all conceptual, place with a continuity of settled spaces and the co-presence of many-sided and contradictory (or also complementary) aspirations belonging to a complex society. During the same period that Quaroni, after his designs for the Tiburtino IV residential quarter, wrote his famous article criticising architectural neo-realism entitled *Il Paese dei Barocchi*¹⁵⁰, Muratori began revising his own design methods that he had adopted immediately after the war which were in part neo-realistic and in part rationalistic, moving on from his work in Rome on the INA Casa quarter at the end of the 1940's to the Naples and Magliana designs of the early 1950's. And here there unexpectedly appeared what Piacentini had perfunctorily prophesied, the 'genetic' teaching of Rome's urban architecture, which materialised in the atmosphere of antiquity, I would say of history, that typified the researches of Muratori and Quaroni, and which was certainly reinforced by their intuitive analysis of unplanned settlements in Italy, but also and directly by an exquisitely morphological examination of the 'compositional' efficiency at any given scale of the baroque urban and scenic system. Thus it is not difficult to see the 'genetic' origins of the great spoke-shaped radial systems that are a feature of the residential zones of Muratori's Loggetta and Magliana and of Quaroni's designs for the Barene San Giuliano and the Casilino district. In the first of these Quaroni designed a polycentric system of convergences which is monumental and semi-hidden at the same time, while in the Casilino project he dogmatically designed all the fabric according to polycentric convergences towards focus points that were by this time merely virtual; this marked Quaroni's elimination of any symbolic effect inherent in urban systems since he no longer believed that there was any remaining possibility of there still being a 'Crown' of the District. Instead Muratori still seemed to believe it in his Loggetta project in Naples, but this was no longer the case for the Magliana or the designs for the Barene di San Giuliano, where his research is entirely morphological and the monumentality that is indispensable in an urban context is exclusively assigned to the layout of the residential buildings themselves. It therefore seems to shed light on Muratori's remark in the academic year 1959-60, when he was commenting to his students on the results of the open competition for the Barene di San Giuliano, which he had won, that the only project that he found interesting (apart from his own, naturally) among all the designs presented by the elite of Italian architects of the day, was that of Ludovico Quaroni. A project, however, Muratori pointed out, that had been dealt with in a 'formalistic' manner; his use of this word revealed the difference between the two approaches, his and Quaroni's. Muratori certainly realised that his words were in any case an important tribute to Quaroni, but he could never have known then that he was proving Pippo Ciorra right, when, many years later, in the book mentioned above, he revealed that in the Barene project Quaroni was attempting to uphold "form as the primary instrument of urban design", to the astonishment of the Italian architectural world, and that he was opening "an explicit dialogue with the urban proposals put forward by the great modern masters". But Quaroni also, Ciorra goes on to say, appeared to want to restore meaning (if somewhat abstrusely) to the long-term aims that linked him to Saverio Muratori from an early age. Muratori's designs for San Giuliano, Ciorra says, were "the exact opposite in every sense to Quaroni's, yet this 'opposing polarity' – and here Ciorra is quoting Quaroni – 'resulted in a confirmation, rather than a contradiction of certain affinities that I shared with Muratori in the pre-war infantile period of architecture'". Finally, reflecting on the courses in composition during his teaching experience at the Rome School of Architecture, Quaroni wrote¹⁵¹ some significant comments on Muratori in the cultural atmosphere of the Faculty of Architecture in Rome: "after the twenties, which were a sort of decade of trial runs, came the thirties and the crisis of rationalism, the controversy of 'the arches and the columns' and the famous struggle between modernity and tradition (the review

¹⁵⁰ Quaroni L. (1957), *Il paese dei barocchi*, in (Casabella-Continuità, Milano), n.215

¹⁵¹ Quaroni L. (1972), *Cronaca d'un corso di composizione*, (Controspazio, Roma), maggio-giugno, n.7

Casabella was forbidden to students and the Library did not subscribe to it); then we had the forties and the war, then the 1950's and the neo-realist crisis, the organic movement and the APAO which flowed into the student movements, a battle that pivoted round the *old* and the *new*, that was principally a movement of an élite that was aware and culturally and politically committed, up against an élite that was conservative, culturally represented by Muratori alone, but exploited politically by a group that had more or less disqualified itself by the bad behaviour of its followers and disciples. Muratori's philosophical standpoint was totally different from that of the Italian Academy who wanted the Faculty to be a 'breeding ground' for small-time professionals armed with tracing paper. It was Muratori who first began to read books on architecture and get his students to read them; the first, in Composition, to teach on a cultural plane and get to work on a disciplined plane. He was also one of the first to specialise in city architecture [.....] But the discipline Muratori insisted on did not work for our times, and despite the fascination of his words, many students said they were dissatisfied with his teaching". At this point Quaroni's voice seems full of consideration and regret, a voice speaking the truth about his 'true' Muratori, his companion in 'the pre-war infantile period of architecture', but also a difficult, fragile friend; there was much that linked the two of them, and much that separated them; there was much that he learned from him, and much that he rejected. In the last years of his life Quaroni loved to listen to the music of Brahms, with whom one can imagine he loved to secretly identify himself; he saw himself in the loneliness of the German composer, who was only half understood in his day, and also perhaps, in the pointless, condescending story about the great rivalry between Brahms and Wagner and the Wagnerians, invented, as always, by the 'best' disciples of one or the other.

Project descriptions and figures

The geometric arrangement of the 'La Loggetta' (up) project in Naples has many similarities to the Casilino project: it has a radial network system, but compared to the Roman project it is situated on a hill rather than on flat ground. This has influenced the creation of a landscape¹⁵² which has as its focal point the service area and the church which are clearly shown in the perspective view of the project. This view brings to mind the designs for the village of La Martella Village by Ludovico Quaroni (down), built with a completely different rationale in an area that is mostly flat and only slightly sloping, and which determines the scenic appearance of the buildings that surround the 'crown of the city', the church, with the rich variety of residential buildings below (La Martella Photo). The height of the buildings in the La Loggetta project, on the other hand, is constant, and the variations in shape are made by varying the heights of the plots on the sides of the hill. Reproduced from Maretto M. *op. cit* (La Loggetta) and Ciorra P. *op.cit.* (La Martella).

Muratori created four designs for the Magliana project (Magliana I on the left, Magliana II on the right), one for a settlement at the foot of the valley, and the other three for a settlement arranged on a complex hill ridge. All of them remained in a somewhat preliminary state, especially those for the ridge. The most complete was the one for the valley, and shows a considerable evolution from the INA-Casa La Loggetta project from a few years before. The designs for the hill ridge are masterful compositional exercises in a very difficult natural morphological situation using the most refined instruments from the baroque urban project in which, under extreme conditions, Muratori experimented with his already elaborate system of analysing and designing the city: external and internal polarities, architectural piazzas, and axial and radial roads worked out, naturally, by his very advanced studies of the hill ridge settlements. Reproduced from Maretto M. *op. cit* (Magliana I-II)

¹⁵² Maretto M. (2012), *Saverio Muratori. Il progetto della città. A legacy in urban design*, (Franco Angeli, Roma), 97-101

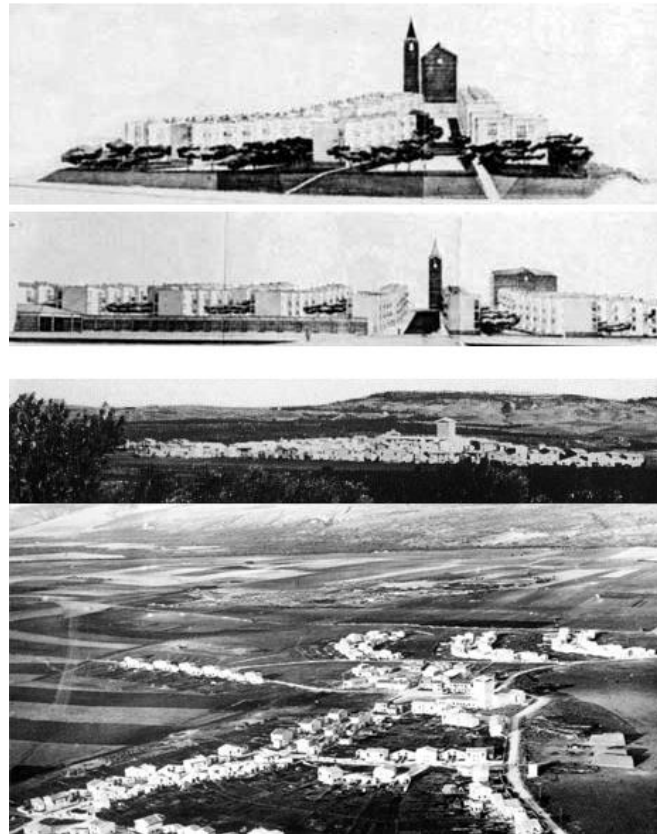


Figure 1. INA-Casa ‘La Loggetta’ (1953) and La Martella (1951).

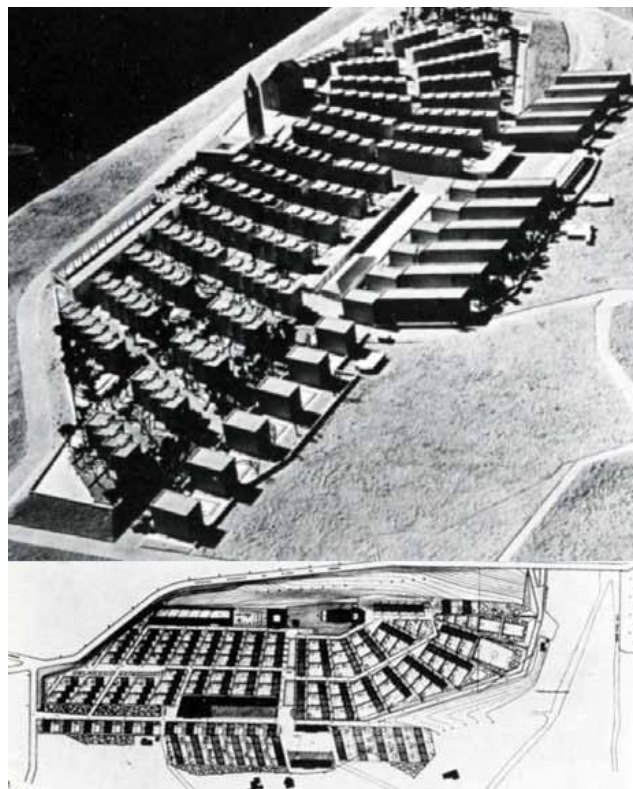


Figure 2. INA-Casa ‘La Loggetta’ (1953) and La Martella (1951).

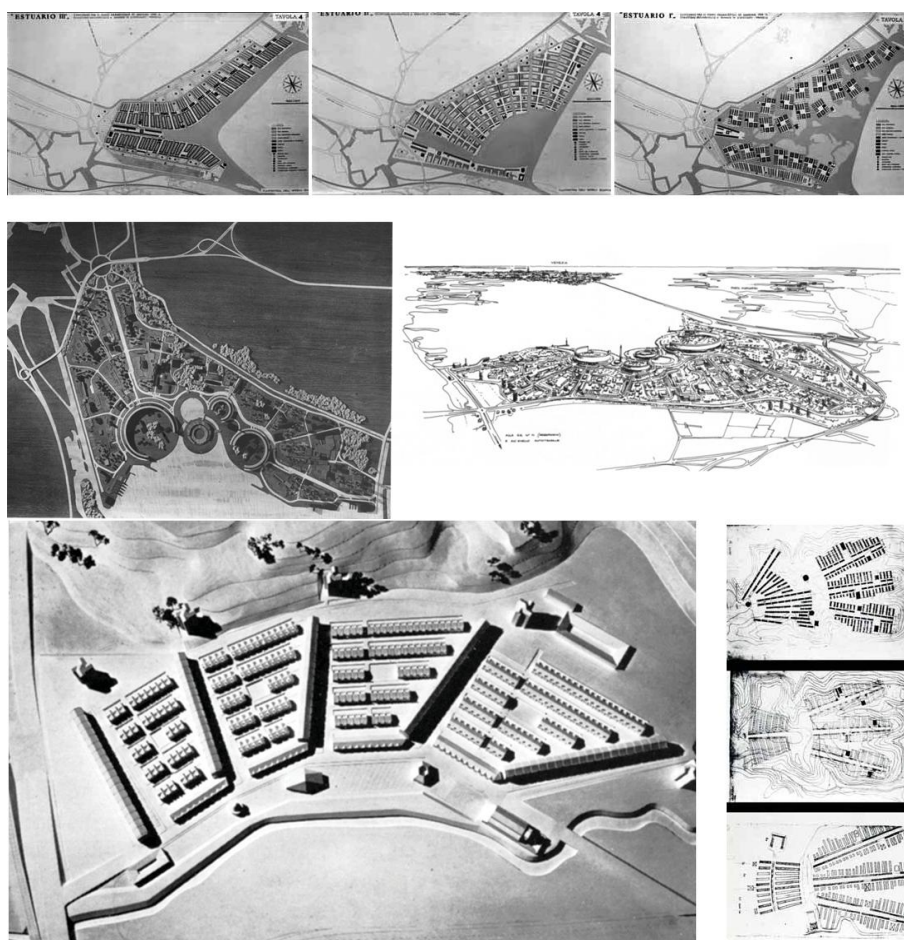


Figure 3. INA-Casa “Magliana I-II” (1956-57).

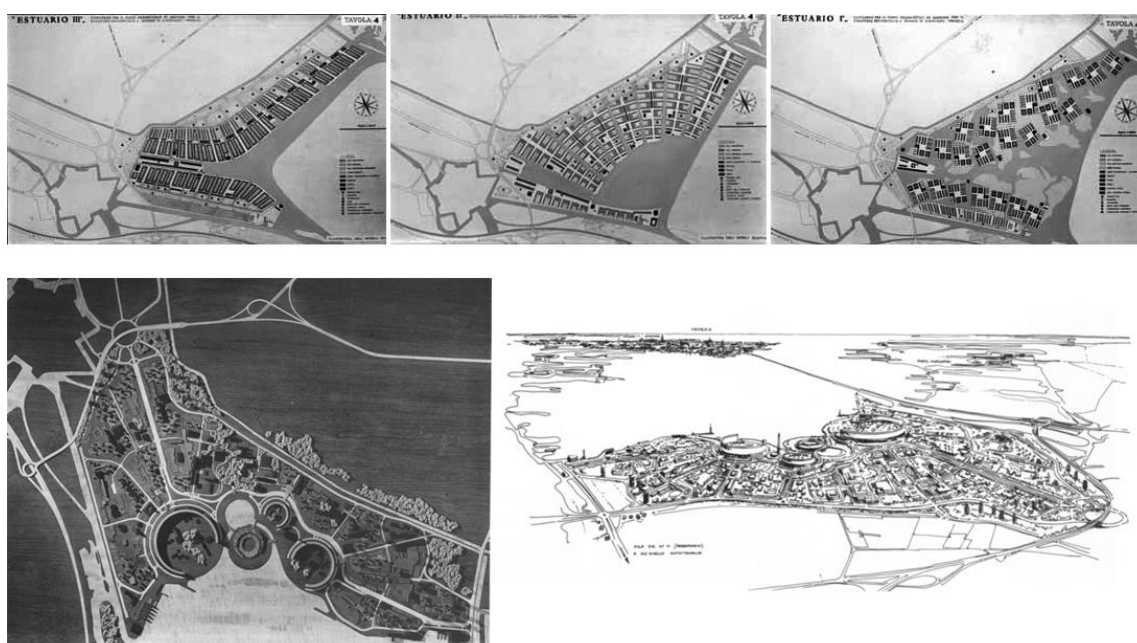


Figure 4. Le Barene di San Giuliano (1959): centre and radial system.

The projects developed by Muratori and Quaroni for the Barene di San Giuliano are too well known, analysed and published for me to make a detailed description here. I shall merely draw attention to certain characteristics that are relevant to our present purposes in this short paper. Both architects made the presence of the city of Venice on the horizon of the lagoon the focal point of their designs. These designs therefore were arranged according to a radial layout, more or less expressed in the overall plan. The interrelation with the water was determined in different ways by the two architects; Quaroni used a language that was decisively geometric, abstract and expressive, while Muratori saw the logic of the inescapable morphology of the sea front with respect to the urban fabric, and he could not avoid, for example in his winning design, a reference to the baroque and late-baroque palace complexes of the cities on the Tyrrhenian sea and the attempt to restore the apartment blocks of Giuseppe Samonà in Messina. In Muratori's designs for the Barene, the *centre* as a physical place is an identifiable area and forms part of the design. Quaroni's designs, on the other hand, did not have an well-identified functional centre, while there was a central zone of great modern monumentality which however seemed to be mostly residential. This was set in a geometric radial system, whose rhythmic force was interrupted dynamically by great circles of varying size, which were where the entire design converged; behind was an area developed in an apparently free style, like a Kasbah, wrote Ciorra, 'a series of types of the modern: a residential fabric with courts, in clusters, in lines, uniting together in a new mode the typology and the form of the city. The form and size of all the buildings, in fact "essentially depend on their function within the general form and concept of the quarter"¹⁵³. Yet even in Quaroni's design the real centre of the fan-shaped composition is the view of Venice that emerges delicately across the waters of the lagoon. The sense one has of large buildings in the form of cylinders open to the landscape is therefore one of great *mirrors*, *reflecting* the geometric centrality of the residential district within the landscape of Venice at the centre of its inland sea. Reproduced from Maretto M. *op. cit* and De Sola M. *UR Urbanismo* Revista n. 7.

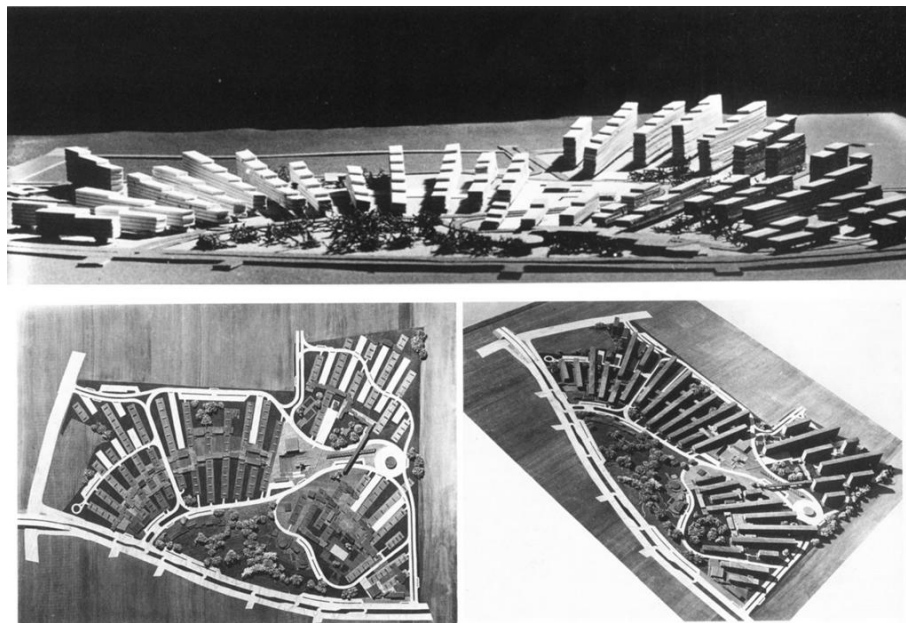


Figure 5. Casilino (1964): the opposite of the Barene of Quaroni, the similarity to the Barene of Muratori.

¹⁵³ Ciorra (1989), *op.cit.*, 46

An important commentary on the questions we have been discussing here, and in particular, on the Casilino 23 project, is made by Roberto Maestro in his recent essay on Quaroni's Casilino project, in which he took part as a young and active assistant: 'How do you arrive at that solution? At first sight we thought of using the model of the geometry of Roman piazzas (based on circles and ellipses) but we scrapped that idea because it would lead to a solution that was closed, not really suitable for the design of a city neighbourhood in expansion. And then that solution was too 'Quaronian', or rather too formulaic for Quaroni himself. Lucio Barbera recalls that he used to tell Quaroni that the Casilino 23 project seemed to follow along the same path as Muratori's researches for the Magliana quarter, and so also some of his designs for the Barene. Barbera noted however that Quaroni's Casilino 23 designs appeared to be the reverse of his designs for the Barene. On the same radial layout at the Barene, Quaroni envisaged the powerful architectural presence of the polycentric arrangement that supported the fan shape of the convergence of the fabric, whereas at Casilino the centres of the convergence disappeared into an indefinite space that was partly green, partly and irregularly covered, while the rays of the fan emerged stereo-metrically as the main features of the urban form. Roberto Maestro, another pupil of Quaroni, adds: 'in the Casilino project you can quite easily see that Quaroni's idea was to reproduce, on an experimental scale, that mixture of freedom and restriction (or rules) that formed the basis of the medieval city, and thus prove the effectiveness of the traditional tools of architectural design on the formal management of a modern city of today.'¹⁵⁴ Reproduced from De Sola M. UR Urbanismo Revista n.7.

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¹⁵⁴ Maestro R (2012), 'Il progetto del Casilino 23 quasi mezzo secolo dopo' in Strappa G. (ed) (2012) *Studi sulla periferia est di Roma* (Franco Angeli, Roma), 124

Re-thinking city. An example of Ilse's multidisciplinary approach to urban morphology questions

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Abstract. *«Architettura della città» written by Aldo Rossi (1966) is a classic in urban morphology, but we must look at this book in its original form, a field research report (1964), in order to understand how much urban morphology is important in the city planning design process. Analysing the report we can point out the main references on which Rossi bases his new urban science theory, also we can trace the basis concepts that Rossi will develop in the book written two years later. Reading the report within its original wider context, the Ilse's scientific program – a program shared by politicians, administrators, technicians and academicians – means contextualize the Rossi's thought in the Italian Sixties debate, a reformism season where territorial management could not regardless reasoning about city, its form and its content. In this sense, the Rossi's theory goes back to being part of the urban planning debate in line with one of the two new territorial imagines discussed.*

Key Words: Ilse's, Aldo Rossi, urban questions, urban planning.

The urban question in the Italian sixties debate

The Sixties were the most fertile period for Italian urban planning: the economic boom, the reconstruction of bombed-out city, the large-scale migration and immigration movements and the rapid urbanization of increasingly large portions of territory posed a number of new technical and theoretical problems. The 'urban question' becomes part of the public language: State becomes a promoter of development and, therefore, demands to local governments a qualitatively and quantitatively improvement of their action. New situation make it clear that studying in depth the socio-economic aspects of territory has become a necessity (Bellaviti and Fareri 1986, p.3, p.43).

To cope with these new demands, some public and private research institutes were established. These ones – as well as providing support to the government – thanks to the introduction of social sciences, help to update the techniques, methods and tools of all those disciplines that have city and territory as their object of study (Romano 1980, p.127).

At the same time, the urban question animates the town planning-architectural debate raising numerous objections to the disciplinary tradition that, according to some critics, was not able to deal with the new territorial transformation dynamics. Especially planners, who still had not been able to formalize a scientific statute for their discipline, trying to legitimate their technical knowledge by developing a new cognitive model (Olmo 1992, p.X; Romano 1980, p.80).

A strange relationship between politicians and technicians was created: politicians see technicians as the modernizing force that is essential for the development and, therefore, they seek a technical advice to justify their political choices; technicians need the support of political power to give authoritativeness to their intervention (Crosta, Pizzorno and Secchi 2013, pp.11-12; Olmo 1992, pp.X-XI).

Milan, where a part of political forces had already begun a slow renewal process of the ruling class, becomes an excellent testing field where for the first time technicians work with politicians (Landoni 2011, p.107). The Institute for Economics and Social Studies of Lombardy (Ilse) established in Milan in 1960, is an illustrative case of this reformism season: representatives of the main political forces and the most important members of the academic

staff are involved; the scientific products, based on American socio-economic researches matrix, help to introduce social sciences in the Italian culture (Crosta, Pizzorno and Secchi 2013, pp.11-12).

The 'Metropolitan area urban structure' research group

Ilse's aim was twofold: to carry out socio-economic studies; to cope with the problems related to regional planning¹⁵⁵. The Institute tries to accomplish its task by putting together a team of experts from different disciplines (urban planning, sociology, economy, finance, etc.) to take an overall view of the complexity of territory.

The original work program was organized in nine projects research whose case study was the Milan metropolitan area. This was not just an object to be analysed – what are its structures? how can we steer the development? – but also a problem to be defined – how can we recognize the metropolitan area spatial extent? how can we trace characters of a metropolitan community?

The 'Metropolitan area urban structure', directed by Giancarlo De Carlo and Paolo Ceccarelli, is the most interesting research project. They carried out about eleven researches (1962-1965) through which they wanted to understand what were the factors, that interacting with each other, determined the structures and the morphological configurations of the Milan metropolitan region. Among these works, in 1964, was published the Aldo Rossi's research, «*Contributo al problema tra tipologia edilizia e morfologia urbana. Esame di un'area studio di Milano, con particolare attenzione alle tipologie edilizie prodotte da interventi privati*¹⁵⁶», on which he will base the book «*Architettura della città*» (1966).

Many of the conclusions outlined in this research group have also had wide repercussions outside the Institute: the famous *Turbina* plane (1963), made by Giancarlo De Carlo, Silvano Tintori and Alessandro Tutino, was based on the data and analyses carried out by Ilse's; the De Carlo's book «*Questioni di architettura e urbanistica*» (1964) was taken from results of numerous observations made by the Ilse's researchers and it tried to state a new way of reading and interpreting territory; the famous meeting «*La nuova dimensione della città. La città regione*¹⁵⁷», organized in Stresa (1962) by the De Carlo Ilse's research group, was one of the most important moments of the international debate.

The new dimension of urban phenomena forces architects and urban planners to redefine their branch of learning (Lobsinger 2006, pp.30-32). Rossi's opinion gradually moves away from the De Carlo's group statement and we can see the impact of these theories on the disciplinary debate looking at the two new spatial images produced: *città regione* and *città territorio*.

The report

Rossi shared the De Carlo's group starting hypothesis: there is a close relationship between planning goals and urban form, since each phase of planning process is crystallized in a specific pattern, but the targets choice, although based on multiple factors, depends largely by human behaviour. For this reason, enforcing a city in a form without regard these complex dynamics, would have serious implications both from an economic point of view – because there would be a resistance would rise the operation costs – and from a social point of view – because the

¹⁵⁵ Although Regions had already been included in the Constitution (1948) and the issues related to regional planning had already been dealt with in the Planning Law (1942), Regions were officially established in 1970.

¹⁵⁶ «*Contribution to the problem of building typology and urban morphology. Examination of a study area in Milan, with a focus on building types produced by private interventions*»

¹⁵⁷ «*The new dimension of the city. Città regione*»

operation would be rejected. The De Carlo's group was working on the theoretical references developed by F. Stuart Chapin, who correlated urban structure changes to the sequence of individuals and social groups behaviour, and those developed by Lynch and Rodwin, whom proposed an alternative analytical method to describe urban form and to extrapolate the traces of effects left in space organization by the activities localization.

In my opinion, Rossi takes two step forward: he explores the transformation of urban fabric in a transversal direction that can hold together times and modes of evolution (Rossi 1964, p.II); he shifts the focus of analysis from urban structure to the structure of architecture, because Rossi thinks that the changes in a minimum element of a system can trigger the mechanism of the whole structure.

Already in this first work, we can see the main features of the new urban science developed by Rossi in the following years. He proposes urban planning shifts towards architecture, where architecture becomes the tools through which know the reality: on the one hand, architecture allows us to study the structures and dynamics of the city process formation; on the other hand, through architecture we can develop new tools and methods for planning (Vasumi Roveri 2010, pp.26-30; Lobsinger 2006, pp.28-29).

It is no coincidence that Rossi develops this new ideas within Ilse: on this occasion Rossi comes into contact with social sciences that widen his literary knowledge and help him to 'rediscover' some classics (Vasumi Roveri 2010, pp.32-54).

An urban morphology study, in the context of this reformism season, is relevant: who have to deal with urban morphology becomes an interlocutor for who dictate terms of the public agenda because urban morphology specialists view city from a different angle, since urban fabric is no longer considered as a product of time but as a product of society. This turnaround appears in the Rossi's work especially in the choice of references on which he builds the reasoning.

Object of Rossi's research is a wedge-shaped area that extends from the center of Milano to the periphery¹⁵⁸. The result that this research wants to reach is the identification of the interrelationships between urban form – in terms of the relationship between building typology and infrastructure – and social structure. The aim is twofold: using the data obtained from survey to express an opinion about the characteristics of urban fabric; formulating hypothesis about the structure-form ratio, referring both to the present situation and the evolution in progress (Rossi 1964, p.I).

The report is organized into three sections: the introduction, where the author exposes the underlying assumptions and describes the methodological approach; the first part is divided into four chapters, which collect the cartographic documents and surveys; the second part is divided into nine points or paragraphs, where Rossi argues investigation findings. The iconographic equipment is composed by maps and technical drawings that attend and illustrate the analysis. One interesting thing is that this section has its own bibliography. The bibliographic notes conclude the report and are a programmatic selection. Looking at the bibliographic references, explicit and implicit, we can understand the Rossi's attempt to reformulate the problem of urban form within a wider design reflection, although initially Rossi seems to abstract its reflection compared to the contemporary debate on the different governance dimension (Vasumi Roveri 2010, pp.28-29). Four books are essential: «The City», written by Robert E. Park, Ernest W. Burgess, Roderick D. McKenzie (1925); «*Introduction à l'urbanisme. L'évolution des villes*», written by Marcel Poëte (1929); «*Le mémoire collective*» written by Maurece Halbwachs (1950); «*Géographie des villes*» written by Pierre Lavedan (1936).

Revising them, Rossi extends the meaning of urban morphology from a simple analytic tool to a guide for planners.

¹⁵⁸ From Piazza Mazzini to Viale Beatrice d'Este; from Corso Italia to Corso di Porta Romana

Study area, urban space construction, *fatti urbani*

The definition of the study area is not a simple problem of selection, but it is a very important theoretical point. Rossi refers to the concept of natural area¹⁵⁹: is a city portion that, during the urban structure evolution, develops its own characteristics because of different growth processes. This allows us to distinguish it among other areas. This means that, if it is possible starting from the analysis of these characteristics, through historical recognition, to reconstruct the area evolutionary process, it is also true that the identification of these dominant features allows us to work out future trends (Rossi 1964, p.105). Rossi starts from the assumption that city is built up over time, therefore, on one hand, as citizens we can experience just a few moments of its history, on the other – both from the architect and the urban planner point of view – city maintains the memory of what it has been and it holds traces of what it could be.

Another important aspect is the interdependence between area and its inhabitants: environment is continually shaped by individuals and social groups behaviour, understood as common values and ideals inherited from a particular culture; environment affects these behaviours through primary impulses of urban life, such as economic and social needs and desires. Spatial grouping forms, therefore, may be constant or they can change over time. This depends on the importance of behaviour patterns, since they cyclically affect the spatial forms reappearing, determining frequency and permanence over time. This spontaneous zoning trend was also empirically demonstrated by the early sociology and ecology studies applied in the urban field.

The main contributions about the sociology aspects of urban life came from the surveys realized by the Chicago School of Human Ecology (1920-1970). The first collection of essays is «The City», published (1925) by Ernest W. Burgess, Roderick D. McKenzie and Robert E. Park.

This book is relevant for some key concepts that have opened up the way for new studies. One of these concepts is 'natural area', proposed by Park to indicate the people tendency to congregate according to homogeneous characteristics. From the human ecology point of view this process can be explained by distinguishing between two basic relationship types: social selection and division of labour; agreement and assimilation (Torres [1996] 2000, pp.217-218). Evolutionary process can be summarized, therefore, in two main phases, invasion and succession – taking these concepts from natural ecology – that indicate penetration and slipping of a group in an area that is already occupied by a different entity. We can understand how social mobility becomes synonymous of spatial mobility. Contrary to what we may think, the area still retains a leading role, because it develops its own character – let me say – its own consciousness, which allows it to react to invasion in a positive way, attracting them, or in a negative one, rejecting them (Elia 1971, pp.31-32).

What is natural to assume, therefore, is that this process occurs regardless of planners' projects, because it takes life by energy that – as in the osmosis processes – is generated when social organization and physics organization interact. Understanding city development as a 'process' is another original and important aspects dealt in this book: Burgess uses 'metabolism' to describe this continuous process of organization and disorganization of society that leads to the renewal of urban organism (Park, Burgess, McKenzie [1925] 1967, p.7, pp.52-53; Elia 1971, pp.31-32).

The biunique relationship existing between environment and people, in terms of mutual transformation, has already been recognized, but Rossi wants to emphasize that there is a further degree of complexity expressed in the consciousness of social body in relation to the places it occupies. Social morphology studies, developed in France in the late Nineteenth and early Twentieth century, had faced the problem of social body 'form', that is how society is spatially determined within urban structure, describing the practices and their effects from the social point of view, and how its structure evolves over time. A breakthrough is made when

¹⁵⁹ Rossi uses the English word in the report

Halbwachs analyses through what kind of *immaginario* the different entities – that make up the social body – become aware of it (Jedlowski 1987, pp.13-14).

We must look to the Halbwachs' book « *Le mémoire collective* », in order to understand how the thought of the French sociologist and philosopher influenced Rossi. Halbwachs wanted to investigate and examine the relationship that memory, here understood in the particular meaning of collective memory, interweaves with the various dimensions of reality (Halbwachs [1968] 1987, p. 137).

Signs and images that are gradually deposited on the elements of the city express the dialectical relationship existing between environment and inhabitants. This slow sedimentation process means recognizing a value in certain areas or in certain buildings that goes beyond their formal or aesthetic qualities. At the same time, however, this accumulation process turns out to be a strict selection process: we can perceive only the strong and distinctive characters that remain over time, ultimately, those which contribute to form the image of the city. In this sense, the memory becomes the instrument through which we – as citizens – take position into its construction process. Contrary to what we might think, our contribution, since it is strictly temporally defined, is still active and constructive, because the tool we use – memory – is a tool for a critical selection: it does not make us able to revive the past, but through memory we can remodel some aspects of the past in response to the needs solicited by our present conditions (Jedlowski 1987, pp.20-21).

Thinking city as the deposit of the community experience signs, reminds me of what Roland Barthes said about urban semiology. Urban space, understood in a strictly material sense, has always been a mediator of meaning, and as such it is comparable to a linguistic sign. Therefore, urban space can be broken up into form – the combination rule that organizes concepts – and substance – the material articulation of the concept. Understanding city as the expression of a concept through a material mediation, but mainly as a linguistic sign, means reading it by forms and substances whose physical traces can be taken up and manipulated. These signs whereas are irreversible because they are a container for the transmission of the social institution values, therefore they can not be changed by individual, but only by community. Introducing the concept of space as a sociological category, Halbwachs considers the memory as an institution. Urban space and its elements become the forms through which the memory explicits itself.

Obsolescence and decay become synonymous of continuity. The slow aging of certain parts of the fabric, due to the progressive loss of efficiency and functionality, is interpreted as a loss of value and it shows those parts of building fabric that are prone to accommodate recovery or expansion. At the same time, however, the presence of these parts shows that, regardless of evolutionary process that involves the whole urban system, some items – houses, streets or neighbourhoods – survive the natural selection. These *isole* or *aree di riserva*, as Rossi defined it (Rossi 1964, p.110), can become strategic elements because they are the result of almost spontaneous micro-dynamics, which express the right and natural city evolution process.

If evolution of urban structure is not governed by a top-down action, it must exist an implicit design that directs development. Rossi, referring to the Pierre Lavedan's studies, talks about the 'implicit plan' as a set of city elements that create an invisible but solid frame on which city grows. «*Qu'il s'agisse d'une ville spontanée ou d'une ville créée, le tracé de son plan, le dessin de ses rues notamment, n'est pas dû au hasard. [...] Il existe toujours un élément générateur du plan*» (Lavedan [1936] 1959, pp.91-92).

Lavedan introduces and develops the concept of 'plan' as that forces system which, forcing on some foundation elements, determines the shapes of urban structure evolution. Through History, we can see how human laws have gradually replaced the laws that had always governed city development. In certain cases it is complicated finding the *élément générateur* of these forces, especially if the city is ancient, and is also impossible to think that there can be only one generating element (Lavedan [1936] 1959, p.18, pp.92-94). The «*comprensione e creazione*» (Rossi 1966, p. 142) process through strategic elements, as Rossi said, joins the past city to the future city. This is the right way to accompany urban system evolution in accordance with his implicit plan.

Lavedan rightly states those generating elements can be either *matériels* and *intellectuels*, Rossi often uses the expression *âme de la cité* to give us the idea and make us feel the consistency of this aspect that is intangible and indescribable with the terms of reason, but all of us daily experience it as citizens. The preeminence or individuality – to use a Rossi's word – of these elements, therefore the justification for their active role within urban system, is due to their ability to catalyse forces. Rossi uses *fatto urbano* locution to indicate these urban elements: the word *fatto* takes us back to the real and physic dimension of what we experience as inhabitants of a place; while its nuances of meaning – action, event, etc. – can make us feel the exceptionality dimension of that experience. This locution comes from the French urban geography knowledge and we can find it especially in the Pierre Lavedan and Marcel Poëte studies.

Rossi referred to Poëte theory, when he says city is an organism. This means not only that who want to design city have to deal with past, but it also means that city is a living entity. Continuity of life is manifested by the presence of some significant elements – roads and buildings – that come from distant eras and characterizes city as a whole and also they infiltrate into its minimum elements. Reconstructing the story of a particular building we can see that it is constantly in evolution, although it seems fixed in a precise form. Poëte suggests a evolutionary approach to the study of city: as in the case of human organism, evolutionary process selects only those characters that have been able to adapt to change. From the urban planner point of view, therefore, it will be crucial examining how some urban structure elements have been evolving naturally to adapt itself to the needs dictated by time, rather, this study should become the guide for planning actions (Poëte [1929] 1958, p. 25, pp. 128-129, p. 132).

City structure, in other words, varies over time, it maintains some fixed elements that constitute its load-bearing structure. They are active elements compared to the city growth dynamics, because they are the centers around which – and through which – city continuously reorganizes itself. These elements are permanence in real and physical terms, «*un passato che sperimentiamo ancora*» (Rossi 1966, p. 51), but they are persistences from a 'qualitative' point of view, because of their intrinsic qualities which distinguish them in the system.

Their function or their form does not determine the exceptional nature of these elements, although in most cases their trace constitutes an exception within urban fabric. Speaking of the exceptional qualities of these elements, we immediately think of monuments (Rossi 1966, p. 24): 'monument' is a status that we confer to an element in reference to the community imagination.

Città regione vs città territorio

If city grows without the aid of a plan, what is the urban planning role? «*D'altro canto il concepire la fondazione della città per elementi primari è a mio avviso anche l'unica legge razionale possibile; cioè l'unica estrazione di un principio logico nella città per continuarla*» (Rossi 1966, p. 143).

The city that Rossi imagines is a city of cities, where each fragment evolves as a result of both direct transformations – which depend on factors within the area – and reflected transformations – whose causes stem from dynamics originated in other portions of the city (Rossi 1964, p. 6). According to this logic, using the plan as a tool would be contradictory: we can not think of applying a unique design on different reality. In most cases, in fact, the plan does not have a positive effect on city structure, rather it isolates *fatti urbani* and it contrasts its action (Rossi 1966, p. 133). If we accepted the idea of a city made by fragments, we should work focusing on primary elements in order to take advantage of them as growth engines.

Although initially Rossi seems to abstract its reflection compared to the contemporary debate on the different governance dimension, this statement shows us how his thinking is in line with one of the two hypothesis that, in those years, animated the disciplinary debates.

The De Carlo's research group was processing a new territorial concept, *città regione*, that comes from the American 'city region'. They look at Geddes and Mumford theories and they refer to the line of research generated after the publication of the Robert E. Dickinson's book 'City, Region and Regionalism' (1947). *Città regione* is a constellation of remarkable points of the territory linked by continuous and dynamic relationships, in this way they share the same economic, social and urban development process (Aymonino 1964, p.94; Dickinson 1952, pp. 2-17). In this scenario, we can no longer talk about town as a generator center, but we can talk about the potential expressed by the different parts of the territory in order to capture or repel the forces that govern the location process of people and activities. Urban planning goal, therefore, is to identify systems and structures (Viganò 2010, p.215).

This concept is opposed to *città territorio* that is an own Italian locution, in fact, it appears for the first time in the workshop organized by Aymonino «*La città territorio. Un esperimento didattico sul Centro direzionale di Centocelle in Roma*¹⁶⁰» (1962), and in the essay «*La città territorio. Verso una nuova dimensione*¹⁶¹» (1962), written by Giorgio Piccinato, Vieri Quilici and Manfredo Tafuri. According to the authors, it was necessary using this neologism to emphasize the difference between American examples, where 'region' is an area whose size is variable, and the Italian situation, where the word *regione* referees to a specific political and administrative entity (Campos Venuti 1967, p. 62). *Città territorio* instead means a network formed by different cities. In this scenario, urban planning has to identify new themes and their interrelationship (Piccinato, Quilici, Tafuri 1962, pp.16-17).

An illustrative example of the latter statement can be found in the debate about *centro direzionale* and *asse attrezzato* in relation to historical center – which is well documented in the Casabella numbers published during Sixties. These two elements were the solution to remove directional functions from historical center, in order to protect it and to promote the localization of cultural activities (Aymonino 1964, p. 21). This issue has always been felt in Italy, but new size of urban phenomenon imposed a serious and critical meditation. Before the explosion of city in modern times, our territories had homogeneous characteristics, therefore, the ancient nuclei had to stand out as a place of interests and values. In a *città territorio* scenario, instead, the old center will have to find a synthesis with the whole territory in order to restore the balance necessary to survive. This means understanding *centri direzionali* as elements that mediate city and territory. They should be complementary respect historical fabric and they should work in synchrony with it. The lesson we can learn from historical centers is the ability to develop a continuous and compact fabric, where functional and formal uniformity also allows the formation of singular points or 'monuments' that are its backbone (Aymonino 1964, pp. 28-29). *Centri direzionali*, therefore, would have become the new generating element of *città territorio* (Aymonino 1964, p. 24). *Centri direzionali* and all the facilities for community life – universities, shopping centers, cultural centers, etc.. –, which are already spread in the contemporary territory, will become the monuments of the metropolitan area.

In opposition with *città regione*, they want to reflect again about city as a generator, but redefining the meaning for the word 'city' because it is no longer sufficient to describe the spatial, economic and social complexity of the urban organism (Lobsinger 2006, p.30). The reasoning about the shape of the city goes back to being central in the urban question debate: the many issues raised by urban phenomena can not be resolved through a single and general project, but the action should be focused on the design of little city fragment that can be strategic for the evolution of the whole organism (Viganò 2010, p.219).

We must read the Rossi's reasoning in this second line of thought, that aims to redefine the role of planning within the architecture field: urban planning goal is to provide a framework within which the urban fabric project can deal with the construction of urban space, as a place where society can build its image. Urban morphology, therefore, from an analytic tool becomes a design tool.

¹⁶⁰ «*Città territorio. An educational experiment about the Centocelle business center in Rome*»

¹⁶¹ «*Città territorio. Towards a new dimension*»

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The influence of classics on contemporary thinking Louis Kahn and Hestnes Ferreira

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Abstract. *Architecture and the consequent urban form can be analysed and interpreted without reference to classical influences? Or can we analyse the urban form dated to the time and devoid of any previous bonding or influence? The purpose of this article is to show that two contemporary architects, Louis Kahn and Hestnes Ferreira created their own language of interpretation and implementation of formal relations at the same time they developed their buildings, transposing the formal urban analysis for the formal development of each projected unit. The designation of morphology results from the analysis of configuration and the exterior structure of an object, in direct relation to the phenomena that arise. Despite all the classical thought, the architecture of both architects closes a dimension beyond the essential nature of architecture as Michel Freitag uttered (2004) in his book *Architecture and Society*. The architecture relies on a phenomenological and sociological interpretation related then with *History of Architecture*, aiming to understand the urban form. Louis Kahn and Hestnes Ferreira approach the process and the materialization of urban form by following these guidelines. The main conclusion of this article is to prevent that architecture, in contemporary thought, do not continue to be associated with the paradox of the beautiful and the ugly.*

Key Words: Louis Kahn, Hestnes Ferreira, classic influence, contemporary thinking.

Introduction

Our reading and comprehension of architecture remain intertwined, with architecture history always supported in Art History tradition, oblivious of social analysis and social and historical identity. Therefore, it is almost impossible to analyse both the architecture and the urban form without comparing them to the classical models. Architecture, art, literature and philosophy history have always determined broad and deep domains.

Louis Kahn and Hestnes Ferreira's fascination with Architecture History and classical models knowledge were essential in their architecture. The purpose of this article is to demonstrate that these two contemporary architects have created their own language of interpretation and implementation of formal relations, simultaneously to the development of their buildings, transposing urban formal analysis to each projected unit's formal development.

The influence of the classical thinking on contemporary architecture

Our intention to map the classical thinking influence is centred on these two architects and how their architecture displays that influence.

Morphology is the result of both configuration analysis and outer structure of an object, in direct relation with the phenomena that originate it. Analysis fits in the sectorial dimension, just as Lamas (1993) refers the street scale, having the author also analysed the dimensions as presented by Rossi and Tricart.

The proposed formal analysis is based on the four aspects presented by Lamas (1993), the quantitative, the functional organization, the qualitative and the figurative ones.

Studies by Rudolf Arnheim, Kevin Lynch, Christian Norberg-Schulz, Francis Ching, Josep Maria Montaner, among many other authors, present different models of descriptive and phenomenological analysis of formal configuration.

In his book *A Modernidade Superada. Arquitetura, arte e pensamento do séc.XX*, Josep Maria Montaner (2001) refers to Louis Kahn as one of the architects from the third generation of the Modernist Movement, next to Denny Lasdun, Jorn Utzon, Aldo van Eyck, Josep António Coderch, Luis Barragán, Fernando Távora, and others. According to Montaner, all these architects assume a different attitude, they intend to incorporate history, to associate it with vernacular architecture, adjusted to reality and its user, thus rejecting both the formalism and mannerism of the international style.

Louis Kahn initiated his professional practice under the scope of the Modernist Movement, but evolved in a different direction from the 1950's on. Kahn didn't relate to the rupture propositions meanwhile adopted regarding the form and planning of the modern city.

Montaner (2013, 41) refers that,

... con un fuerte ascendente platónico, el pensamiento de Louis I. Kahn evidencia la influencia de Andrea Palladio, por su relación entre obra escrita y construida y por divinización de la idea, el orden y la simetría. Y una de sus más destacables aportaciones se refiere al concepto de nueva monumentalidad en arquitectura.

Although Louis Kahn never refers to Martin Heidegger or his *Carta sobre o Humanismo* (1949), Norberg-Schulz writes that he intends to find the projecting form reasons and their theories, in light of Heidegger's philosophy. The text is rather surprising, once that, just like Hestnes Ferreira does, it mentions that Louis Kahn did not reveal his source of inspiration, nor did he talk about his conception process. Hestnes Ferreira mentions in Saraiva (2011, 287),

Kahn não defendeu princípios que depois renegasse, havia sempre uma evolução, o pensamento dele flutuava, evoluía, assim como evoluía a arquitetura dele, criando novos conceitos e espaços. A coerência com que destacou nessa altura a importância da arquitetura moderna, dado o seu contributo para a renovação da arquitetura americana e para si próprio, nos anos trinta e quarenta, levou-o também mais tarde a ser dos primeiros a criticar a arquitetura moderna, nos anos cinquenta.

Ignasi de Solà-Morales states that ethical humanism and aesthetic phenomenology had their highest influence in 1950's architecture, presenting the reasons for that influence,

Realización personal, producción experimental, plena libertad estética, disolución de la tradición moderna como método racionalmente elaborado serán puntos de apoyo de un sinnúmero de obras arquitectónicas en las que la experiencia individual, la primacía de lo privado, el anti monumentalismo, la incorporación de materiales y técnicas antropológico-vernaculares, la búsqueda, en definitiva, de un grado cero para la arquitectura. (1991,33)

Although he wouldn't say it, Louis Kahn used Beaux-Arts notions, namely the central plan and the centrelines, even if only as starting points that would then be overcome by other factors. Hence the need to travel, to know, to register and understand the classical civilizations, having stayed in Europe for two long periods. This same need was confessed and felt by Hestnes Ferreira.

The sectorial dimension in works by Louis Kahn and Hestnes Ferreira

According to Kahn, the architectonic project process is divided in two distinctive stages that alternate throughout the process: the conceptual and the material stages. The process initiates from the production of a conceptual image that sets the basic principle around the project essence and to which all other generated elements are subordinate.

In terms of formal and conceptual process, there is continuity in Hestnes's process, when compared to Kahn's.

Design, order and form are understood as part of the formal development process, where geometry and formal hierarchy allow to define the character and the essence of the project.

To achieve the purpose of this article, we compared a building by each architect, Kahn's Indian Management Institute (1962|1974), in Ahmedabad, India, and Hestnes's Casa da Cultura da Juventude de Beja (1975|1985), in Portugal.

The suggested formal analysis is based on the previously mentioned four aspects presented by Lamas (1993). However, we will name them design | order | form, in dialogue with the function, the spaces quality and the aesthetic communication.

Design | order | form

Even though these projects' dimension is sectorial, in both projects the architects structured them as elements of transition between the street scale and the neighbourhood scale or, as referred to by Lamas (1993), the urban dimension.

According to Kahn and Hestnes, form is always associated with a set of parts that determines a whole, providing the final result with a strong sense of unity.

This strong sense of unity is the result of an evolving and cumulative process. In it intervene the formal, conceptual and material processes, the latter making the whole set visible.

Louis Kahn defines design as something circumstantial, order as what determines appearance and form as something that does not materially exist, something that can be understood as pre-form.

To Hestnes Ferreira, design, order and form are concepts that interrelate and complement each other, willing to overcome the conceptual process.

With the square and rectangular forms, Louis Kahn usually defines the unit. It is through repetition and the proposed relation between units that he obtains the building, granting its unity and formal coherence.

In a line of continuity with Kahn, also Hestnes finds formal coherence in geometry and unit exploration.

This analysis helps to reinforce the formalists' idea over the functionalists' one, that is to say that form in both architects' buildings is much more than a consequence of a function.

Analysing the quantitative aspects in both the Indian Management Institute, in Ahmedabad, India, and Casa da Cultura da Juventude de Beja, according to Lamas (1993), there is a very unique and cohesive reality, developed and tested by Louis Kahn and followed by Hestnes Ferreira.

Dialoguing with Function

This institute's programme would reveal itself to be comprehensive and at a large scale. It included classrooms, administrative areas, a library, students dormitories, faculty and workers residences and other services and premises.

As always, the first thing Louis I. Kahn would do would be having a look into the programme and rewrite it according to his ideas for each space. He wouldn't be intimidated by its restrictive character nor its dimension.

From the beginning, Louis I. Kahn would exhibit a visible distribution according to the spaces required by the programme, dividing the project into specific areas, as he had previously done in La Jolla, at the Salk Institute for Biological Studies. Such a division assumed a hierarchy and simultaneously pointed out the main structure, the school building – although Louis I. Kahn never referred to the spaces in a differentiated manner, as they were all equally important –, where all the school community's functions would concentrate. This hierarchy and space division are only noticeable because Louis I. Kahn has always based his project ideas on one of his fundamental concepts – order.

The school building solution would suffer the most modifications, as it held numerous functions. Kahn's final version would be presented in 1972, although some areas would never

be built. In this plan, his order principle can be observed, as well as a slight symmetry. Its contours resemble the rectangular shape Louis I. Kahn had envisioned from the beginning, creating a united space in which all parts are intertwined. The different functions gather around a central area, the court, where students and teachers should meet. *'The court is the meeting place of the mind, as well as the physical meeting place.'* (Kahn apud Brownlee e De Long, 1997, 163)

Montaner (2002) describes Louis Kahn's ability to differentiate spaces and functions also through the proposed construction system, introducing the double façade, also referred to as membrane wall (Saraiva, 2011).

It is interesting to understand that central spaces assume utmost importance in Louis I. Kahn's architecture, which would be related to his fascination with Italian squares, which he repeatedly drew during his travels to Europe. He was able to capture the essence of those meeting areas and to build them in his works. This same fascination is also present in Hestnes Ferreira's work, in particular regarding Casa da Cultura da Juventude de Beja.

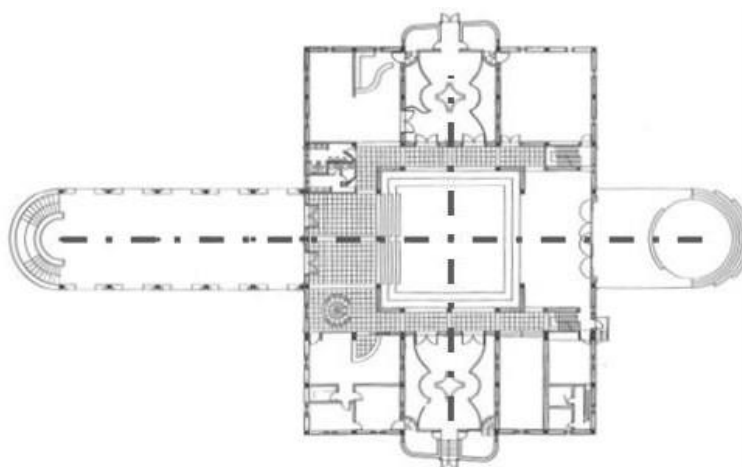


Figure 1. Floor plan, main symmetry centrelines_ Casa da Juventude de Beja.

Casa da Cultura da Juventude de Beja (Picture 1) was the first construction of its kind to be built after 25th April 1974. Because of its use specificity and the population it was addressed to, Hestnes Ferreira intended it to have a festive atmosphere.

Its privileged location, making it visible from every angle, has reinforced its sense of centrality, which has contributed to its formal feature, intensely symmetric.

The central building includes a court at a lower level, from which all other areas develop, clearly representative of both serving and served spaces. The constant search for these two spaces translates into projecting in a continuity line with Louis Kahn.

Spaces quality

Louis Kahn's architecture assumed a constant search for materiality, implying that the choice of material was much more than its function and its technical characteristics.

Materials were used according to their formal and expressive possibilities, simultaneously staying true to them and also to the construction systems, by not hiding them.

This attitude matches Frampton's (1996) definition of Critical Regionalism, assumed by Louis Kahn and followed and sustained by Hestnes Ferreira.

In both architects' work, materials respect the interaction between the light and themselves. The surface texture definition, and how it reveals the light, intensifies even more the proposed space quality. We can say that the revealing of the materials' secret qualities depends on the

shadows that occur when the light diverges from the surface and on how the material absorbs the light.

In both these architects' work, expressiveness is directly related to the concept of light, as the combination between light and shadow highlights the formal composition, originating volume effects on the façades.

According to Leland M. Roth (2005, 77), Louis Kahn stated that light is the most important and significant element in the perception of an architectural work, and as such it should be integrated and worked upon according to its potential.

Urs Büttiker (1993) developed a thorough research on the effects of light on Louis Kahn's work, having created analysis diagrams. In the same line, we present a similar analysis on Hestnes Ferreira's work. (Saraiva, 2011)

Both Louis Kahn and Hestnes Ferreira reveal extreme care towards comfort and quality standards in their work. The pinnacle of this comfort is achieved through the interaction between interior|exterior they suggest in association with the materiality.

In this interior|exterior interaction, the significance of the openings in the built architecture should be highlighted. The way Louis Kahn and Hestnes Ferreira capture the vertical light sets them apart from other architects by their use of geometry in the opening, that is its dimension and form.

Hestnes Ferreira, in his Casa da Juventude de Beja, (Picture 2) materializes this interaction including a small skylight in the cupola centre.

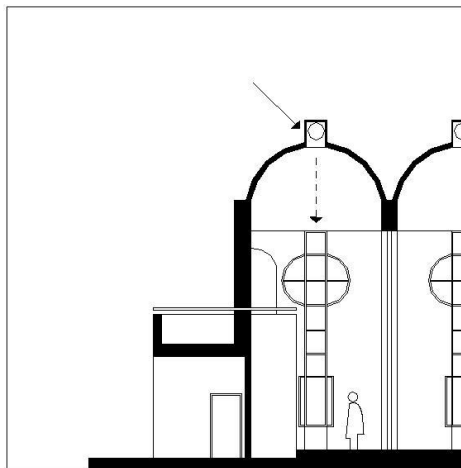


Figure 2. Light entrance scheme _Casa da Juventude de Beja.

Vertical light, as used by Louis Kahn and Hestnes Ferreira, assumes two possibilities and consequently determines two differentiated light spaces.

The first one is related to large scale interior spaces, enabling the intensification of the beam of light projection; the second one occurs when the opening is smaller, directing and intensifying the beam of light, increasing the luminous concentration in one point.

As we can see, the form and dimension of the opening intensify the beam of light, at the same time that they increase the lightness concentration in one point.

According to Hestnes Ferreira, Louis Kahn defined silence as the key to the understanding of architecture.

Kahn, in his drawings for the *Architecture: Silence and Light* conference, defined silence as the wish to be|express, and the light as the wish to be|make. In his perspective, silence also depends on the light diversity, introducing the concepts of *Darkless* and *Lightless*.

Aesthetic communication

Local construction tradition was a defining element in these architects, who have always projecting in respect to it without mimicking it.

Along with this tradition, the respect for the structure and its material is another essential aspect in aesthetic communication.

In Casa da Juventude de Beja (1975|1985), Hestnes Ferreira uses cloister vaults inspired by traditional domes from Alentejo to cover the building, in a total of twenty domes. Brick assumes a double feature, as both structure and coating. The work was so thoughtful that to this day the quality and final image of this element is well preserved in the global context of this building.

Louis Kahn, in his Indian Management Institute project, in Ahmedabad, included the traditional brick arch in the 20th century architecture vocabulary.

The Indian Management Institute buildings translate an unparalleled spiritual quality. This ability in Kahn's work relies on the constant dialogue between light and silence.

Among the different architectural elements, silence can be interpreted as the one that links and synthesizes Louis Kahn and Hestnes Ferreira's works.

Kahn establishes a relation between the concepts of light and silence. Silence represents what is not there, and light what is.

In both architects' work, silence translates into the simplicity and neutrality of spaces and is achieved through the absence of ornament and effortlessness and clarity of the form. Their architecture is defined by homogenous spaces, valued for their light and silence. Both architects convey a Monumental architecture. The Monumentality concept can be defined by the way the building manifests itself, by the identity it transmits, by its use of scale, by its interaction with light and by the way it rouses a reaction.

Conclusions

The university campus in the Indian Management Institute (1962|1974), in Ahmedabad, may be understood as a synthesis of buildings within the comprehensive work of Louis Kahn.

According to both Hestnes Ferreira and Louis Kahn, each architectural work should be simplified, allowing to exclude any element that might confound its reading, in order to achieve its purest aspect.

In part, the range of timelessness in Louis Kahn and Hestnes Ferreira's architecture is a result of their own capacity to observe and reflect on the two most important and always existing entities: nature and Man.

In the perspective of Campo Baeza (2013), the desire that architecture persists in time depends on its capacity of persisting in the memory of Men.

Beauty may only be achieved when architecture is true in its Conception, idea and materialization. This kind of beauty shall not be related to the beautiful and ugly paradox. According to Nesbitt (2008), in 20th century architecture, the reference to beauty and to sublime was repressed both by scholars and architects, eager to break from the past.

Campo Baeza (2013) notices the concept of time in its relation with history, as presented by Heidegger. He summarizes every architect's ambition to accomplish an essential work, able to transcend them, to exist as a part of history and to persist in time.

The truth and beauty motto '*Design with beauty, build in truth*', that features in the London's A.A. Architecture Association coat of arms, is the perfect synthesis of Louis Kahn and Hestnes Ferreira's work analysis.

Louis Kahn's architecture is formalist, intense and true, simple but not minimal as it unveils the essence of architecture.

Hestnes Ferreira, like Louis Kahn, does not project dependent on a style, a trend or a mainstream. By repeating some elements, he creates a unique signature and sets aside the Portuguese national scene. Assuming his own authenticity, his path is the result of a continuous search for the architectural essence.

Acknowledgments

I would like to thank the architect Raúl Hestnes Ferreira for his availability and for providing me with all the necessary material, as well as for all his support throughout the research process. Also significant were the interviews in his Lisbon office, on 12th October 2009 and on 1st April 2010, included as attachment in the doctoral thesis. (Saraiva, 2011).

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Relevance study: relationship of morphological characteristics between residential plot and building pattern in Nanjing, China

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Abstract. *Residential plots dramatically contribute to urban form of Chinese modern cities for large quantities. However, just a few studies following Conzenian tradition of urban morphology have been undertaken in China, especially few at the scale of plot. And previous researches about residential plot concentrate on living units or indicators of plot, lacking in thoroughly morphological exploration of relationships between plot and buildings within. Therefore, this paper pays attention to residential plots, describes geometrical characteristics of these plots and building patterns and reveals their relationships. By investigating of 2019 residential plots within urban area in Nanjing, this paper has categorized them in terms of residential building types within plots. According to different shapes, rotation angle of residential plots, how patterns of building arrangement change has been examined. It thus firmly proves that residential building pattern has a relationship with shapes and rotation angle of plot. And through several typical building patterns, how they are affected by geometrical characteristics of plot is demonstrated with boundary condition as well. These discoveries on the relevance of residential plot and building pattern lead to a complete summary of designing rules for residential plots, and are valuable for urban design reference and policy-making.*

Key Words: residential plot; building pattern; morphological characteristics; relevance

Introduction

Background

Chinese cities have seen dramatic changes of urban form with the process of urbanization in past three decades. Especially large numbers of residential buildings for increasing population contribute to these changes, forming notable urban fabric. Plot as a unit of or component of urban fabric has helped to clarify the relation between buildings and the town as a whole (Kropf, 1998). Therefore, it is essential to identify morphological characteristics of residential buildings at plot scale and articulate the formation mechanism of urban fabric.

Nanjing, one of main developed cities in Yangtze River Delta, is a typical Chinese city undergoing extensive development, and residential plots account for nearly 65 percent of all residential and commercial plots. Excluding vernacular dwelling, 2019 residential plots from old town and Hexi new town in Nanjing form sound basis of the study (Figure 1), which provide good examples of all kinds of residential building types and plots over the course of past three decades (Figure 2). Based on mass data of these residential plots, statistics is an effective way to focus on common problems and build up appropriate classification.

Morphological study on plot and residential plot

The Cozenian school founded by M.R.G. Cozen recognized urban landscape into the town plan or ground plan, comprising three distinct ‘plan elements’: streets, plots and block plans of buildings. The plan analysis following Cozenian tradition has been identified as a fruitful

approach in Europe (Whitehand and Gu, 2007), and the study on relationships of plan elements above to analyze contemporary urban fabric was emphasized (Levy, 1999).



Figure 1. All the plots in old town (left) and Hexi new town (right), residential plots are shaded.



Figure 2. Urban fabric formed by typical residential building types and plots in old town (left) and Hexi new town (right).

Morphological studies on modern cities concentrate on streets and their arrangement in a street system (Scheer *et al.*, 2001), plots and their aggregations in block (Siksna, 1997). And this paper pays attention to the plot level. Plot is a crucial notion in building typology and urban morphology, and typomorphological studies is a view of type that shows built structures and their associated open space (Kropf, 1998). Along this acknowledgment comes that plot is a basic unit of urban planning and direct restriction of architectural design, which builds a firm link between building typology and urban form. Therefore, morphological element 'plot' provides an effective tool to clarify the relation between plots and buildings within.

Related studies on plot and buildings within fall into three groups. First one refers to building typology and building patterns. Building types are carefully examined to articulate

physical transformation (Moudon, 1986) and building arrangement in a plot to distinguish plot types has drawn attentions (Kropf, 1998). These studies have some influence on this paper. The second is characteristics of plot, such as density and coverage, are used to describe urban fabric (Lupala, 2002). However, studies of this subject mainly correspond to square or rectangular plots, plot shapes are seldom discussed. Geometrical characteristics of plot are very complicated in Chinese modern cities and are worth studying. Meanwhile, research on plot characteristics is not closely connected with physical form. The third group emphasizes the typological process of buildings (Corsini, 1997; Gu *et al.*, 2008), typomorphological attempt in urban renewal rooted in building history (Maretto, 2005), and socio-economy linked with morphology (Mowla, 1997; Chen, 2012). These studies pay less attention to an overall view of physical form of a city. A few pioneer studies at plot level have been undertaken in China (Whitehand and Gu, 2007; Chen, 2012). As for residential plots, previous studies summarize the basic residential building types (Liu, 2012), and reveal the rules of building pattern within residential plots in a quantitative way (Zhang, and Ding, 2013).

Above all, relative research on residential plot and buildings within has not been widely conducted, especially in Chinese modern cities. This paper accordingly makes an attempt in the direction following Conzenian tradition, and take Nanjing city as an example, trying to uncover the mechanism of physical form in China. Levy emphasizes the distinct relationships between plan elements (streets, plots and block plans of buildings) correspond to the typological analysis of each individual element of the fabric (Levy, 1999). Therefore, in order to articulate the relationships between residential plot and buildings within, building typology and building patterns should be further studied except some existing research.

Types of residential buildings and plots in Nanjing

Residential building types

Quan Liu's research on residential plot in Yangtze River Delta (2013) clearly reveals that natural climate and living habits in China mainly influence the shape of residential buildings. That is the need for southern sunshine, natural lighting and cross ventilation determines the basic compositional rules of basic rooms, limiting the depth of the buildings. Normally, a living unit is composed of several rooms for daily life. A dwelling unit is composed of several living units that share the stairs and emergency exits (including lifts), which are the core of a dwelling unit. According to economic efficiency and safety regulations, living units are organized in various ways, thus forming different dwelling units (Figure 3).

Having investigated residential buildings of old town and Hexi new town in Nanjing, residential building types are sorted into two kinds: slab apartment and tower apartment. Slab apartment is composed of several dwelling units in a row, while tower apartment is only one dwelling unit usually composing at least two living units. Specially, one dwelling unit whose aspect ratio of plan is greater than 1.5 is defined as slab apartment, or it is a tower apartment. And among slab apartments, majority dwelling units are arranged together completely along a straight line, while there exists the types that the dwelling units of same orientation are dislocated along an oblique line (Figure 4).

Residential plot types according to building types

Based on the combination of building types within a plot, residential plots are divided into three categories (Figure 5): slab apartments only; tower apartments only; slab and tower apartments. All 2019 residential plots from old town and Hexi new town in Nanjing are classified according to building types. It is obviously found that residential plots with slab apartments, including both slab apartments only and slab and tower apartments, make up nearly 95 percent of all plots

(Figure 6). In order to articulate the most widespread urban fabric, the scope of the research focuses on residential plots with slab apartment for next analysis.

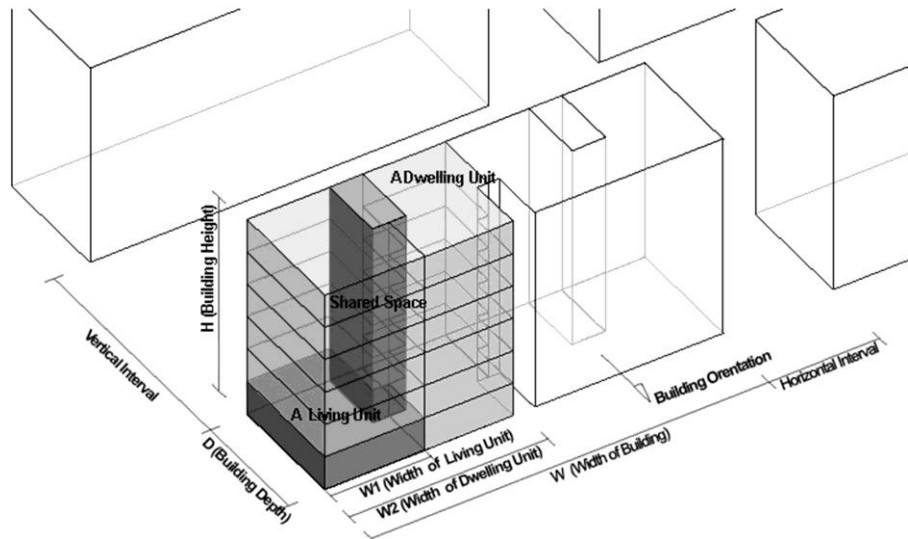


Figure 3. Components of an apartment in China. A living unit is composed of several rooms for daily life. A dwelling unit is composed of several living units that share the stairs and emergency exits (including lifts) (source: Quan Liu, 2013, “Morphological Study on Units of Urban Fabric that Constitute Contemporary Residential Plots in the Yangtze River Delta, China”).

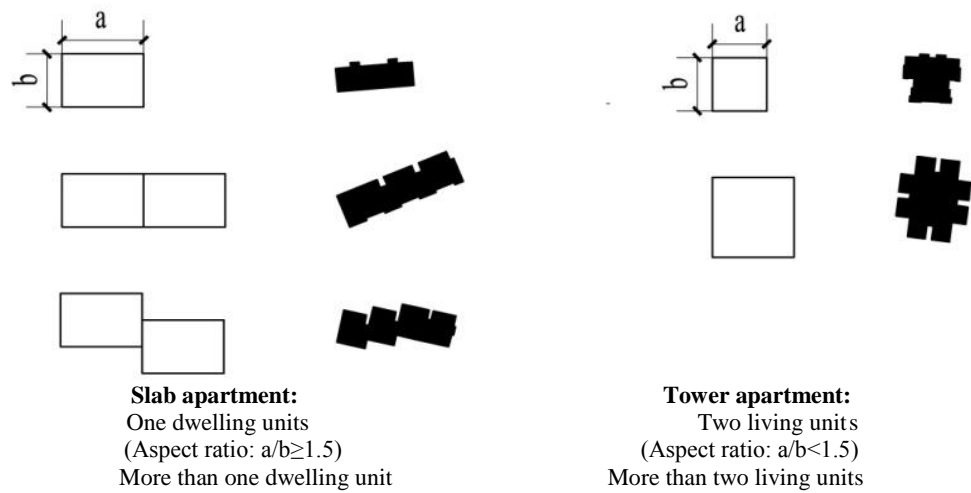


Figure 4. Residential building types are sorted into two kinds: slab apartment and tower apartment.

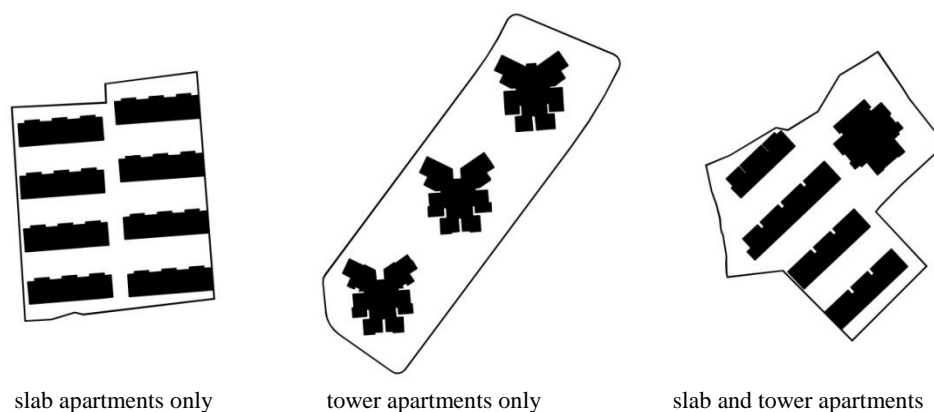


Figure 5. Residential plot types according to building types.

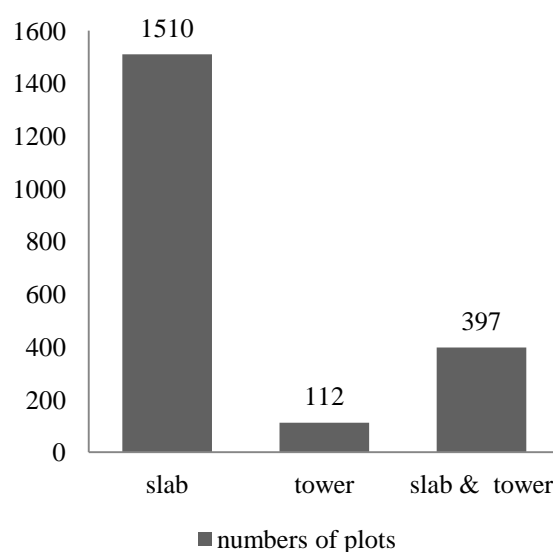


Figure 6. The quantities of three kinds of residential plot types.

Relevance analysis

Reclassification of residential plots

For it is more complicated to discuss the problem of building pattern based on residential plots with at least two buildings, reclassifying the plots with slab apartments according to quantities of buildings within is necessary.

It is read from the table that among all the residential plots with slab apartments, nearly 86 percent plots are composed of more than one building. Emphasis will be laid on these plots.

Table 1. Reclassification of residential plots.

	slab	slab & tower	Amount	Percent
1	272	0	272	14.3%
>1	1238	397	1635	85.7%
Amount			1907	

Elements of typological analysis

The notion 'plot' is not only one of the morphological elements of town plan, but a significant link between individual building and urban fabric. It is quite important to perform typological analysis of residential plots from a perspective of designing rules of buildings.

For Chinese living habit, sunlight reception and natural cross ventilation are the first consideration, which makes orientation of slab apartment is crucial. Then how geometrical characteristics of plot, such as shape, rotation angle, are correlated with orientation of buildings within are worth discussing. When trying to illuminate the relationships above, boundary condition of plot should be taken into consideration as well. Therefore, the typological analysis of residential plots is based on such elements as below according to designing rules of residential building:

- Geometrical relationship between buildings and plot sides;
- Geometrical characteristics of plot;
- Boundary condition of plot.

It should be declared here that building pattern within plot is related to two factors: how buildings within plot as a whole are associated with plot and the interrelation of buildings per se. This paper concentrates on relationships between plots and buildings, regardless of the latter factor.

Geometrical relationship between buildings and plot sides

For these residential plots with one slab apartment, it is easy to see that about 91 percent of the plots are composed of slab apartment parallel to the plot sides conforming to appropriate orientation of residential building no matter what plot shape. And the rest are regular transformation changing with the plot boundary (Figure 7).

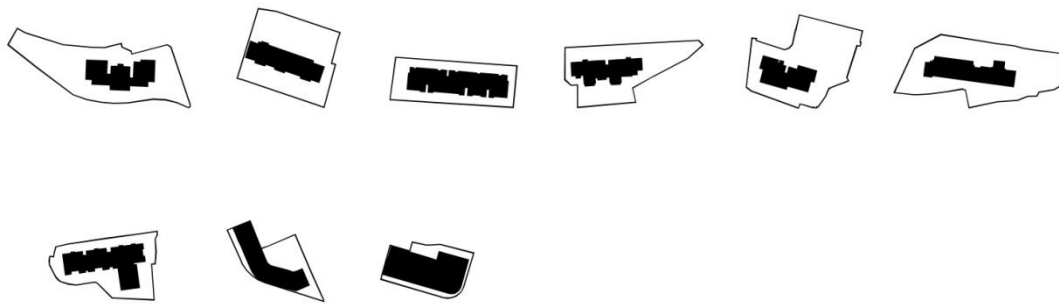


Figure 7. Residential plots with one slab apartment.

By investigating the rest 1635 residential plots with more than one slab apartment, it is explored that there exist three types of geometrical relationships between plot and buildings as a whole (Figure 8):

- a. buildings parallel or perpendicular to at least one side of plot;
- b. buildings totally not parallel or perpendicular to any sides of plot;
- c. part of buildings parallel or perpendicular to at least one side of plot while the rest not, that is the combination of situations above.

Building's side and plot side are identified as parallel or perpendicularity when the angle of the two sides is less than 10 degree.

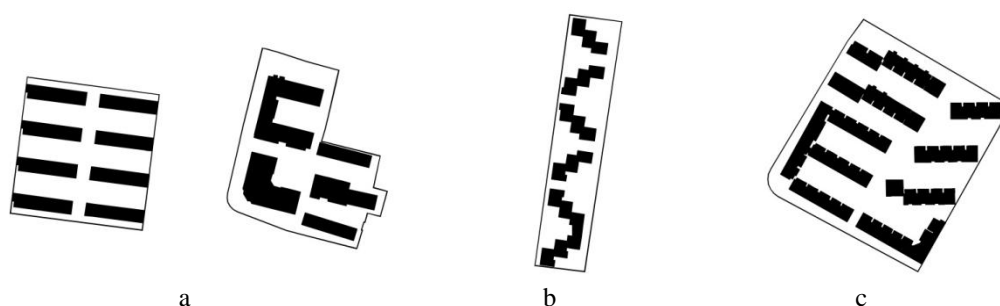


Figure 8. Three types of geometrical relationships between plot and buildings within.

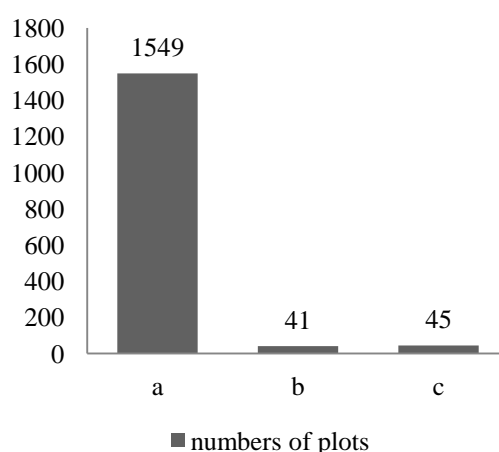


Figure 9. The quantities of plots following three kinds of geometrical relationships.

Nearly 95 percent residential plots with more than one slab apartment conform to the first geometrical relationship (Figure 9). In other word, no matter how residential plot shapes change, the buildings are arranged along (parallel or perpendicular) at least one side, which suggests that the arrangement of residential buildings within plot, namely building pattern, is mainly influenced by plot edge.

However, not all the building patterns are clearly clarified by such geometrical relationship between buildings and plot sides. On the one hand, it is mentioned above that the need for southern sunshine, natural lighting and cross ventilation shapes the east-west long slab and then constitutes the row fabric of residential areas (Liu, 2013). And through long-time summary of designing experience, the appropriate orientation of residential building in Nanjing ranges from south to south by east or west 15 degrees, which provides more comfortable living environment. If rotation angle of residential building is over that degree in a reasonable range, the living environment is not that good but still accepted. Actually, the statistics shows for one third of residential plots, parts of the buildings within adjust themselves to plot boundary beyond reach of appropriate orientation. On the other hand, while majority residential buildings are arranged in rows within plot, for one quarter of residential plots there are one or more buildings within are totally perpendicular to the rest ones. These types of residential plots need to be further studied according to other elements, such as the geometrical characteristics of plot.

Geometrical characteristics of plot









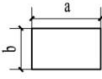








Shape, size, rotation angle and scale of shape are main geometrical characteristics of plot. In this paper, plot shape and rotation angle of plot are mainly discussed to analyze the relationship between plot and buildings within.

Plot shape

All the shapes of residential plots are sorted into 6 categories after carefully examined and reasonably simplified as below:

- Triangle: approximate three straight sides or the length of forth side is less than one third of the longest side;
- Square: approximate four straight perpendicular sides and the aspect ratio is less than 1.5;
- Rectangle: approximate four straight perpendicular sides and the aspect ratio is greater than 1.5;
- Trapezoid: one pair of sides parallel while the rest two sides not, including shapes satisfying condition above with one unfilled or additional shape;
- L-shape: a quadrangle with one unfilled or additional shape;
- Polygon: more than four sides.

Table 2. Categories of plot shape

						
	Triangle	Square ($a/b < 1.5$)	Rectangle ($a/b \geq 1.5$)	Trapezoid	L-shape	Polygon
Regular Shape						
Transformation						
						

Rotation angle of plot

Considering appropriate orientation of residential building, rotation angle of plot is defined here as the angle between bottom side of plot and the horizon for easier description in next analysis (Figure 10).

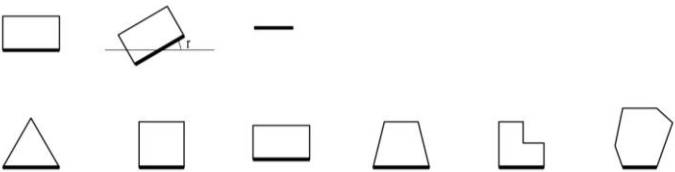


Figure 10. Definition of rotation angle of plot.

Boundary condition of plot

It is found that two kinds of boundary characteristic of plot that are worth discussing in this paper: next to road, including main road, secondary road and branch road, and next to adjoining plot (Figure 11).

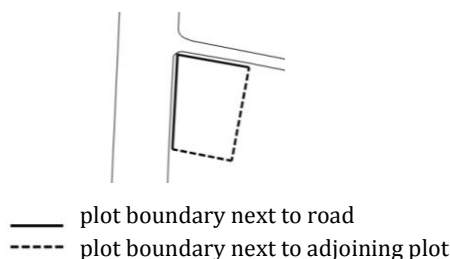


Figure 11. Two kinds of boundary characteristic of plot.

Comprehensive analysis

According to the typological analysis above, 1549 residential plots with more than one slab apartment parallel or perpendicular to at least one side of plot are further studied here with geometrical characteristics of plot. Based on the shape category of residential plots, rules of building arrangement are analyzed comprehensively with rotation angle and boundary condition of plot. Through statistics below, square, rectangular and L-shape plots need detailed discussion for their great proportion.

Table 3. Quantities of plots with more than one slab apartment parallel or perpendicular to at least one side of plot based on shapes

	slab	slab & tower	Amount	Percent
Triangle	11	3	14	0.9
Square&Rectangle	475	61	536	34.6
Trapezoid	204	67	271	17.5
L-shape	331	118	449	29.0
Polygon	148	131	279	18.0
Amount			1549	

Square and rectangular plots

These two kinds of plots are put together for their similar rules of building arrangement, which account for the nearly 35 percent of all plot shapes and can reveal the most common rules. As it has shown that slab apartments are mainly parallel or perpendicular to plot sides, it is easy to imagine that in square and rectangular plots, slab apartments should be arranged in rows at certain angle with corresponding distance between according to the need of sunshine. Actually, about 20 percent of these residential plots are composed of slab apartments perpendicular to each other, thus leading to two plot types: square and rectangular plots with unidirectional slabs and the ones with multidirectional slabs (Figure 12, 13).

For plots with unidirectional slab apartments, rotation angle of plot plays an important role in building arrangement. The rotation angle of square and rectangular plots ranges from 0 degree to 45 degree, among which nearly 98 percent ranges from 0 to 15 degree, that is conform to appropriate orientation of residential building. Therefore, it is valid for slab apartment to be parallel or perpendicular to plot sides while keeping appropriate orientation. When rotation angle of plot ranges from 15 degree to 45 degree, arranging slab apartments along plot sides

regardless of the appropriate orientation may make plot accommodate more buildings and living environment of these slab apartments is still accepted. Such building arrangement is overall consideration of living habits and economic benefit.

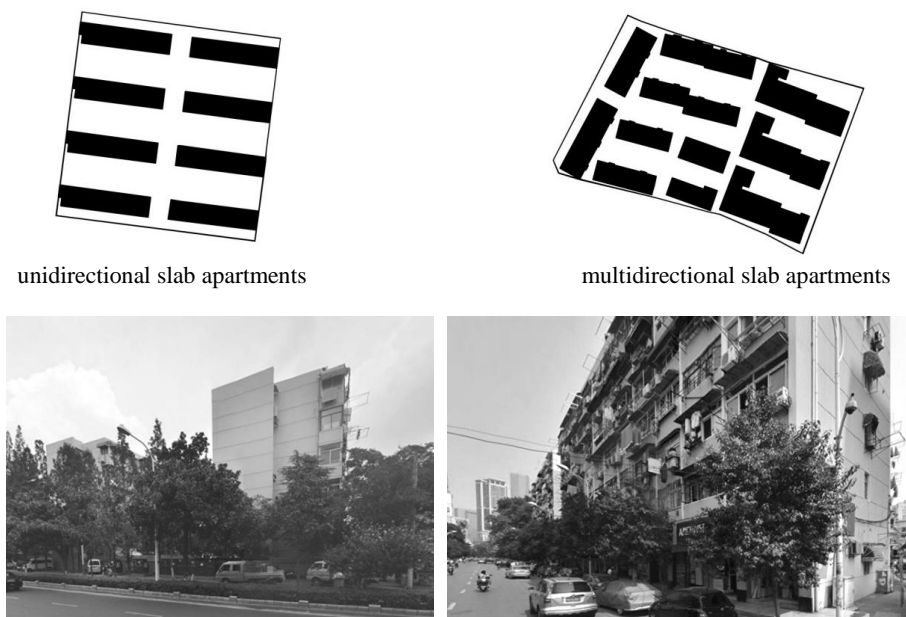


Figure 12. Typical square and rectangular plots with unidirectional slab apartments and multidirectional ones.

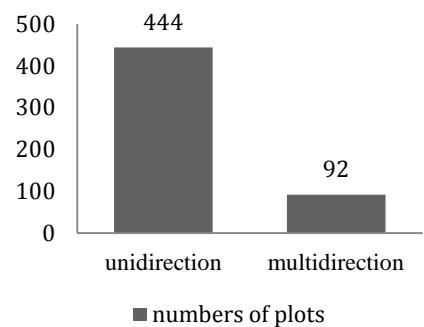


Figure 13. The quantities of square and rectangular plots with unidirectional slab apartments and multidirectional ones.

The rotation angle of square and rectangular plots with slab apartments perpendicular to each other also follows the rules above, thus majority of buildings within such plots keep unidirectional in rows, while there are small parts of buildings perpendicular to the rest ones. The arrangement of these perpendicular slab apartments correlates with two aspects: boundary condition of plot and designing requirements.

Boundary condition. There are 58 plots within which these perpendicular slab apartments are parallel to plot side next to road, which account for nearly 70 percents of plots with perpendicular slab apartments. Taking function of ground floor into consideration, three quarters of plots with slab apartments parallel to road are commercial-residential types. It thus suggests that these perpendicular slab apartments are the result of overall consideration of residential needs and economic benefit.

Designing requirements. The rest plots with slab apartments parallel to sides adjoining to other plots are preliminarily supposed to be the result of some stage, for that in cases from Hexi

new town lately, such plots are quite rare, while it is more common in old town. The perpendicular slab apartments may be designed to contribute to Floor Area Ratio (FAR). It needs further study on typological process historically.

Triangular plots

In triangular residential plots, though all sides of plot are oblique at different angle, slab apartments are firstly arranged parallel to the sides which are conform to appropriate orientation of residential building. As for the rest sides, they mainly have effect on size of the slabs (Figure 14a).

When one side of the plot is next to road, slab apartments tend to be arranged along the side. Cases show that within some triangular plots, except slab apartments conforming to appropriate orientation of residential building, the rest are totally parallel to the side next to road beyond reach of the appropriate orientation, or the dwelling units are dislocated along the side next to road as mentioned above to keep the appropriate orientation (Figure 14b).

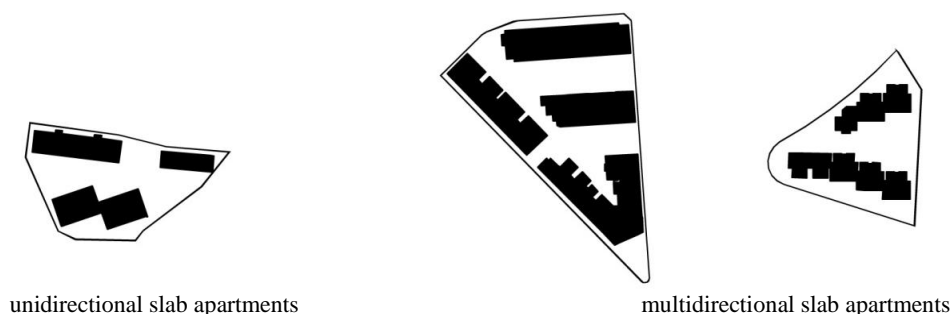


Figure 14. Typical triangular plots with unidirectional slab apartments and multidirectional ones.

Trapezoidal plots

Similar to triangular plots, sides of trapezoidal plots conforming to appropriate orientation of residential building firstly determines the arrangement of slab apartments. Then the direction of unparallel sides of trapezoidal plots makes sense. On the one hand, unparallel sides of vertical direction mainly limit the size of slabs. On the other hand, slab apartments are prone to be organized parallel to the sides of horizontal direction conforming to the appropriate orientation (Figure 15).

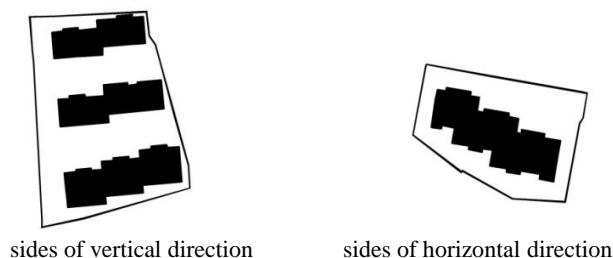


Figure 15. Typical trapezoidal plots with unidirectional slab apartments.

There are one third of trapezoidal plots composing of multidirectional slab apartments. Firstly whether side of plot is next to road is still important. Statistics shows that for 75 percent of trapezoidal plots, the slabs within perpendicular to the rest ones beyond reach of the appropriate orientation lies along the side of plot next to road. Secondly, in order to

accommodate more buildings, the shape of ‘trapezoid’ itself determines slab apartments’ arrangement along hypotenuse. Regular trapezoidal plots with one unfilled or additional shape follow the rules as well (Figure 16).



Figure 16. Typical trapezoidal plots with multidirectional slab apartments.

L-shape plots

Nearly 97 percent of L-shape plots are identified as a square or rectangle with one unfilled shape. Therefore, the rules of building arrangement within square and rectangular plots can be applied here. What make a difference specially in L-shape plots is the size and scale of the unfilled shape, in other words, the size and scale of the two wings of L-shape (Figure 17,18). The minimum width of the wings almost equals to the depth of slab apartment.

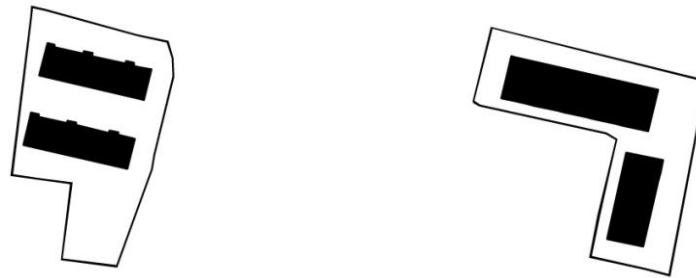


Figure 17. Typical L-shape plots with unidirectional slab apartments and multidirectional.

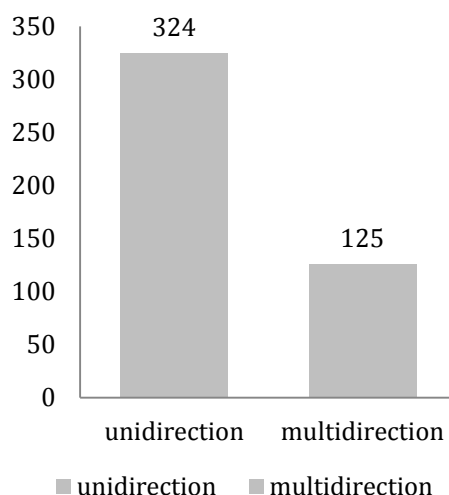


Figure 18. The quantities of L-shape plots with unidirectional slab apartments and multidirectional ones.

23 percent of L-shape plots are composed of multidirectional slab apartments, among which arrangement of slabs beyond reach of the appropriate orientation are influenced by two equally important elements, one is still the side of plot next to road contributes to that change, the other one is L-shape itself with two wings of certain size and scale only can accommodate multidirectional slabs. Regular L-shape plots with an unfilled or additional shape still follow the rules.

Polygonal plots

Although polygon is defined as shape with more than four sides, it can be seen as combination of simple shapes (triangle, square, *et al*). After investigating all the polygonal plots, it is found that rules of building arrangement within regular plots (square and rectangular plots) and irregular plots (triangular, trapezoidal and L-shape plots) fit polygonal plots as well.

It is strengthened here that for all multidirectional slab apartments within irregular plots (triangular, trapezoidal and L-shape, polygonal plots), the correlation between arrangement of slab apartments along the side of plot next to road and the boundary condition is similar to the situation in square and rectangular plots.

Conclusions and further work

The paper pays attention to plot level in the light of Cozenian morphological study. By investigating 2019 residential plots from main city and Hexi new town in Nanjing as mass database, residential building typology and geometrical characteristics of plot have been examined. In order to reveal the relationship between residential plot and buildings within, how building arrangement changes with geometrical characteristics of plot is analyzed step by step and demonstrated with boundary condition. Statistics provide effective tools for processing data to articulate the classification in typological analysis.

The geometrical analysis of buildings and plot sides has shown that building arrangement within residential plot is related with such geometrical characteristics of plot: plot shape and rotation angle of plot. For irregular plot shapes (triangle, trapezoid and polygon), hypotenuse of these shapes has obvious effect on orientation or size of building. As for regular plot shapes (square and rectangle), plot angle plays an important role in controlling rotation angle of

residential building except the experiential orientation. Beyond that, plot side next to road as main boundary condition of plot mainly contributes to the change of residential building beyond reach of appropriate orientation.

As the second level of morphological elements, plot links building typology with urban fabric, which prompts the cognition of physical form of Chinese modern cities. In Nanjing, as residential buildings are always arranged along plot sides, the key point of different fabric between old town and Hexi new town is plot, especially plot shapes. Complicated historic-geographical transformation of plots in old town leads to more fragmental plot shapes and more various building arrangement than those in new town.

The study is preliminary analysis of residential plots, more detailed and comprehensive work should be conducted. First, more characteristics of plot need to be taken into consideration, such as size, scale of plot and FAR. Then the tower apartment and interrelation of slab apartment should be included in following research for overall understanding. Furthermore, more precise geometrical analysis of the relative study can be made to summarize designing rules practically. All the achievements will contribute to better understanding of plan analysis following Cozenian tradition in Chinese modern city.

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Multidisciplinarity in urban morphology

Multidisciplinarity in urban morphology constitutes one of the ten thematic sessions of ISUF 2014 that wishes to reflect on 'Our Common Future in Urban Morphology'.

The main goal of this session is to encourage new multidisciplinary teams to come together to strength and depth the study of urban form fresh perspectives. Urban Morphology as already recognized by some of ISUF founders and the editor of *Urban Morphology* journal is a field of knowledge that exists for over than a century ago and that was built up throughout the contributions of different disciplines, including, history, geography, architecture, among others. It is precisely on the possibility that urban morphology offers as a potential bridge to bring together knowledge provided by different disciplines that this thematic session has been proposed and encourage reflection and debate upon three specific topics: i) The benefits from the potential of cross-disciplinary knowledge, while bringing together separate disciplines to better contribute to the study of urban form; ii) The need to encourage the formation of new areas of knowledge, while encouraging new multidisciplinary teams to come together in a timely manner in response to identified opportunities as places by *Our Common Future*; and iii) Determine how can urban morphology better determine and evaluate the impacts of urban form on the natural environment and therefore contribute to our common future through sustainability at the ground. In order to reflect on the potential of these three main topics, a group of question was placed by this session to encourage further discussions: Which are the contributions that the different disciplines have imputed to the study of urban form? What advances can be identified from such cross-disciplinary knowledge and what lines of thought are emerging? How and why specific relationships between changes of lifestyle, population growth and urban form can be identified? How can these be measured and evaluated? Which are the impacts of these factors on the natural environment? How to evaluate the dynamics interactions between urban form, water and green spaces? How can urban form better respond to the call for Sustainability?

Teresa Marat-Mendes

The study of urban form versus water management

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Abstract: *This paper exhibits the on-going results of a research project, MEMO - Evolution of the Lisbon Metropolitan Area Metabolism. Lessons towards a Sustainable Urban Future, which aims to develop a comparative analysis of the metabolic behaviour of Lisbon Metropolitan Area (LMA), in different historical periods (1900-1950-today). The existing relationship between urban form and the access to water is examined, to provide a possible application of urban morphology to face Our Common Future (WCED, 1987). The concept of urban form considered in this investigation includes territorial, urban and rural forms that testify the man will to transform the territory, while providing access to water. Nine types of water elements were identified and analysed against three territorial scales: Municipality, Settlements and Royal Farms. The analysed relationship between the water elements and the access to water contributed to visualise the characterization of the metabolic behaviour of Lisbon Region, in 1900. Finally, this study testifies that specific urban forms of water typologies are preferable than others, at different territorial scales. Thus, testifying the interaction between urban form and water management, but also how and why specific urban forms and territorial arrangements were selected and allocated to better respond to human and environmental needs.*

Key Words: Lisbon region, royal farms, settlements, urban morphology, water

Introduction

Requests for more linkages between sustainability and the study of urban form have already been addressed. As emphasized by Marat-Mendes (2013) and Talen (2014) urban morphology is strategic for the recognition and articulation of the relationships between changes of lifestyle, population growth and urban form, as well as to explore the impact of these factors on the natural environment.

Recent studies focusing the study of urban and rural form (Cakaric, 2010; Ribeiro, 1989), the evaluation of the metabolism of cities (Barles, 2009; Billen et. al., 2009; Gandy, 2004; Niza et al., 2009), and also historical accounts of water infrastructures and cities metabolism (Bocquet, 2008; Barles, 2007; Swaney et al., 2011; Tarr, 1980) evidence that water infrastructures are responsible for urban transformations within cities, rural territories and the natural environment. It is based on this assumption that the study of urban form, conducted by this investigation integrates several forms built by man, including: water infrastructures, territorial arrangements, and urban and rural forms. These are the forms that have contributed to modulate the physical form of the built environment within which man lives and testifies its respective lifestyle.

This investigation analyses the urban form of Lisbon Region against the access to water, in order to identify why and how specific territorial arrangements, water infrastructure typologies and urban-rural morphological units were conceived, while responding to specific human and environmental needs.

This paper is organised in four parts. After this introduction and the description of the adopted methodology, it moves into the analysis of water and urban form evaluation for the Lisbon Region in 1900. More precisely, it identifies and characterizes: i) the territory under analysis; ii) the historical archive and cartographic sources that have informed the analysis; iii) the identified water typological elements; and iv) the territorial units under analysis. Finally, the access to water evaluation is provided in section four.

Sources and method

Study area and territorial scales

The territory under analysis agrees with present LMA administrative limits, which did not exist yet in 1900. Thus, this paper has designated such territory in 1900 as Lisbon Study Area (LSA). Sixty-three charts at scale 1:20.000, elaborated between 1896 and 1905, acquired from the Instituto Geográfico Português (Charts 1 to 34; 36 to 38; 44; 59 to 74; 79 to 82 and; 84 to 85), belonging to Carta dos Arredores de Lisboa (CEM, 1893-1932) (see figure 1) illustrate LSA for the period under analysis. Complementary cartographic and historical sources were also used to visualise the territory under analysis and confront it against the account and characterization of the identified water elements.

The methodology involved an analysis of historic cartography and other original archive documents. Selected data and information for the period under analysis, aimed to identify and characterize: i) water elements; ii) water volumes; iii) population; and iv) urban form.

From the analysed sources and cartography it was possible to identify three territorial scales, according to the availability of needed data: 1) the Municipality; 2) the Settlement; and 3) the Royal Farm scales. Fifteen Municipalities were identified at the municipal scale, as existing in 1900: Alcochete, Almada, Barreiro, Cascais, Lisboa, Loures, Mafra, Moita, Montijo, Oeiras, Seixal, Setúbal, Sesimbra, Sintra and Vila Franca de Xira (Direcção Geral dos Trabalhos Geodésicos, 1907). Sixteen Settlements were identified. These corresponded to the main Settlements of the above identified Municipalities, plus Palmela. The number of inhabitants, the area and the number of dwellings for each municipality were gathered from the 1905 Portuguese Census (DGEPN, 1905).

The 1903 survey on the hygienic conditions of the most important Settlements of Portugal (CMSMOPCI, 1903) and the 1935 survey on the water provision of Portugal Municipalities (CEMOPC, 1935-1936) constituted two important sources regarding water use in LSA Settlements and Municipalities.

In 1900 LSA included a high number of farms (Marat-Mendes, 2011). This paper focuses its analysis exclusively on the Royal Farms, as information about water supply was available for 1904 (CFR, 1905). Ten Royal Farms were identified: Ajuda, Alfeite, Belém, Caxias, Mafra, Necessidades, Pena, Queluz, Sintra and Tapada da Ajuda.

Water supply typologies, Settlements and Royal Farms

The adopted methodology implied: i) geo-referencing the selected cartography; ii) geo-referencing a mosaic map in Geographic Information Systems (GIS); and iii) a web map.

A GIS Survey for the nine water elements, identified from the analysed cartography and geo-referenced in the mosaic map provided an innovative database of aqueducts (including underground aqueducts), fountains, springs, tanks, tide-mills, water mills, water mines, water reservoirs, and wells (see figure 2), totalizing approximately 3.800 units (see figure 3, table 1 and table 2)

The location and the relative position of all water elements, at the sixteen Settlements and at the ten Royal Farms, within LSA, were also identified.

At the Settlements scale the perimeter of the built area determined the polygons that allowed measuring each Settlement area (see table 3). An overview of these sixteen Settlements, within in their established limits, at the same scale (except for Lisbon) is provided in figures 4 and 5. For the ten Royal Farms, the GIS survey was complemented with data and information provided by the 1904 report (CFR, 1905). Additional aqueducts, fountains, pipelines systems, springs, tanks, water mines, water network and wells were identified. When present, the Royal Farms inherent Royal Properties were also identified. These were considered for the delimitation of the Farms polygons, bounded by the farms walls and surrounding roads (see table 4). An overview

of these ten Royal Farms, within in their established limits, at the same scale, (except for Mafra), indicating water elements is provided in figure 6.



Figure 1. Lisbon Study Area (LSA) - Settlements and Royal Farms. (source: Geo-referenced map (IN+ and DINÂMIA'CET-IUL MEMO Team)).

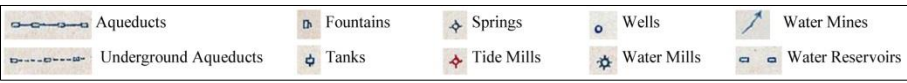


Figure 2. Water Elements identified in the Cartography. (source: CEM (1896-1905)).

Table 1. Water elements in LSA Municipalities vs. area. (source: Geo-referenced map (IN+ and DINÂMIA'CET-IUL MEMO Team) and (a) through DGEPN (1905); (b) CMSMOPCI (1903) and CEMOPC (1935-1936). *Municipalities with different limits in 1900 than in 2014.

Municipality	AREA	WATER ELEMENTS												WATER ELEMENTS/TOTAL AREA (Km²)												
	Area (Km²) (a)	Wells	Springs	Aqueducts (Total)	Above-ground Aqueducts	Underground Aqueducts	Water Reservoirs	Fountains	Tanks	Water Mills	Tide Mills	Water Mines	TOTAL WATER ELEMENTS	Water Network (until 1905) (b)	Wells/Km²	Springs/Km²	Aqueducts/Km²	Above-ground Aqueducts/Km²	Underground Aqueducts/Km²	Water Reservoirs/Km²	Fountains/Km²	Tanks/Km²	Water Mills/Km²	Tide Mills/Km²	Water Mines/Km²	Total Water Elements/Km²
Vila Franca Xira	260.40	26	20	15	3	12	54	11	8	0	0	0	134	no	0.10	0.08	0.06	0.01	0.05	0.21	0.04	0.03	0.00	0.00	0.00	0.51
Mafra	292.00	101	21	4	0	4	2	60	13	30	0	5	236	no	0.35	0.07	0.01	0.00	0.01	0.01	0.21	0.04	0.10	0.00	0.02	0.81
Loures*	193.30	122	42	19	8	11	88	52	54	36	0	6	419	no	0.63	0.22	0.10	0.04	0.06	0.46	0.27	0.28	0.19	0.00	0.03	2.17
Sintra*	325.70	170	61	73	61	12	137	109	46	37	0	11	644	1855	0.52	0.19	0.22	0.19	0.04	0.42	0.33	0.14	0.11	0.00	0.03	1.98
Cascais	97.60	31	11	7	4	3	21	28	8	13	0	0	119	1894	0.32	0.11	0.07	0.04	0.03	0.22	0.29	0.08	0.13	0.00	0.00	1.22
Oeiras*	68.10	52	5	13	8	4	156	30	11	4	0	0	271	no	0.76	0.07	0.19	0.12	0.06	2.29	0.44	0.16	0.06	0.00	0.00	3.98
Lisboa	87.70	182	22	13	3	10	99	33	13	0	0	8	370	1880	2.08	0.25	0.15	0.03	0.11	1.13	0.38	0.15	0.00	0.00	0.09	4.22
Alcochete	91.30	93	0	0	0	0	0	3	17	1	0	0	114	no	1.02	0.00	0.00	0.00	0.00	0.00	0.03	0.19	0.01	0.00	0.00	1.25
Montijo	375.30	114	0	0	0	0	0	1	4	0	6	0	125	no	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.33
Almada	81.70	107	0	0	0	0	1	2	7	0	0	0	117	no	1.31	0.00	0.00	0.00	0.00	0.01	0.02	0.09	0.00	0.00	0.00	1.43
Sarredinha	36.20	43	0	0	0	0	0	3	6	4	6	0	62	no	1.19	0.00	0.00	0.00	0.00	0.00	0.08	0.17	0.11	0.17	0.00	1.71
Moita	50.30	84	0	0	0	0	0	1	5	0	6	0	96	no	1.67	0.00	0.00	0.00	0.00	0.00	0.02	0.10	0.00	0.12	0.00	1.91
Seixal	84.40	140	3	3	2	1	3	9	43	0	8	2	211	no	1.66	0.04	0.04	0.02	0.01	0.04	0.11	0.51	0.00	0.09	0.02	2.50
Setúbal*	687.00	327	14	30	11	19	45	68	103	4	0	12	603	1896	0.48	0.02	0.04	0.02	0.03	0.07	0.10	0.15	0.01	0.00	0.02	0.88
Resimbra	204.50	131	0	6	2	4	21	23	14	5	0	11	211	no	0.64	0.00	0.03	0.01	0.02	0.10	0.11	0.07	0.02	0.00	0.05	1.03
TOTAL	2935.5	1723	199	183	102	80	627	433	352	134	26	55	3732		0.59	0.07	0.06	0.03	0.03	0.21	0.15	0.12	0.05	0.01	0.02	1.27

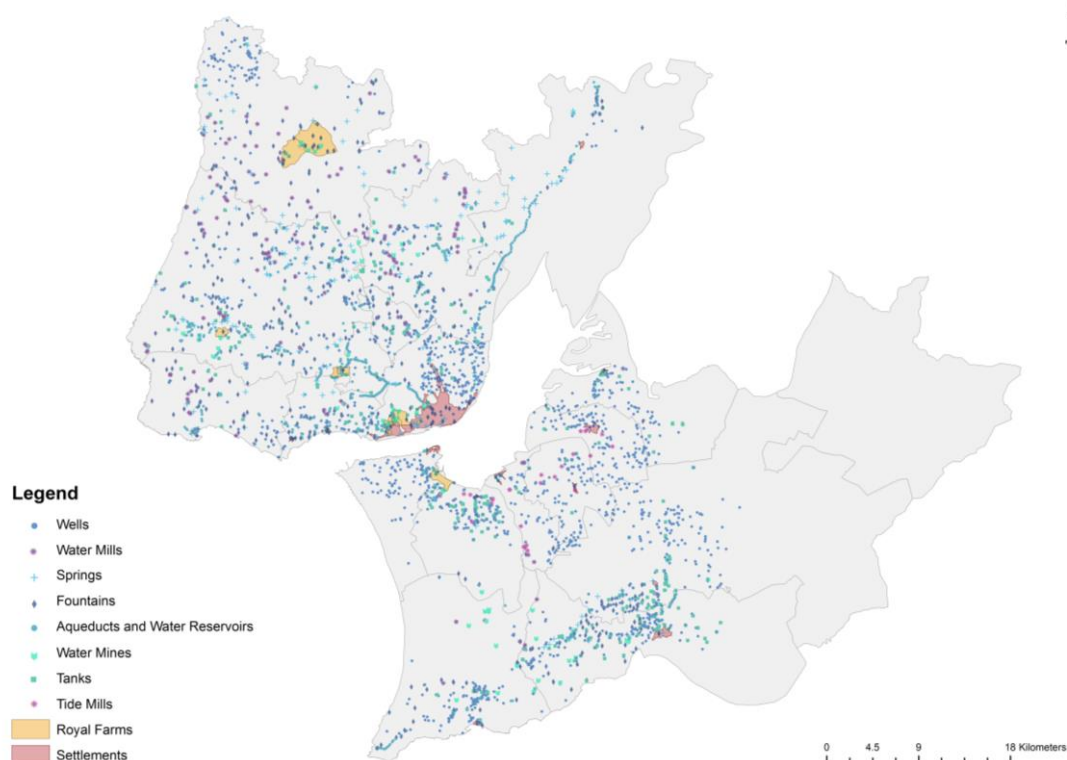


Figure 3. Identification of water elements in LSA. (source: Geo-referenced map (IN+ and DINÂMIA'CET-IUL MEMO Team)).

Table 2. Water elements in LSA Municipalities vs. population. (source: Geo-referenced map (IN+ and DINÂMIA'CET-IUL MEMO Team) and (a) through DGEPN (1905); (b) CMSMOPCI (1903) and CEMOPC (1935-1936). *Municipalities with different limits in 1900 than in 2014.

	POPULATION	WATER ELEMENTS												WATER ELEMENTS/ THOUSAND INHABITANTS												DENSITY	
Municipality	Thousand inhabitants (a)	Wells	Springs	Aqueducts (Total)	Above- ground Aqueducts	Underground Aqueducts	Water Reservoirs	Fountains	Tanks	Water Mills	Tide Mills	Water Mines	TOTAL WATER ELEMENTS	Water Network (until 1995) (b)	Wells/1000 inh	Springs/1000 inh	Aqueducts/1000 inh	Above- ground Aqueducts/1000 inh	Underground Aqueducts/1000 inh	Water Reservoirs/1000 inh	Fountains/1000 inh	Tanks/1000 inh	Water Mills/1000 inh	Tide Mills/1000 inh	Water Mines/1000 inh	Total Water Elements/1000 Inhab.	1000 inhabitants/km²
Vila Franca Xira	16	26	20	15	3	12	54	11	8	0	0	0	134	no	1,65	1,27	0,95	0,19	0,76	3,42	0,70	0,51	0,00	0,00	0,00	8,50	0,06
Mafra	25	101	21	4	0	4	2	60	13	30	0	5	236	no	4,01	0,83	0,16	0,00	0,16	0,08	2,38	0,52	1,19	0,00	0,20	9,37	0,09
Loures *	22	122	42	19	8	11	88	52	54	36	0	6	419	no	5,46	1,88	0,85	0,36	0,49	3,94	2,33	2,42	1,61	0,00	0,27	37,76	0,12
Sintra *	26	170	61	73	61	12	137	109	46	37	0	11	644	1855	6,47	2,32	2,78	2,32	0,46	5,22	4,15	1,75	1,41	0,00	0,42	24,51	0,08
Cascais	10	31	11	7	4	3	21	28	8	13	0	0	119	1894	3,09	1,10	0,70	0,40	0,30	2,10	2,80	0,80	1,30	0,00	0,00	11,88	0,10
Oeiras *	11	52	5	13	8	4	156	30	11	4	0	0	271	no	4,83	0,46	1,21	0,74	0,37	14,49	2,79	1,02	0,37	0,00	0,00	25,17	0,16
Lisboa	356	182	22	13	3	10	99	33	13	0	0	8	370	1880	0,51	0,06	0,04	0,01	0,03	0,28	0,09	0,04	0,00	0,00	0,02	1,04	4,06
Alcochete	6	93	0	0	0	0	0	3	17	1	0	0	114	no	14,77	0,00	0,00	0,00	0,00	0,00	0,48	2,70	0,16	0,00	0,00	18,10	0,07
Montijo	11	114	0	0	0	0	0	1	4	0	6	0	125	no	10,78	0,00	0,00	0,00	0,00	0,00	0,09	0,38	0,00	0,57	0,00	11,82	0,03
Almada	16	107	0	0	0	0	1	2	7	0	0	0	117	no	6,69	0,00	0,00	0,00	0,00	0,06	0,13	0,44	0,00	0,00	0,00	7,32	0,20
Barreiro	8	43	0	0	0	0	0	3	6	4	6	0	62	no	5,38	0,00	0,00	0,00	0,00	0,00	0,38	0,75	0,50	0,75	0,00	7,76	0,22
Moita	6	84	0	0	0	0	0	1	5	0	6	0	96	no	13,27	0,00	0,00	0,00	0,00	0,00	0,16	0,79	0,00	0,95	0,00	15,17	0,13
Seixal	7	140	3	3	2	1	3	9	43	0	8	2	211	no	20,64	0,44	0,44	0,29	0,15	0,44	1,33	6,34	0,00	1,18	0,29	31,10	0,08
Setúbal*	37	327	14	30	11	19	45	68	103	4	0	12	603	1896	8,74	0,37	0,80	0,29	0,51	1,20	1,82	2,75	0,11	0,00	0,32	16,12	0,05
Sesimbra	9	131	0	6	2	4	21	23	14	5	0	11	211	no	14,47	0,00	0,66	0,22	0,44	2,32	2,54	1,55	0,55	0,00	1,22	23,31	0,04
TOTAL	567	1723	199	183	102	80	627	433	352	134	26	55	3732		3,04	0,35	0,32	0,18	0,14	1,11	0,76	0,62	0,24	0,05	0,10	6,58	0,19



Figure 4. The delimited Lisbon Settlement (source: Geo-referenced map (IN+ and DINÂMIA'CET-IUL MEMO Team)).

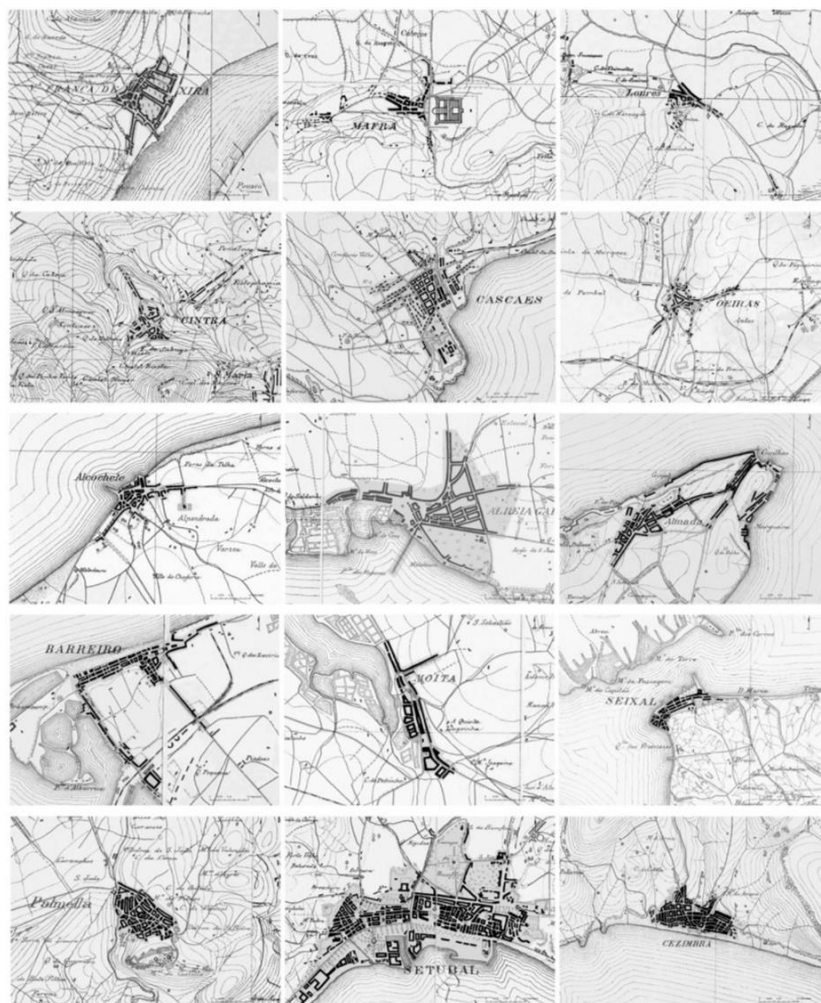


Figure 5. The delimited fifteen Settlements in LSA. (source: Geo-referenced map (IN+ and DINÂMIA'CET-IUL MEMO team). Legend: See Figure 2).

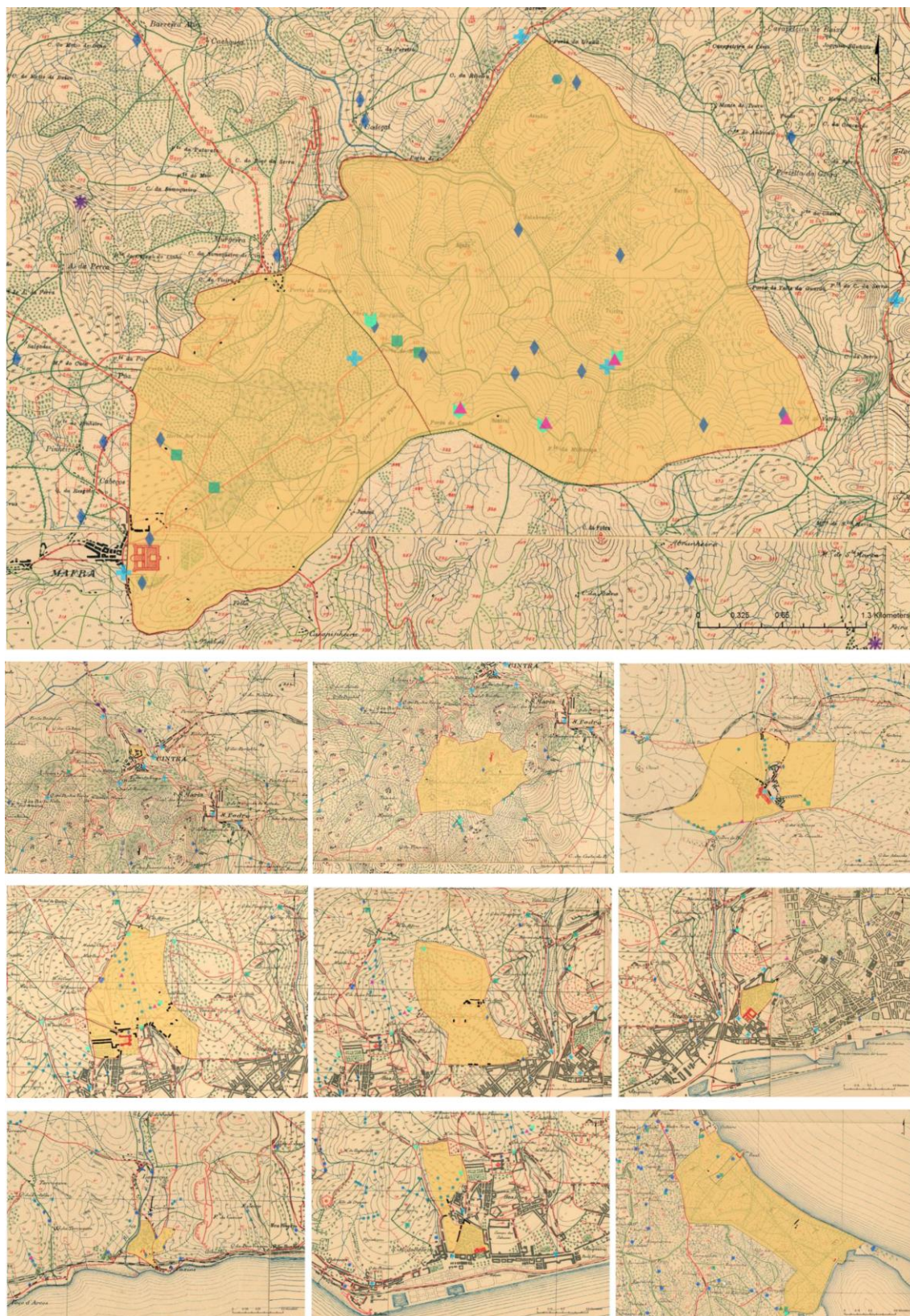


Figure 6. The delimited ten Royal Farms and respective Royal Properties in LSA.
 (source: Geo-referenced map (IN+ and DINÂMIA'CET-IUL MEMO Team). Legend: See Figure 3).

Access to water in Settlements and Royal Farms

Following the cartographic treatment, and based on the geo-referenced cartographic mosaic, it was developed a comparative systematization of the access to water for the sixteen identified Settlements and ten Royal Farms. Information provided by the 1903 and 1935 surveys, but also by the 1904 report, was used for this systematization.

This systematization required the establishment of a standard graphic representation. This informed about the location and the relative position of water elements to the Settlements and Royal Farms. No scale consideration was required.

Four relative positions of the localization of water elements in Settlements were identified: 1) in public space; 2) inside the Settlement; 3) at the Settlement border; and 4) in the vicinity of the Settlement. For these last ones, it was considered elements existing within a radius of 1 Km approximately (see figure 7).

Two relative positions of the localization of the water elements in the Royal Farms and their inherent Royal Properties were identified: 1) inside the Royal Farm and; 2) inside the Royal Property (see figure 8). The relative position of the Royal Farm to nearby Settlements was also represented.

Water elements considered in these analyses did not cover the nine identified water elements. Water reservoirs and water mines were excluded from the Settlements analysis, as these were inexistent. The analysis was based on the observation of the water elements within, at the border and in the vicinity of the delineated polygons, which gave a very subjective detail. For the Royal Farms, the 1:5000 scale plans of water distribution within the Royal Farms provided by the 1904 report, allowed to complement this analysis with greater detail. Nevertheless tide mills, water mills, water mines and water reservoirs were excluded from the accounting, as these were inexistent within Royal Farms. The number of water elements in each identified Settlement and Royal Farm, and the rate of water elements per area unit, is provided in tables 3 and 4.

Table 3 - Water Elements at the LSA Main Settlements. (source: Geo-referenced map (IN+ and DINÂMIA'CET-IUL MEMO Team); *CMSMOPCI (1903) and CEMOPC (1935-1936)).

Settlements	AREA	WATER ELEMENTS									WATER ELEMENTS/TOTAL BUILT AREA (ha)							
	Built Area (ha)	Wells	Springs	Aqueducts	Fountains	Tanks	Water Mills	Tide Mills	TOTAL WATER ELEMENTS	Water Network (until 1905)*	Wells/ha	Springs/ha	Aqueducts/ha	Fountains/ha	Tanks/ha	Water Mills/ha	Tide Mills/ha	Total Water Elements/ha
Vila Franca Xira	17	0	0	1	0	0	0	0	1	no	0,00	0,00	0,06	0,00	0,00	0,00	0,00	0,06
Mafra	9	4	1	0	3	1	0	0	9	no	0,44	0,11	0,00	0,33	0,11	0,00	0,00	1,00
Laures	7	5	2	1	1	2	0	0	11	no	0,71	0,29	0,14	0,14	0,29	0,00	0,00	1,57
Sintra	10	0	6	1	0	2	3	0	12	1855	0,00	0,60	0,10	0,00	0,20	0,30	0,00	1,20
Cascais	30	2	6	2	0	0	0	0	10	1894	0,07	0,20	0,07	0,00	0,00	0,00	0,00	0,33
Oeiras	9	3	0	0	6	0	0	0	9	no	0,33	0,00	0,00	0,67	0,00	0,00	0,00	1,00
Lisboa	1430	18	14	3	20	3	0	0	58	1880	0,01	0,01	0,00	0,01	0,00	0,00	0,00	0,04
Alcochete	12	17	0	0	1	5	0	0	23	no	1,42	0,00	0,00	0,08	0,42	0,00	0,00	1,92
Montijo	73	8	0	0	0	0	0	2	10	no	0,11	0,00	0,00	0,00	0,00	0,00	0,03	0,14
Almada	33	2	0	0	1	1	0	0	4	no	0,06	0,00	0,00	0,03	0,03	0,00	0,00	0,12
Barreiro	29	5	0	0	0	2	0	3	10	no	0,17	0,00	0,00	0,00	0,07	0,00	0,10	0,34
Moita	18	3	0	0	1	0	0	1	5	no	0,17	0,00	0,00	0,06	0,00	0,00	0,06	0,28
Seixal	8	12	0	0	1	3	0	3	19	no	1,50	0,00	0,00	0,13	0,38	0,00	0,38	2,38
Palmela	15	3	1	0	0	0	0	0	4	no	0,20	0,07	0,00	0,00	0,00	0,00	0,00	0,27
Setúbal	120	6	2	2	2	7	0	0	19	1896	0,05	0,02	0,02	0,02	0,06	0,00	0,00	0,16
Sesimbra	16	10	0	0	2	2	0	0	14	no	0,63	0,00	0,00	0,13	0,13	0,00	0,00	0,88
TOTAL	1836	98	32	10	38	28	3	9	218		0,05	0,02	0,01	0,02	0,02	0,00	0,00	0,12

**Access to water at the
main settlements in the
Lisbon Study Area
(LSA) 1898-1905**



Settlement and
relative positions of
water elements

- Wells
- * Springs
- ▶ Fountains
- ◆ Tanks
- Public Space
- * Water/ Tide Mills
- ||| Aqueducts
- / Rivers
- Coast Line
- + Water Supply Net

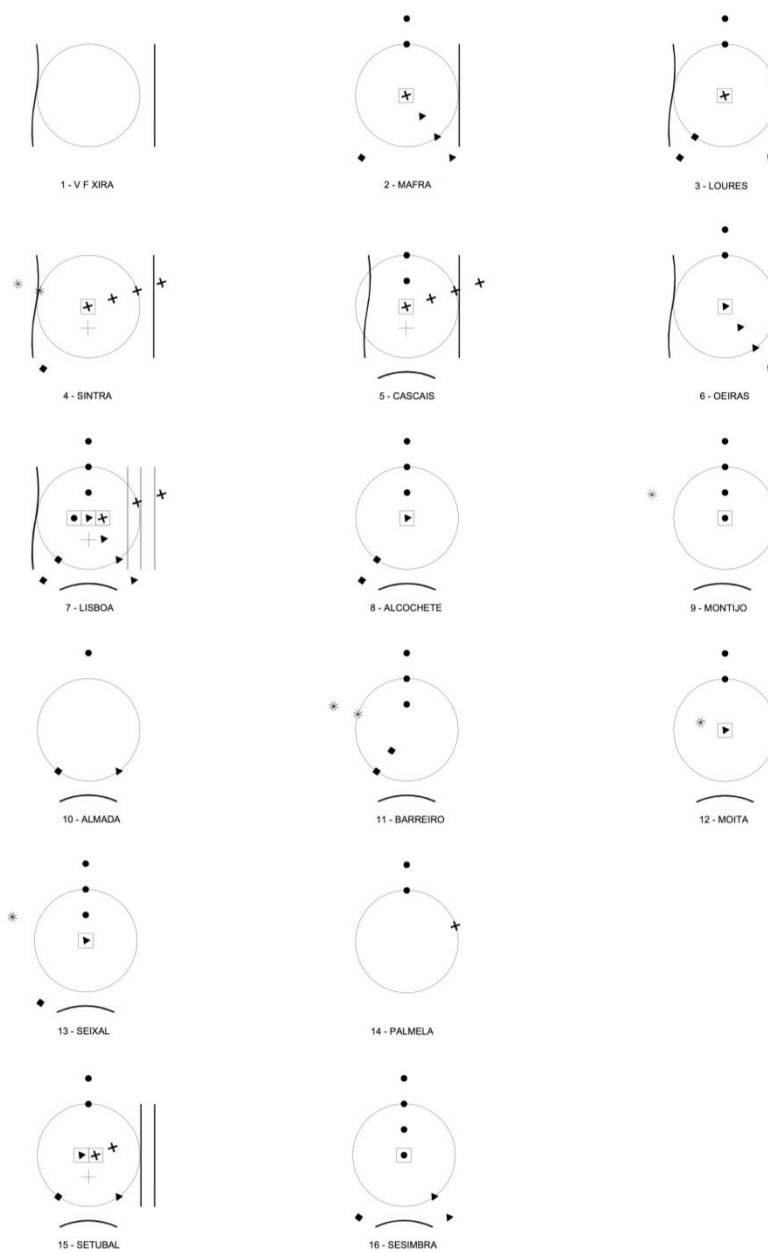


Figure 7. Access to water at the main Settlements in LSA (source: by authors).

**Access to water at
the Royal Farms
in the Lisbon
Study Area (LSA)
1898-1905**

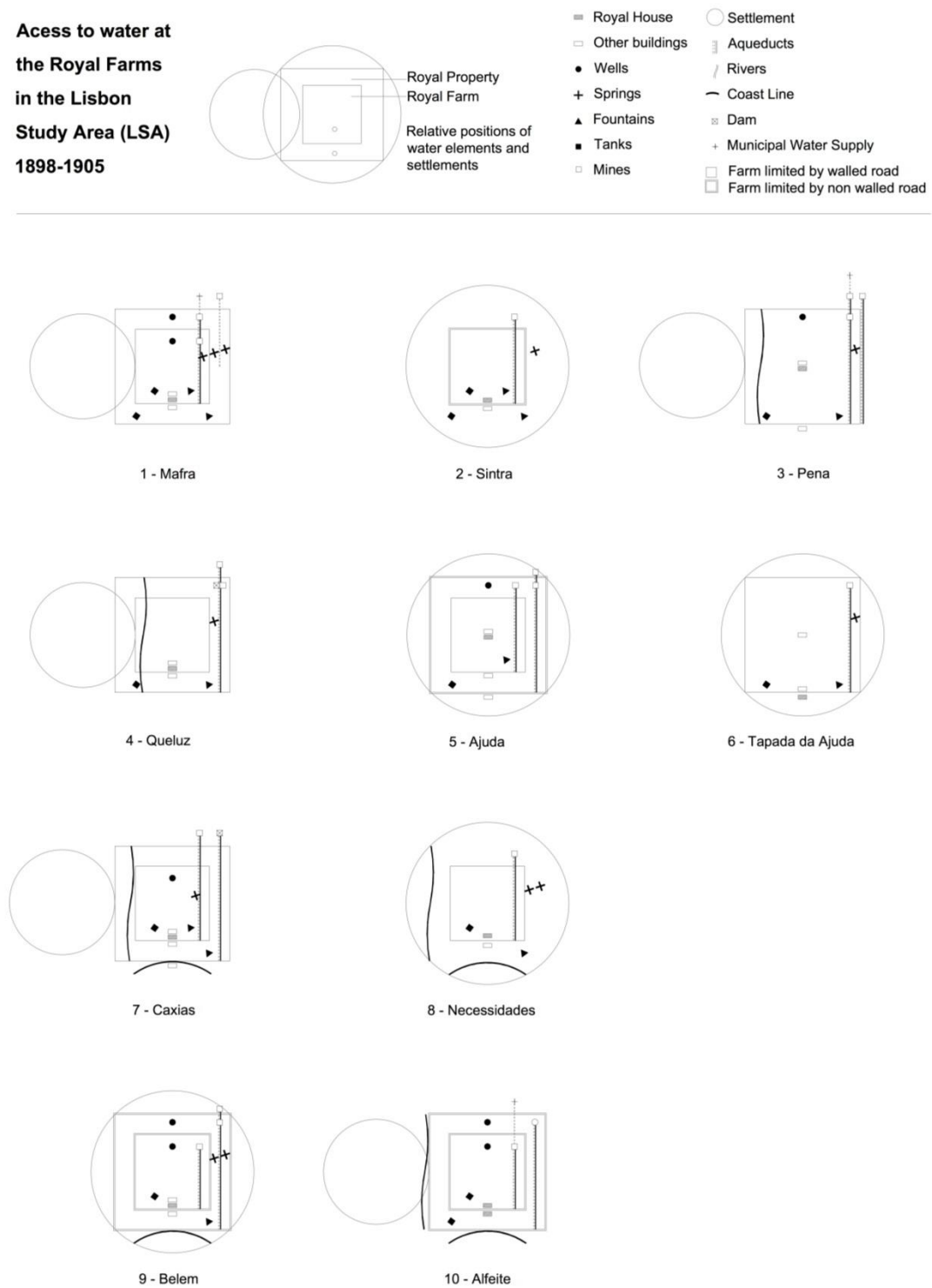


Figure 8. Access to water at the main Royal Farms in LSA (source: by authors).

Table 4. Water Elements at the LSA Royal Farms (source: CFR (1905); *Geo-referenced map (IN+ and DINÂMIA'CET-IUL MEMO Team)).

Royal Farms	AREA*			WATER ELEMENTS								WATER ELEMENTS/TOTAL AREA (ha)						
	Royal Property Area (ha)	Royal Farm Area (ha)	Total Area (Property+Farm) (ha)	Wells	Springs	Aqueducts and Pipelines	Fountains	Tanks	Water Mines	TOTAL WATER ELEMENTS	Water Network Supply (until 1900)	Wells/ha	Springs/ha	Aqueducts and Pipelines /ha	Fountains/ha	Tanks/ha	Water Mines/ha	Total Water Elements/ha
1-Mafra	826	425	1251	9	11	6	13	2	6	47	no	0,01	0,01	0,00	0,01	0,00	0,00	0,04
2-Sintra	0	2,4	2,4	0	3	2	2	5	2	14	no	0,00	1,25	0,83	0,83	2,08	0,83	5,83
3-Pena	91	0	91	1	1	8	7	3	37	57	yes	0,01	0,01	0,09	0,08	0,03	0,41	0,63
4-Queluz	125	20	145	0	3	4	1	1	7	16	yes	0,00	0,02	0,03	0,01	0,01	0,05	0,11
5-Ajuda	103	18	121	2	0	5	3	3	5	18	no	0,02	0,00	0,04	0,02	0,02	0,04	0,15
6-Tapada Ajuda	115	0	115	0	2	6	1	3	7	19	no	0,00	0,02	0,05	0,01	0,03	0,06	0,17
7-Necessidades	0	12,6	12,6	0	5	2	1	1	2	11	no	0,00	0,40	0,16	0,08	0,08	0,16	0,87
8-Caxias	3	7,4	10,4	1	1	3	2	1	2	10	no	0,10	0,10	0,29	0,19	0,10	0,19	0,96
9-Belém	34	11	45	4	2	4	1	2	0	13	no	0,09	0,04	0,09	0,02	0,04	0,00	0,29
10-Alfente	170	4,5	174,5	8	0	4	0	4	4	20	yes	0,05	0,00	0,02	0,00	0,02	0,02	0,11
TOTAL	1467	500,9	1967,9	25	28	44	31	25	72	225		0,01	0,01	0,02	0,02	0,01	0,04	0,11

Water and Urban Form in Settlements and Royal Farms

The present section follows with a brief description for each Settlement and Royal Farm. Gathered information includes: location; elevation, water elements, water supply net, building form, public space availability; and land uses. An account of the inhabitants and dwellings was also provided for Settlements description.

Settlements

Vila Franca de Xira (5-25 meters above sea level, MASL) located beside Tagus River and North railway, in 1911 housed 4873 inhabitants in 1220 dwellings. No water network was present in 1935, and in 1903 this Settlement was supplied by one fountain, two municipal wells for irrigation and washing and also by private wells. Buildings were distributed along the access roads in narrow blocks and beside the railway, in large scale closed blocks with vineyards in the inner space.

Mafra (210-230 MASL) located beside the Convent of Mafra, in 1903 housed 2175 inhabitants in 387 dwellings. In 1935 it had no municipal network, except a municipal pipeline located at the Royal Farm. Water was sold by watermen and collected in two fountains, next to the convent and the Royal Property entrance. The Settlement was distributed along two radial roads, starting from the main entrance of the convent. In the vicinity vineyards and pinewoods were located.

Loures (20-45 MASL) located along Malveira hills, in 1903 housed 457 inhabitants in 118 dwellings. A high slope, at 110 MASL, surrounded *Loures* where spring water was brought by an underground aqueduct to the central fountain, where the water was free. In 1903 the water network was only provided for the City Hall and Military buildings. Water was sold to the remaining buildings. The Settlement, formed by three radial short rows of buildings was surrounded by ploughed land.

Sintra (160-200 MASL) in 1903 housed 2856 inhabitants in 753 dwellings. One water network existed since 1855, although private and partial. In 1914 there was a municipal network and in 1923 also a private company network was developed, which provided one fifth of the water for municipal use. Altogether these networks supplied fifteen fountains. One fountain was located in a public space inside the Settlement. The Settlement was surrounded by trees and by a valley with several water mills.

Cascais (5-20 MASL) located by the sea, in 1903 housed 2536 inhabitants in 876 dwellings. Several springs and fountains, where the water was free, served it. Additionally, two

underground aqueducts supplied a partial network since 1894, which served 1173 dwellings in 1935. Six springs and one well located in public spaces were also present. In the vicinity land was not cultivated except for a small vineyard, an orchard and pinewoods near the fortress.

Oeiras (10-35 MASL) located near Tagus River, in 1903 housed 1.776 inhabitants in 455 dwellings. A private company developed a water network in 1919. Previously, the water available for human consumption was sufficient. It was obtained from private wells along a waterline, from one spring and one water mine. Water was freely available at the fountains located on the main access roads, in the way out of the Settlement. The buildings were distributed along these roads, close to vegetable gardens, orchards and vineyards.

Lisbon City (10-70 MASL) stands at Tagus estuary surrounded by the railway. It housed the majority of the municipal population, 352.715 inhabitants in 81.021 dwellings, in 1903. The Aqueducts of Águas Livres and Alviela supplied houses and fountains. In 1851 (Andrade, 1851) counted more than fifty fountains, seventeen pipelines and six wells. From 1880 onwards a water network served Lisbon. Vegetable gardens and trees were located within the Settlement. In its vicinity, land was cultivated with orchards, vineyards, olive trees and ploughed lands.

Located beside Tagus River, *Alcochete* (3-15 MASL) in 1903 housed 3506 inhabitants in 937 dwellings. The small and compact Settlement had a public square with a municipal well that in 1905 was replaced by a fountain. The water network was installed in 1918. Previously, water was supplied by private wells and tanks located within the Settlement and its surroundings. Along the river there did vineyards and orchards, while the remaining Settlement was organized in small blocks, surround small rows of buildings perpendicular to the margin.

In 1903 Montijo (2-15 MASL) housed 7.010 inhabitants in 1687 dwellings, which corresponded to 70% of the municipal population. In 1903 the drinking water was distributed by car, provided by wells, four of them were inside the Settlement. In the vicinity there were two tide mills with basins contiguous to the urban form. The Settlement had large empty spaces, two with public wells in the centre. The ploughed soil was found inside the urban fabric, protected by a walled road by the riverside.

Almada occupies an elevated promontory (75 MASL). In 1903 it housed 3162 inhabitants in 815 dwellings and was developed with linear rows of buildings forming large blocks, bounded by ploughed land and vineyards. In 1905 there were no water elements inside the Settlement. One fountain was present at the riverbank. In 1935 there was still no water network, but there was one spring and one fountain in the highest part of the Settlement, providing free water public supply. Until then, water was distributed in barrels and in pitchers.

Barreiro (5-15 MASL) is surrounded by Tagus River and by tide mills basins. In 1903 it had 5206 inhabitants and 1419 dwellings. Small compact blocks were concentrated on the north side of the Settlement and along two access roads. Until 1927, when the water network was built, water supplied by wells was abundant. In 1935 the network served 287 dwellings and water was still being sold by the Municipality to the watermen.

Moita (5-30 MASL) is located in a long recess of the Tagus estuary with salt basins. In 1903 it housed 6850 inhabitants and was served by wells and by one fountain located on a public space. In 1925 the water network collected water from wells, and in 1935 it served 105 dwellings. The buildings were distributed through three linear rows. One formed by quadrangular blocks next to central water basin. Cultivated land and vineyards surrounded the backyards of the Settlement. At the southern end of this basin a tide mill and salt basins limited the Settlement.

Seixal (0-15 MASL) stands on a recess of the Tagus estuary. In 1905 a riverside road and a landfill with pinewoods surrounded it. In 1911 housed 2769 inhabitants in 614 dwellings. It was supplied by five wells; two of these were public with free water, and by one fountain located on a public space at the east side of the Settlement. Small compact blocks, including two green areas along the river, built the urban form. In 1935 there was still no municipal water network.

Palmela (160-190 MASL) is placed on a hillside. In 1903 it housed 2490 inhabitants in 690 dwellings. One spring located in the base of the hill and one public well supplied the population in 1903. Six public wells and four fountains complemented these water elements in 1935, while

there was no distribution network. The Settlement is arranged along the slope with trapezoidal blocks. Due to the topography cultivated land was not contiguous to the Settlement. Yet, at the vicinity there were vineyards on the southern slopes, but also olive and cork trees.

Setúbal (0-20 MASL) is a city that stands next to the Sado River. In 1903 housed 20,027 inhabitants in 5869 dwellings. Watermen sold water network dates from 1896, when the inhabitants were still served by wells and water. In 1905, one fountain and one spring existed in public space. There were no wells within the Settlement but in its vicinity there were twelve of them supplying the network. The city had green spaces beside the large closed blocks, at the river.

Sesimbra (10-35 MASL) is located at the seacoast. In 1903 it had 5,104 inhabitants in 1483 dwellings. Water network was available since 1909, although fountains only used such water in some parts of the year. Before, was supplied by wells (one in the main public square) and two fountains. Narrow streets and orthogonal blocks structured the compact urban form. Flanking the access roads to the Settlement the land was cultivated with cereals and vineyards. Olive trees were present along the waterlines.

Royal Farms

Mafra Almoxarifado (230-356 MASL). Almoxarifado corresponded to a number of lands that belonged to the jurisdiction of an Almoxarife, whom was treasurer of the Royal House. In 1900 the waters that supplied these properties were obtained within the Tapada of Mafra (a Hunting Reserve) or in the lands belonged to the Royal House. Without the obligation to supply any others, the Municipality of Mafra such as other buildings did also served by some of these sources. From the nearly fifty sources, four were piped. Apart from the Aulas Fountain, twenty other sources supplied the Royal House and the Cerca Garden. Most of the property was cultivated with pine and other trees; Frades vegetable garden was watered by two springs.

In 1904 Sintra Palace (200 MASL) was supplied by water from two aqueducts: Serra Aqueduct, whose waters were also served by some privates; Sabuga Aqueduct, that supplied the lake located in front of the Royal House and watered the Preta Garden. The distribution of the Sabuga leftovers was of the responsibility of the Municipal Council, without prejudice of the public and the Royal Palace.

The Pena Royal Property (380-529 MASL) principally consisted of woods. Because of this elevated location, in 1904, the 72 sources that supplied the Pena Almoxarifado consisted of mines, tanks, lakes, and sources and spring whose origins sprouted from the properties of Pena Park (explored since 1838). Several other buildings and private farms were also supplied by these waters, both for human consumption and irrigation.

Queluz Royal Farm (100-140 MASL) is located in the municipality of Sintra. In 1900 more than eight water mines and sources provided the water catchment. One of these sources was at a distance of 2kms from the Royal House. Although a river with a dam crossed the Royal Farm, the water was also brought by three aqueducts that supplied one spring located within the Royal Farm; one spring located on the main square of Queluz; and one public fountain in the northern edge of this village. In 1898 the ploughed lands occupied the Royal Property. Near the Royal House garden and woods occupied the soil.

The property where is located the Ajuda Royal Palace (85-110 MASL) was bounded by a road. In 1904 the waters provided by mines and wells supplied this almoxarifado and were distributed by piping systems. These were used to serve the Royal House, three public fountains, and the irrigation of ploughed fields and gardens. There was no municipal network. Telheiros and Quintinha residents were served by the Palace water mines and in case of fire, water should be provided by the Royal House water.

The Tapada da Ajuda (25-160 MASL) property was bounded by walls and cultivated with several types of trees and ploughed lands. This was located within the municipality of Lisbon. From the piping systems built up to 1904, some of them supplied also some buildings located within the Royal Property, such as a lake, orchards, vegetable gardens and the Calçada da

Tapada spring. Among the eight sources whose origins were located within this Tapada, two water mines were owned by other properties: Belém Royal Farm; and Saldanha Farm.

Necessidades (30-60 MASL) is located within the municipality of Lisbon. The quantity of water produced in this property that ran into the Royal Farm woods would gather 12 Pennas (1 Pena measured approximately 3390 litres/24h) from the Águas Livres Aqueduct. In 1904 the waters from the Almarjão mines, apart from supplying the Palace, also supplied four springs located outside the property, placed in public spaces, such as lakes, tanks and one waterfall located in the Royal Park, stables and the Queen garden.

Caxias Royal Farm (10-42 MASL) is located along the coastline. The property was surrounded by walled road and was cultivated with olive trees, vineyards and other trees. In 1904 the Barcarena River, next to the Royal Property, was dammed just below Laveiras village and its waters were used for irrigation and supply the Cartuxa Convent and other private properties. The Royal House and the cascade fountain were supplied by water from the Queijas Aqueduct. This also supplied the spring located in the courtyard of the palace, the public fountain from Queijas and other close palaces. One well situated next to the cascade provided abundant water for irrigation.

The Belém Royal Palace (5 and 114 MASL) is situated on the margins of the Tagus River in the municipality of Lisbon. In 1901 the water that watered the orchards and gardens of this property was provided by a well located in the Belém Royal Farm. These waters, despite of being an abundant source, were not enough for the required consumption. The public and private houses consumed the waters from the three groups of water mines in large quantities, collected from springs. The water source located on the west side of the Ajuda Royal Palace was connected to the Belém Royal Farm pipeline.

The Alfeite Royal Property (5-60 MASL) is located on the south bank of Tagus River. In 1904 the Royal House was supplied by water from one well and by the Municipality of Almada, through a contract from 1890. The property was cultivated mostly with pinewoods, some olive and other trees. The Brejo da Romeira ditch, whose waters were elevated by a dam, irrigated the nearest lands. Three wells watered the orange orchard. The water provided by this Almojarifado sources was all consumed in this property.

Discussion

This section moves into a comparative analysis of the access to water in the analysed LSA Municipalities, Settlements and Royal Farms.

For the total area of 2935 km² LSA housed 567 thousand inhabitants in 1900, and presented a total of 3732 water elements. Table 1 and table 2 allow characterizing the average number of water elements per km² and per inhabitant. However, it should be stressed that these densities do not testify the water elements efficiency in terms of quantity of water supplied. Moreover, the distribution of water elements over the territory is not homogeneous as indicated in figure 3.

It should be noticed that the density of water elements per area is not always proportional to the density of water elements per inhabitant. Thus, some Municipalities with a high population density do not always present a high density of water elements per area. The case of Lisbon is exemplar: while presenting the highest population density, it presents the lower rate of water elements per inhabitant. Additionally, scarcity of water in Lisbon was a problem already identified by Montenegro (1895). A further analysis of water volumes account is needed to better inform about this heterogeneity of water elements distribution.

Water elements in LSA and in its main Settlements follow a growing hierarchy in complexity, from the simple well or direct water source to the more complex spring where man, often conducted by an aqueduct, drives water. Such hierarchy responds to the natural hydrographical conditions and to the population needs.

Wells were more common and numerous at the Municipalities and Settlements of south area of LSA, while springs and fountains were more present at north area (see figure 3). The presence

of water elements within public spaces occurs in the majority of the Settlements. Three Settlements without public spaces do only present water elements within their border areas (see figure 7). Lisboa and Setúbal present a greater number of public spaces and water elements variety within such areas. These are the most important cities.

It is evident from the description of all Royal Farms the presence of a complex network of water pipelines and aqueducts for irrigation and human consumption (see figure 8). Half of the Royal Farms had water infrastructures that connected to public springs. A considerable number of Royal Farms allowed privates to collect water directly from their sources. Two of them supplied a municipal water network (Mafra and Pena) and one received water from the municipality (Alfeite), testifying the articulation between Royal Farms and Settlements in what concerns to access to water in LSA in 1900.

The provided tables allow an account of the various water elements in each analysed Municipality, Settlement and Royal Farm. Their comparative analysis allows concluding that in Municipalities and Settlements wells represent the predominant water element per Km² and also the presence of a great variety of water elements. However, at the Royal Farms it is evident a uniformity in the distribution of the total water elements. Yet, some Farms present a higher number of water elements than others. Water Mines are the most numerous water elements but Aqueducts and Pipelines are present in all Farms.

Conclusions

A characterization of the access to water in LSA in 1900 was offered in this paper, although conditioned by available sources. The analysis and confrontation of historical governmental surveys and cartography proved to be adequate to the investigation methodology. Such information did not cover all the needed data for the full account of the urban metabolism in LMA, as referred by Barles (2009). Nonetheless, the present analysis contributes to visualise the water use and the characterization of water flows that operate within the LSA metabolism.

The analysis of access to water in LSA has confirmed the existence of a hierarchy of water elements, supported by the complexity of their infrastructure and involved costs. This analysis also reveals an existing relationship between Settlements and Royal Farms, in what concerns to water management.

The overall distribution of water elements in LSA confirms their relationship with geographical conditions, population concentration and territorial arrangements. Thus testifying the interaction between territorial, urban and rural forms, and water management.

Finally, this paper has verified that the localization, type and number of water elements are determined by pre-existing territorial structures, but also determines future urban form structures.

Acknowledgements

The Portuguese Science Foundation with grant PTDC/EMS-ENE/2197/2012 financed this research. The full MEMO team includes Samuel Niza (PI) and Daniela Ferreira from IN+, IST. For further information visit the research project MEMO website at <https://sites.google.com/site/memoamlmetabolism/>.

The authors are thankful to Nuno Gomes to have prepared the geo-referenced map. The authors are also thankful to Instituto Geográfico Português for the use of cartography.

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Morphology and functioning of the metropolitan urban areas

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Abstract. *The principal aim of this paper is to construct a new spatial typology of the Metropolitan Urban Areas (MUA), based on four metropolitan processes: concentration, dispersion, centralization and decentralization. It is at the same time, a theoretical and multidisciplinary approach that rest on works of many Francophone and Anglo-Saxon researchers. In this context, it is necessary at the first step, to determinate for each spatial type, morphological (localisation/land use) and functional (mobility/transport networks) characteristics of MUA and to specify at the second step, their evolution according to the centrifugal mode.*

Key Words: *spatial typology, metropolitan urban areas; metropolitan processes; morphological and functional characteristics.*

Introduction

Through the literature, we note the abundance of concepts and alternative models in order to find a solution to urban sprawl phenomenon and designate the most sustainable urban form: polycentric city, urban corridors, smart growth and new urbanism. These models are in the centre of the current debate whose the crucial question is: what's the urban form that promotes a more sustainable society?

We distinguish a variety of urban forms across the world and specifically in Europe: monocentric versus polycentric forms, centralized versus dispersed models. We classify these urban forms in several geographic scales: neighbourhood, city and metropolitan area (Tsai, 2005). The neighbourhood and the city are included in the metropolitan area, so, the metropolitan scale seems to be the most pertinent to understand the spatial organisation of Metropolitan Urban Areas (MUA).

In general, spatial structure of MUA can be defined as 'the overall shape, may characterise such land use phenomena' (Tsai, 2005) and refers to 'the set of relationships arising out of the urban form and its underlying interactions of people, freight and information' (Rodrigue et al., 2009). These two pertinent definitions gathering both land use and relational aspects show that the understanding of spatial organisation of MUA is conditioned by two things: morphology and functioning.

The reflection initiated today seeks in particular to deepen links between morphological, functional and structural aspects of the city and the challenge of sustainable urban development. In this context, this paper tends to know morphology and functioning of MUA by using a theoretical and conceptual approach. This paper is divided into five sections on, respectively: the definition of metropolitan processes, the construction of new spatial typology, the MUA's morphological and functional characteristics, the evolution of MUA according to centrifugal mode and the example of a metropolitan territory named G10.

Definition of metropolitan processes

MUA as a term is used to configure a statistical unit which can extend up to several tens of kilometres from the city centre; it includes both city and urban area (Roger, 2007). It may

correspond to 'a major city together with its suburbs and nearby cities towns and environs over which the major city exercises a commanding economic and social influence'¹⁶². In addition, MUA is a functional and scalable territory (Conesa, 2008) since it corresponds to the influence area of metropolis (etymologically mother city). In terms of threshold, French metropolises are spaces with 500 000 inhabitants at least which include one urban area of more than 200 000 inhabitants and involve several medium sized cities (DATAR, 2004).

In a context of globalisation, MUA defines the territorial system concerned by metropolisation, the major urban phenomenon of the last fifteen years (Roger, 2007). Metropolisation is 'a protean and contradictory phenomenon which now works both urban spaces and national and international urban framework' (DATAR, 2012). Researches on metropolitan processes are conducted in several fields such as economy, geography and town planning. Among processes that accompany metropolisation, we have dilatation and stretching frame, concentration and decentralization, increase and diversification of mobility, logics of residential and economic localisations, rural–urban confusion and pressure on natural and agricultural spaces.

Four contradictory processes catch our attention in order to build a spatial typology of MUA: concentration, dispersion, centralization and decentralization. It is necessary to define these terms basing on a theoretical corpus and taking into account the most significant definitions.

Concentration reflects the high density and represents monocentric development (Gordon and Richardson, 1997). It is a condition to improve accessibility (Pouyanne, 2004) and concerns employment and dwellings (Ewing, 1997). It opposes to urban sprawl and integrates a high functional diversity. Furthermore, the concentration of development is required by the compactness (Tsai, 2005), thus, monocentric and polycentric compact forms (Anderson *et al.*, 1996) require the concentration of development. Concentration refers also to clustering term. According to Rodrigue *et al.* (2009), clustering is the setting of activities in relation to a specific part of the urban area. A cluster of activities is therefore a concentration around focal point which can be a transport infrastructure (example of station) or a smaller town that has been absorbed by the metropolis expansion.

Dispersion called also decentralized sprawl (Ewing, 1997) designates the urban sprawl. It is characterised by discontinuity (Tsai, 2005) and low density. Newton (2000) explains that dispersion is a suburban low density development concerning population, housing and jobs. Moreover, dispersion is the diffusion of spatial components according to principle of automobile accessibility and it opposes to concentration which correspond to the agglomeration of components according to principle of proximity (Secchi, 2002).

Consequently to concentration and dispersion processes well known of the economic geography, two opposing forces occur within the urban system with the obligatory presence of transport networks: centrifugal and centripetal forces.

Centripetal forces push to concentration (Duranton, 1997) or agglomeration. Among the agglomeration factors, we have for example the proximity of firms to exchange information, existence of fixed costs, availability of labour, etc. Centrifugal forces push to differentiation or dispersion (Duranton, 1997) and they are the result of many factors such as increasing land costs in the centre, congestion, space consumption, transport costs, etc.

Centralization refers to the setting of activities in relation to the whole urban area (Rodrigue *et al.*, 2009), so, centralized cities gather more than 60% of jobs in the centre¹⁶³ while decentralized cities have less than 40% of jobs in the centre (Aguilera and Mignot, 2004). In Switzerland, decentralization doesn't concern only workplaces; it represents dispersed housing zones situated in rural areas at some distance from agglomerations (Meyre and Stalder, 2006).

¹⁶² <http://global.britannica.com>.

¹⁶³ The authors designate centre in contrast to periphery.

This is confirmed by Bertolini (1999) who clarifies that decentralization is the remoteness process of houses toward suburbs and peripheral zones.

In their paper titled 'spatial structure and productivity in US metropolitan areas', Meijers and Burger (2010) are interested in localisation of the metropolitan population. They have mentioned that population either it localises in urban poles or it disperses with decentralized manner on metropolitan territory. They confirm that localisation of the population is related to 'centralization–dispersion' dimension. Moreover, Bertolini (1999) explains that concentration and decentralization are concomitant because economic functions like production can decentralize contrary to business services which need to concentrate. Pouyanne (2004) stipulates that there is a double movement because firms detach from centre to peripheral zones where they tend to gather and to concentrate.

Finally, the World English Dictionary attributes two pertinent definitions to decentralization in closed relation with concentration and dispersion. 'To decentralize is to distribute the administrative powers of functions of a central authority over a less concentrated area. It is also to reorganise a government, industry, etc. into smaller more autonomous units'. This first definition related to administration shows that decentralization is the process of transferring some of power exercised by state to political or administrative entities of lower level (Bussi, 2010). 'In France in 1980s, decentralization was synonym of state modernisation and democracy deepening. It was questionable to organise best repartition of political competences between centre and periphery entrusting new missions to local authorities and shortening decision times' (Levy and Lussault, 2003; Bussi, 2010).

'To decentralize is to disperse something from an area of concentration. In other words, it is to disperse a concentration, as of industry or population'. This second definition of the dictionary completes and coincides with Bertolini's definition.

Table 1 recapitulates concisely what we mean when we refer to concentration, dispersion, centralization, decentralization.

Table 1. The recap chart

Concentration	Dispersion	Decentralization	Centralization
monocentric forms	decentralized	dispersion	concentration
polycentric forms	sprawl	distance from the metropolitan centre	proximity to the metropolitan centre
compact forms	low density	peripheral localisation of people, employment and activities	localisation of people, employment and activities in metropolitan centre
high density	discontinuity	competences organisation between centre and periphery	functions exercised by a central authority
continuity			

Corollary, we propose personalized definitions (figure 1) of the four metropolitan processes:

Centralization: is to centralize population, economic activities, employment and major equipments (cultural, of transport...) in the metropolitan centre of commandment.

Decentralization: is to disseminate the components mentioned above to metropolitan limits generating shrinking of the centre in terms of demography, activities, etc. This shrinking can't be quantified in terms of surface (voids can be filled through urban renewal operations).

Concentration: is to gather population, activities... around a focal point upon specific metropolitan parts which can be the main centre or any geographical zone. Specialized concentration (residential, economic or other) is at the origin of cluster formation. The emergence of small non-metropolitan secondary centres is both the consequence of decentralization and concentration.

Dispersion: is the inverse of the concentration action, it consists to delete the logic of clusters spontaneously or regularly (central disjunction followed by localised and peripheral concentration).

The concentration/dispersion tendency is related to a key factor which is land. Inversely, the centralization/decentralization tendency is related to existence of transport infrastructure (road, rail, highway...).

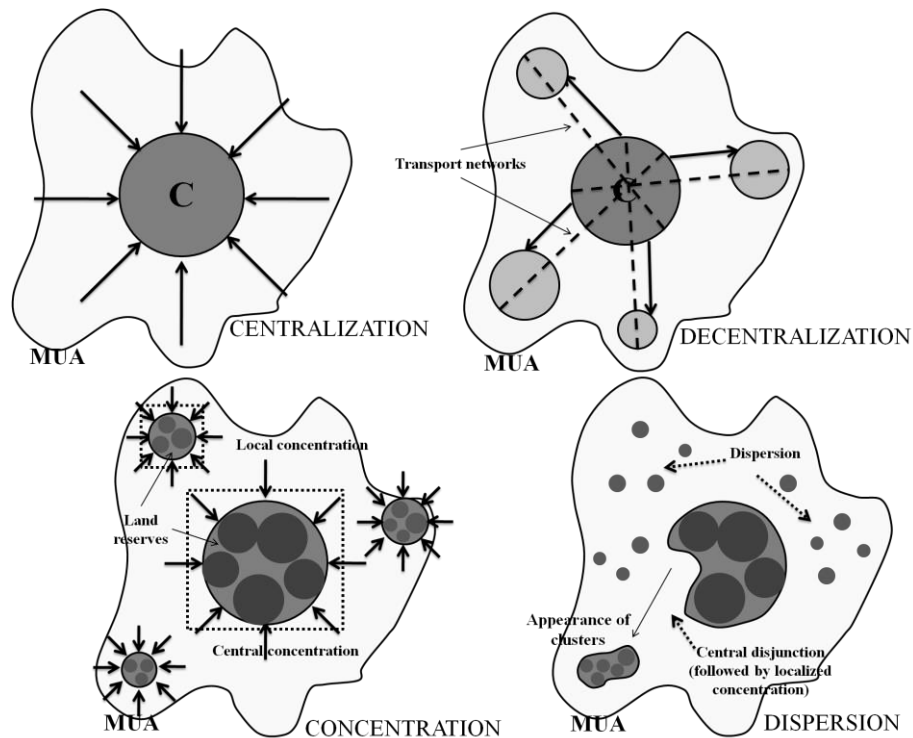


Figure 1. The four metropolitan processes.

Construction of a new spatial typology

If we link the four terms, we will obtain four spatial models which may characterise a MUA: centralized concentration; decentralized concentration; centralized dispersion and decentralized dispersion.

Centralized concentration may represent a compact or a monocentric metropolitan area. Decentralized dispersion may correspond to a diffuse metropolitan area. Centralized dispersion has not a theoretical basis or a set of conditions that can define it.

Decentralized concentration is the intermediate model that may represent a polycentric or a multi-polar metropolitan area. Morphologically, decentralization occurs in metropolitan territory from the centre to secondary polarities whereas concentration occurs in these poles.

In theory, decentralized concentration aims to decrease polarization of the metropolitan centre, multiply polarities and encourage urban growth around nodes and transport networks (figure 2). In Europe, decentralized concentration is a planning strategy which has emerged in Germany in 1993 and a principle announced in Swiss federal law on town and country planning.

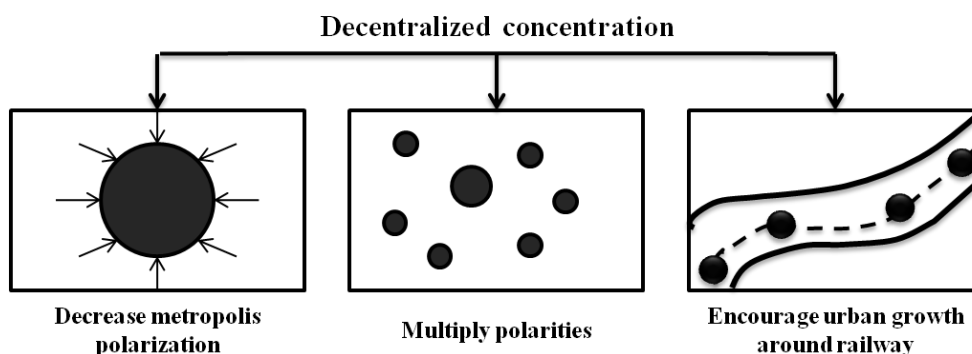


Figure 2. The decentralized concentration.

MUA's morphological and functional characteristics through researchers works

Basing on the works of many researchers and according to the typology cited above, we try through this section to determinate morphological and functional characteristics of MUA.

Works on morphology

Through his paper titled 'the development of spatial structure and regional economic growth', Parr (1987) has defined three distinguish cases of spatial structure development in relation with the economic growth: regional concentration and metropolitan centralization, regional concentration and metropolitan decentralization, regional deconcentration and metropolitan decentralization. We explain in each case, economic and migratory factors which influence the population and the employment localisation at metropolitan and regional scales.

Regional concentration and metropolitan centralization (figure 3): in this first case, the economic growth process is recent, the income per capita is low and the demographic growth is rapid in the metropolis but slow in the non-metropolitan part of the region. Here we have two situations. Firstly, when regional economy is in the process of industrialization and economic activities are concentrated in the metropolis due to forces of agglomeration economies, it will have a net migration from the non-metropolitan part of the region towards metropolis as well as a net international and interregional migration in the direction of metropolis.

Secondly, when growth of the non-metropolitan part stimulates growth in the metropolis, it will have a net substantial international and interregional migration towards metropolis and the non-metropolitan part with a low intra-regional migration towards metropolis. As a consequence of these two situations, the concentration level of regional population will increase and will be accompanied by the centralization of population in the metropolis.

Regional concentration and metropolitan decentralization (figure 4): in this second case, the region has known an economic growth in a certain time and the income per capita is situated at a superior level. The demographic growth increases in metropolis limits and especially in the internal non-metropolitan part of the region. The superior income of population and the low cost of transport system facilitate this decentralization of population. However, the external non-metropolitan part knows slow and negative rhythms of demographic growth. Moreover, the forces of agglomeration economies and low cost of interregional transport promote the concentration of activities and the centralization of employment in the metropolis. So, we note a net international and interregional migration towards the region and especially the metropolis. Consequently, the concentration of regional population increase is accompanied by the decentralization of the metropolitan population.

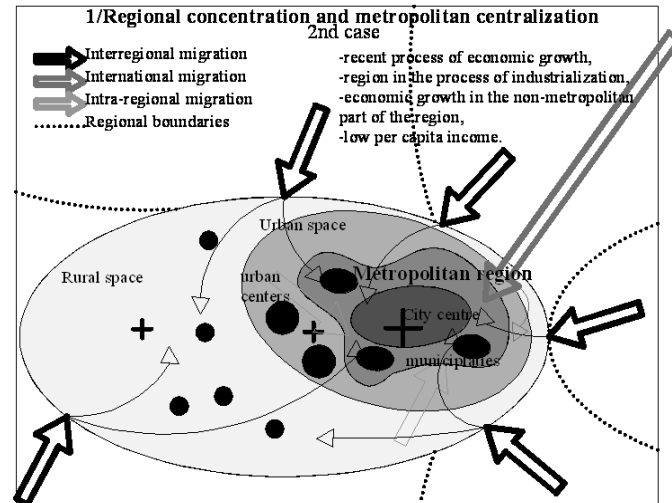


Figure 3. Regional concentration and metropolitan centralization.

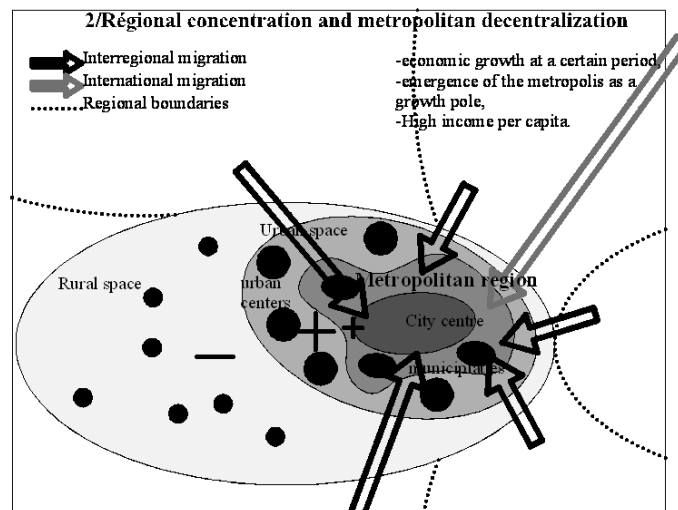


Figure 4. Regional concentration and metropolitan decentralization.

Regional deconcentration and metropolitan decentralization (figure 5): in this third case, regional economic growth and the income per capita are relatively high. The housing demand in zones of low residential densities continues to rise up because of the high income of the population. So, demographic growth rates are negative in the metropolis and positive in the non-metropolitan part of the region. This decentralization of population is also associated to the decentralization of employment in order to escape the negative externalities of metropolis such as congestion, pollution and criminality. Additionally, the firms move away from the metropolis to take advantages of the non-metropolitan part of the region: accessibility of land and the more interesting costs of transport and communication systems.

Two situations are associated to these developments: the first is characterised by a net migration from the metropolis towards the non-metropolitan part of the region while the second indicates a net interregional migration in the region. These tendencies cause in consequence the deconcentration of regional population which is accompanied by the metropolitan decentralization of population and employment.

Globally, Parr has stipulated that the spatial development of metropolitan region can directly pass from a phase similar to the first case to a phase similar to the third case. The intermediate phase is nonexistent or short. Additionally, he has explained that we can imagine a fourth case of regional deconcentration and metropolitan centralization but it's difficult to invent a coherent set of conditions which can explain this development of spatial structure.

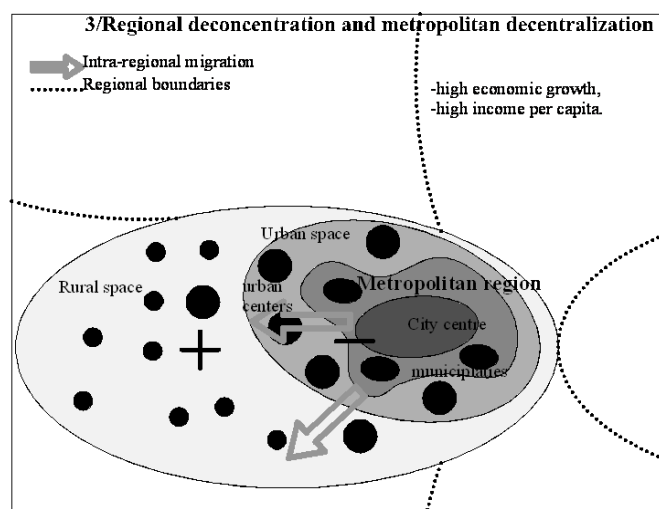


Figure 5. Regional deconcentration and metropolitan decentralization.

Brotchie triangle allows us to understand the different relationships between concentration and dispersion of activities and displacements (Simmonds and Coombe, 2000). It's a simple graph (figure 6) whose the horizontal axis measures the concentration of employment (in terms of the average distance between employment and centre) and the vertical axis measures the average distance that residents travel to work (this distance is conditioned by localisation of residents and jobs). Only the triangle's summits interest us because they represent three theoretical situations:

Point A represents a metropolitan area characterised by centralization of employment and radial home-work trips (the residents travel to centre for working). This first situation reflects the centralized concentration model.

Point B represents a metropolitan area characterised by decentralization of employment, dispersion of population and long distance home-work trips. This second situation represents the decentralized dispersion model.

Point C represents a metropolitan area characterised by decentralization of employment and localisation of home-work trips (each active walks to the nearest workplace, so, it's a local concentration of short distance trips). This third situation indicates the decentralized concentration model.

Besides, Gilli (2005) stipulates that economic activities don't scatter with the same manner and deconcentration can be non homogenous for all sectors. When sectors scatter in the same manner, it means that they undergo spatial horizontal disintegration. This disintegration could be partial if deconcentration has only concerned some sectors. It's the example of an area where population is decentralized to periphery generating an increase of peripheral potential merchants which attract new activities. When sectors relocate and don't scatter, it means they undergo spatial vertical disintegration. This second type generates specialization of urban spaces in different complementary activities.

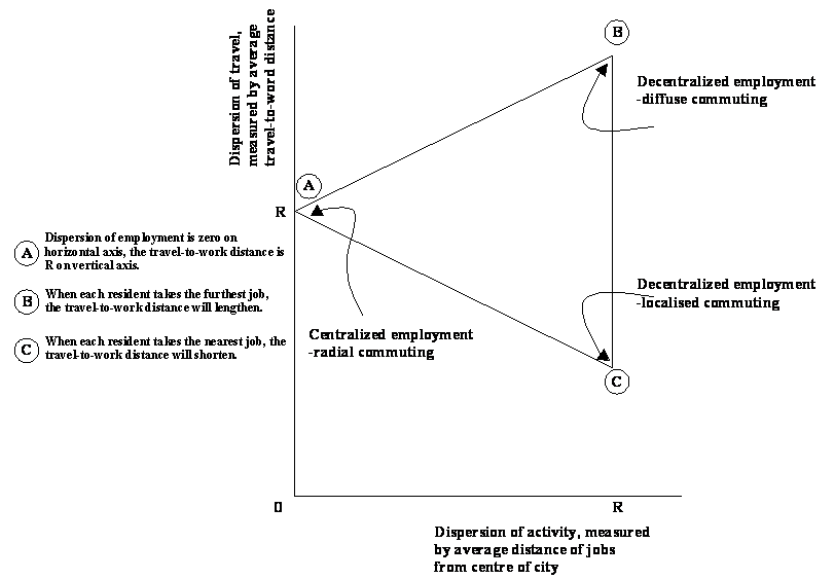


Figure 6. The triangle of Brotchie (source: Simmonds and Coombe, 2000).

According to these works, we can deduce that mutations in MUA morphology are linked to: (i) Behaviour related to the nature of economic activities; (ii) Impact of regional economic growth on spatial structure (income per capita, land costs, economical sectors: primary, secondary and tertiary); (iii) Human behaviour related to employment localisation (nearest jobs, furthest jobs); (iv) Commuting patterns (radial, localised or dispersed trips); (v) Adopting a new lifestyle (choice of low density peripheral zones, presence of various services...).

Works on functioning

In his work on mobility, Appert (2004) stipulates that metropolitan processes influence the urban perimeter with intensification, lengthening and complexity of mobility. Intensification of mobility means concentration of flows due to centripetal forces. This intensification is possible for a single pole or a set of poles, so it concerns the two spatial models of centralized concentration and decentralized concentration. Complexity of mobility is perceived for decentralized concentration, there are at the same time radial, local and dispersed trips. Lengthening of mobility means that distances increase due to dispersion and urban sprawl as well as the presence of centrifugal forces which divide urban system components.

In their work on forms of relationships between poles, Schwanen *et al.* (2001) distinguish four Dutch built-up areas supposing the morphological configuration around a major centre: centralized, decentralized, cross commuting and exchange commuting. We are interested only on the two first models; centralized model corresponds to centralized concentration because there is a strong link between the major centre and the territory. Decentralized model corresponds to decentralized concentration because there are strong links between all urban poles even secondary.

Also about relationships between poles, Champion (2001) distinguishes three formation modes of polycentric urban areas: centrifugal, incorporation and fusion. The first mode is the emergence of secondary centres in urban area initially monocentric. The second mode indicates sprawl of the main urban centre which integrates small other centres to form a stronger area. The third mode signifies that many centres creating an individually attraction area, conglomerate in unique urban area.

Additionally, Bertaud (2004) defines four patterns: monocentric, polycentric, urban village and composite. The urban village pattern is utopian, an autonomous community will emerge

around employment poles allowing short displacements and use of alternative modes (walking and biking). This model could not exist because it does not actually correspond to MUA organisation which obeys to logic of economic scales. The monocentric pattern corresponds to centralized concentration model and it's characterised by concentration of activities and flows in centre, high densities, public transport use, continuous growth and radial transport system. This pattern is organised because main flows converge to the centre.

The polycentric pattern is characterised by several sub-centres without major centre, repartition of activities uniformly, medium and high densities, individual and public means of transport, discontinuous growth and random displacements. This pattern is unbalanced because flows are random and don't converge to a single centre.

In terms of activities, densities and sub-centres, this pattern may correspond to decentralized concentration. Conversely, it may correspond to decentralized dispersion because of random trips and discontinuous growth. The composite pattern corresponds to decentralized concentration and it's characterised by the presence of a major centre and sub-centres. It is unbalanced because the primary and secondary flows are both radial and orbital. It represents the current model of MUA organisation.

Generally, these works have allowed us to note that decentralised dispersion is a disorganised or unbalanced model which is characterised by random trips and lengthening mobility. Both public and individual transports are used here.

Mobility in the decentralized concentration model is intense or complex. Urban centres even secondary have strong links thanks to decentralization process. This disorganised model adapted to individual and public transports, is formed with centrifugal and incorporation modes.

Centralized concentration is an organised model. A strong link exists between the major centre and the rest of territory provoking mobility intensification. Theoretically, this spatial model is characterised by the use of public transports only. Nevertheless, Simmonds and Coombe (2000) explain that this model does not reduce the number of car trips, traffic increases at the centre of area generating a serious problem of pollution and congestion and decreases in the rest of the territory. The centralized concentration of employment pushes commuters to use more and more automobile in order to go to workplaces. However, the concentration of residences along public transport lines permits to reduce distance made by car thanks to the increase of public transport distance and the parking politic in park-and-ride.

From another standpoint, centrifugal model allows the passage from the centralized concentration model to the decentralized concentration model. In other words, the monocentric reading of urban dynamics is less and less pertinent (Heikkila *et al.*, 1989) because monocentric structure of big metropolises has tendency to dissolve over time in a polycentric structure, and it is related to the increase of urban area size.

Synthesis

Table 2 recapitulates the characteristics of MUA using the main explanatory factors.

Evolution of MUA according to the centrifugal mode

In this section, we have to take again spatial structures formation modes and especially the centrifugal mode. According to the factors cited above, we attempt to give two progressive drawings operating with decentralization phase and which illustrate creation of clusters and the development of secondary polarities like village centres and small cities (figure 7). These village centres and small cities have constituted the major elements of a rural framework which had been penetrated by the metropolitan urban system, particularly when they occupy a strategic location near major traffic lines. It is the case of Dijon urban area whom its towns and environs have become employment poles thanks to their demographic and economic growth and their situation near transport networks (Prost, 2001).

The first drawing explains the evolution of centralized concentration to decentralized dispersion passing by sprawl of metropolitan centre and formation of clusters. One of the particularities of this drawing is to tender toward a progression of decentralized dispersion (sprinkling on rural space).

Table 2. The characteristics of MUA

Spatial structure/ Factors		Centralized concentration	Decentralized concentration	Decentralized dispersion
Morphology	Population	Concentration of population in region Centralization of people at metropolis	Decentralization of population at metropolitan level	Decentralization of metropolitan population Deconcentration of regional population
	Employment	Centralization of employment	Centralization of employment at metropolitan level	Decentralization of employment
	Economic activities	Concentration of economic activities in metropolis Vertical spatial disintegration	Concentration of economic activities at metropolitan level Vertical or horizontal spatial disintegration	Decentralization of economic activities Partial or complete horizontal disintegration
Functioning	Home-work trips	Radial trips	Radial and localised trips	Dispersed trips
	Migrations	Migrations toward the metropolis	Migrations toward the metropolis	Migration from the metropolis to the non-metropolitan part
	Transport means	Publics (usual) and individuals (less frequent)	Publics and individuals	Publics and individuals
	Relational models	Organised model	disorganised model	disorganised and unbalanced model

The second drawing explains the evolution of centralized concentration to decentralized concentration specifying that the crossing between transport networks is the support of new agglomeration. It encourages urban renewal and tenders to the efficient management of space. It also clarifies that population and daily services are concentrated in secondary polarities which are characterised by the presence of transit station offering speedy access to metropolitan centre. The economic aim of this organisation is to have a dynamic link between metropolitan centre and secondary polarities. At environmental scale, this organisation proposes an answer to urban sprawl and decreases the individual transports incidence.

In addition, we can with this progression logic explain at the first step the widest range of small cities (3000 to 20000 inhabitants); at the second step their integration to urban framework with different entities: agglomerations, urban areas and employment zones (according to INSEE); at the third step their diverse identities: industrial pole, residential pole, etc.

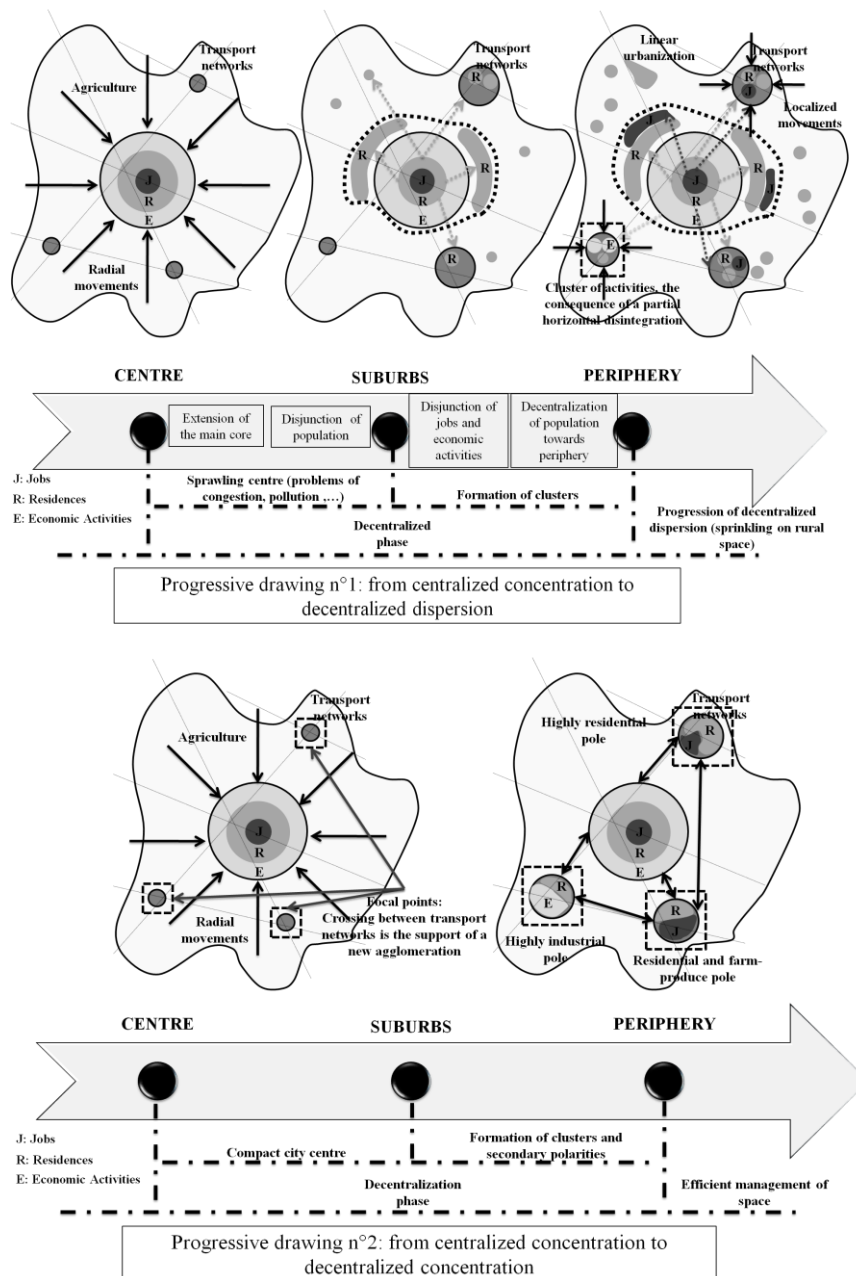


Figure 7. The drawings of MUA evolution.

The metropolitan territory of G10, towards decentralized concentration model

This section is primarily based on the urban project 'Reims 2020' presented during the conference held on December 2010, at the congress centre of Reims. The main goal of this project is to make Reims (French compact city) a reference in terms of sustainable urban development while opposing to urban sprawl and frequent use of automobile. In order to understand the philosophy of this urban project, we have chosen the proposition made by Philippe Panerai¹⁶⁴ team named Reims '2020–2050'. Their reflexion is ported on the whole metropolitan territory going from global scale (G10) to local scale (districts and polarities).

¹⁶⁴ Philippe Panerai is a French architect and town planner. Two others professional teams had participated in the project: Bruno Fortier and Christian Devillers.

With a surface of 17370 km² and more than 1 million inhabitants (80% in urban space and 20% in rural space), the G10 is situated in northern France and concerns three departments (La Marne, L'Aisne and les Ardennes). It's a heterogeneous territory which has a specific and unique geographical configuration in both national and Western Europe levels. Effectively, it represents ten cities situated in a radius of 50 kilometres without conurbation and concurrence, functioning in a good coherency: Laon, Soissons and Chateau-Thierry localised in the Picardie region; Epernay, Chalons-en-Champagne, Vitry-le-François, Rethel, Sedan, Charleville-Mézières and Reims localised in the Champagne Ardenne region. These cities are served by rail and road networks in a star configuration (1 hour maximum for a trip on the railway between the ten cities of G10) (figure 8).

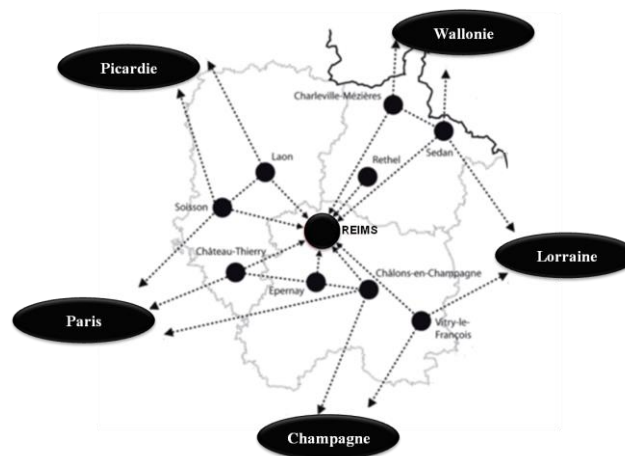


Figure 8. The configuration of the G10 (source: Panerai et associés, 2009).

It is important to note that the G10 is a territory of exchanges based on economic and social relationships; Reims purposely constitutes the metropolitan centre of G10 because it centralizes several exchanges with the nine other cities. Table 3 illustrates population repartition on the G10 territory.

Table 3. The population repartition on the metropolitan territory (source: Panerai et associés, 2009)

Metropolitan territory	Demography
Reims area	2888000 inhabitants
G10 cities (without Reims)	381000 inhabitants
Metropolitan G10	600000 inhabitants
G10+interstitial space of villages and small cities	750000 inhabitants
Departmental G10	1,13 million inhabitants

INSEE (2012) had studied privileged relationships between the cities of G10. In this study, we have understood the general function of the metropolitan urban area which is characterised by framework structured according to centralized concentration:

- At the migratory level, Reims centralizes 70% of residential movements between G10 cities and attracts more and more young people. We can explain this residential attraction by the presence of Reims University as regional and interregional infrastructure that offers higher education. Rethel is the only attractive city for people of Reims because of availability and low

costs of land as well as the existence of speed transport to Reims. Other interdependency links can be highlighted such as Sedan and Charleville–Mézières, Soissons and Laon, Vitry–le–François and Chalons–en–Champagne.

- Concerning commuting, Reims concentrates 60% of trips principally with the seven nearest cities. These exchanges are as the whole equilibrated except those of Epernay and Rethel with Reims. Effectively, many people of Reims go to work in Epernay whereas people of Rethel are more oriented to Reims. Other favourite links exist between nearby employment zones related by a major road: between Charleville–Mézières and Sedan (equilibrated exchanges), between Soissons and Laon (equilibrated exchanges), between Vitry–le–François and Chalons–en–Champagne (unbalanced exchanges). Less important links exist also between Soissons and Chateau–Thierry, Chalons–en–Champagne and Epernay.

- At the economic level, Reims centralizes corporate headquarters occupying an important place in the economic fabric of G10 (especially financial activities and insurances). Economic links exist between Sedan and Charleville–Mézières in sectors of commerce and real estate business, between Rethel and Reims in rubber and plastic products industry, between Reims, Vitry–le–François and Epernay in the food industry.

INSEE is predicting from 2030 negative natural increase and migration balance in Champagne Ardenne as well as negative migration balance more important in Picardie. However, this demographic decrease will be accompanied by a significant increase of households and housing needs. In order to thwart this situation favouring G10 configuration and thinking about polarities organisation, Panerai team proposes the concentration of demographic growth in metropolitan level rather than continuing urban sprawl (figure 9): 60000 additional inhabitants in G10 cities (10%) and 8500 additional inhabitants into the space of villages and small cities, so, 668000 additional inhabitants (11, 5%) in G10 in 2050. According to decentralization process, this growth is moderate because development will operate in urban poles without Reims city (population would pass from 87% to 78%) whereas Reims metropolis in G10 would know demographic gains (population would pass from 36% to 39%). Housing offer and metropolitan network development would be added to this decentralized concentration. So, metropolitan concentration will be accompanied by decentralization of population.

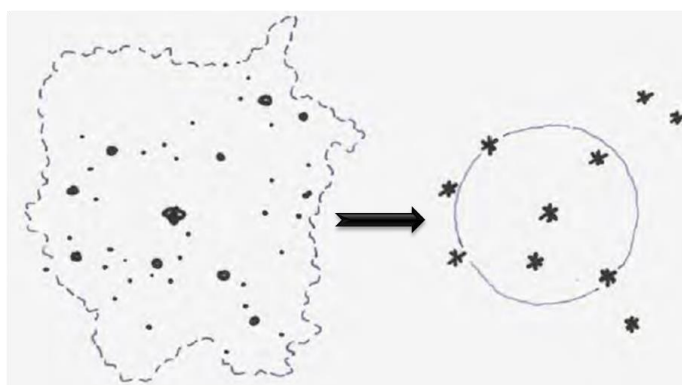


Figure 9. The Panerai sketch (source: Panerai et associés, 2009).

For checking sustainable mobility and decreasing car trip number, Panerai team proposes many ecological measures such as development of express regional train, complementarity between transport networks, setting of rapid buses, access facility to alternative modes and harmonisation of transport pricing.

Finally, the set of these measures tenders to settle decentralized concentration at metropolitan scale and aims to equilibrate flows, increase Reims and G10 attraction, establish

equilibrium between urban and rural space, attract people to come from elsewhere (Paris, England, Canada) and avoid Reims polarization.

Conclusion: towards a more sustainable future of MUA

In this paper, we have tried to demonstrate morphology and functioning of MUA employing theoretical and multidisciplinary approach. This approach is situated in a favourable context for studying the complex processes that accompany metropolisation phenomenon. Effectively, 'morphologies and intern functioning of French metropolises of 2040 would be the spatial result of production systems and exchanges transformations as well as political choices that would have determinate or accompany these transformations' (DATAR, 2012).

All documents studied have allowed us to define the four metropolitan processes (concentration, dispersion, centralization, decentralization), then to elaborate synthesis with a recap chart to obtain a new spatial typology. The objective has consisted to make sense to spatial models with a set of factors pulled from the works of many Francophone and Anglo-Saxon researchers. Factors have been presented in two groups, those in relation with morphology and those in relation with functioning. This list of factors is not exhaustive and varies according to the contexts and planning policies of each country.

Centrifugal evolution of models and general characteristics stemmed from theoretical development have been presented with table and illustrations. We note here that progressive drawings look like to logical explanations of Parr who has confirmed that income increase, transport development and land availability are the most important parameters of decentralization of people and activities as well as the increase of dispersion tendency.

Since reflections on the future European city highlight more and more polycentric and multi-polar forms (Wulfhorst *et al.*, 2007), we defend therefore the decentralized concentration as the ideal spatial model of MUA. It would be necessary to long term to opt for a planning more compact based on transport nodes. These nodes represent an interface places conciliating both urban form and connexion with the territory. Furthermore, decentralized concentration with a political voluntarism could play an important role in space hierarchy and the consolidation of the secondary polarities role in metropolitan space.

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The city, the river and mangroves: a case study in São José, Santa Catarina, Brazil.

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Abstract: *Brazil is among the countries with more mangrove areas, with approximately 25,000 km², representing approximately 12% of mangroves worldwide. For this article, is taken as the study mangrove located in São José in Santa Catarina, Brazil, whose influence growth and urban interventions for improvement in this area, without considering the importance and dynamics of mangrove witness significant environmental impacts and accelerated process of disappearing arising from these changes in recent decades. Thereby, the work seeks to diagnose and analyze the impacts of these dynamic processes, considering physical, environmental, economic and social aspects. Through employee photo interpretation techniques, creation of GIS (Geographic Information System), time series and geoprocessing techniques. Firstly, it takes advantage of a more global scale, which aims to highlight the potential that the area has with its surroundings, using principles of landscape ecology as a means of integrating the systems that make up the area. In a second step, it works in a larger and more detailed scale photographic surveys along with the implementation of municipal courts, in order to understand the dynamics and urban structure. Thus it'll be possible to diagnose and extract important information that underpins strategies to conserving or restoring this mangrove.*

Key Words: city; river; mangrove; impacts; conservation

Introduction

Brazil is among the countries with more mangrove areas, with about 25,000 km², representing approximately 12% of mangroves worldwide. Comprises a territory that extends from the state of Amapá, north, to south in the state of Santa Catarina, more precisely, to the city of Laguna (Vasques et al., 2011).

Mangroves configured in unique environments as they present themselves as a coastal ecosystem that develops along estuaries, bays and lagoons, a result of the meeting of sweet and salt waters. Thus, it is composed in a medium containing brackish water and nutrients endowed with muddy soil encourage the growth of plants species with roots and textures of plant material that partially decomposes. Due to these characteristics their own, also many animal species have shelter (Alves, 2001, Vasques et al., 2011).

Therefore, mangroves play a significant role in relation to marine life, areas of waterways that permeate the plant and animal populations that need this peculiar shelter to develop and, above all, the man who draws his vegetable resources and animals. Also promote the maintenance of coastal areas, with real shells that protect the territory of erosion from waves and tides and retention of sediments carried by the rivers (Correia and Sovierzoski, 2005).

However mangrove areas, although they are protected by specific laws, are suffering significant environmental impacts resulting from human activities, which undermine its stability, vegetation structure, fauna and significant reductions in area due to urban pressures. Are targets of deposits of solid waste, sewage, deforestation and landfills, threatening the existence of their areas and the balance of the coastal zone (Alves, 2001, Silva et al., 2005).

Problems aggravated by neglect and complacency with which the government treats such areas not complying with existing laws and not giving proper ecological and economic value that mangroves provide to citizens.

Thus, this work makes a timely analysis of an urban clipping covering the mangrove and adjacent areas located in the city of São José in Santa Catarina, Brazil, to later propose some strategies to preserve, conserve and enhance these natural spaces.

Methodology

To achieve the proposed objective, a survey of the study area, considering their physical, environmental, economic and social aspects was performed. Through employee photo interpretation techniques, creation of GIS (Geographic Information System), time series and techniques were possible to make a diagnosis and to extract important information about the existing problems (Li, 2008, Kong and Nakagoshi, 2006).

At first, the work took on a more global scale to highlight the potential that the area has with its surroundings, using principles of landscape ecology as a means of integrating the systems that make up this space. In the second stage, we worked from a larger and more detailed scale, taking advantage of photographic surveys as relevant complements the urban cuts, in order to understand the dynamics and urban structure.

Finally, these strategies we could identify measures and plausible solutions could be deployed in these areas, taking into account the ecotourism practices, accessibilities, movements of animals, people and vehicular traffic.

The city of São José

O São José is located in the east of Santa Catarina-Brazil, forming a region of conurbations, as part of what is called Big Florianópolis. It is the fourth oldest municipality of Santa Catarina, the fourth city in number of voters and the vast majority of its population is concentrated in urban area (Livramento, 2008). See Figure 1 .

Among the main access roads to the city, we highlight the BR 101 with international role.

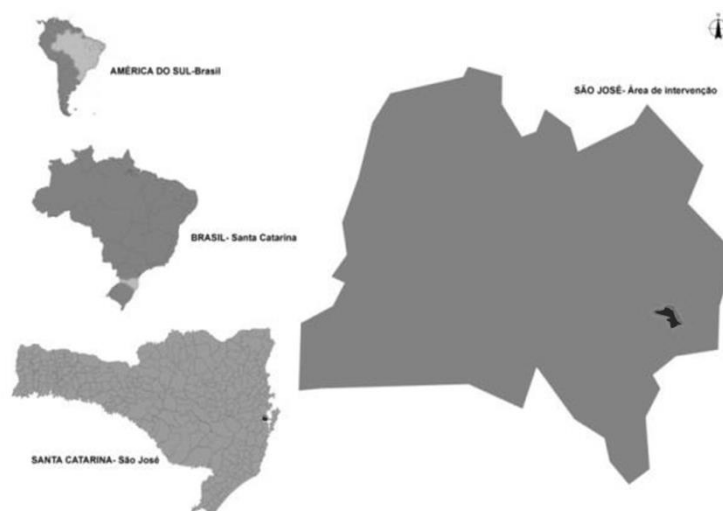


Figure 1. Location of São José-SC and area of study. (source: Authors, 2014).

The landfill

Among the most significant areas of the city, there is the existence of a maritime strip which significant portion is derived from a process of landfill. This is configured as one of the main interventions and responsible for significant changes in the city. Named with Long Beach Landfill, its initial project dates back to 1991, undergoing a reformulate in 1995 and with the final proposal in 1998, starting his execution in 2000. Extension project was to the fillet covering the Araújo river, boundary between the cities of São José and Florianópolis, to the Historical Center. However, its implementation was partly, not reaching the old town (Silva, 2006). See Figure 2.



Figure 2. Landfill proposed (1998) (Source: Silva apud Farias (2001)).

Figures 4, 5 and 6 show terrify area in relation to the case study. We notice how main interventions the creation of Beira Mar Avenue, bike path, promenade and wide open spaces, totaling an area of 37,230.8 m².



Figure 3. Mangroves and the infrastructure around (source: Authors, 2013).



Figure 4. Panoramic landfill area and mangrove (source: Authors, 2013).

Moreover, among the main findings, it is worth mentioning the economic changes as one of the most expressive. Until the implementation of continental landfill, buildings constructed near the shore had characterized the funds as the batch tested overlooking the sea. From the process of filling, with implanted of vehicular roads, bike and pedestrian, note a new trend. Observation made from Silva, 2006: "Finally, the contact with the sea. Historically, the city of São José was built 'backs' of the sea, for even less than a century, the waterfront was considered a negligible space left for slaves and garbage houses ".

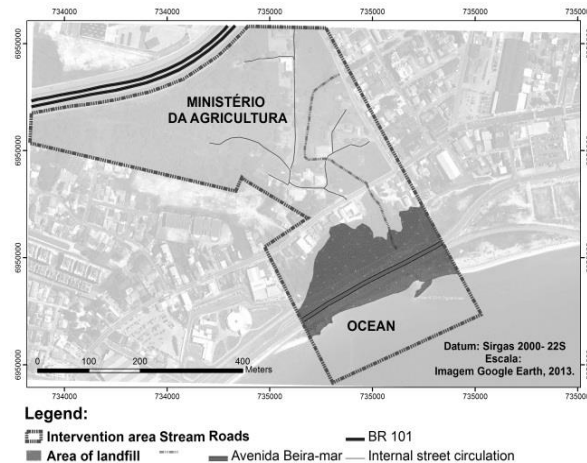


Figure 5. Landfill area in cropping study (source: Authors, 2013).

The buildings are now designing their main front for Beira Mar Avenue, endowed with significant territorial recovery and target real estate speculation. Have as main uses, institutional buildings, connected to the municipal government, and commercial. Mostly present considerable areas of occupation and significant infrastructure.

The study area

Among the areas that comprise the landfill, there is the existence of a mangrove, targeted study of this work, because of its ecological importance and its ecotourism, economic and social potential. Besides the mangrove area, was taken as part of this study an adjacent space, whose domain is the Ministry of Agriculture. These two areas form a big potential for deploying a park with a system of free spaces integrated with significant green areas for recreation and ambient quality taking into consideration your surroundings, especially when associated with Beira Mar Avenue, cycleway and the existing public footpath.

To access the study area has, to the north, the local road Jaci S. Lins and, with higher flow, the BR 101. To the south, the Beira Mar Avenue and dividing the mangrove area of the Ministry of Fishery area, Joaquim Antônio Vaz street, who is responsible for the main access and continuous flow of vehicles throughout the city. See Figure 6.

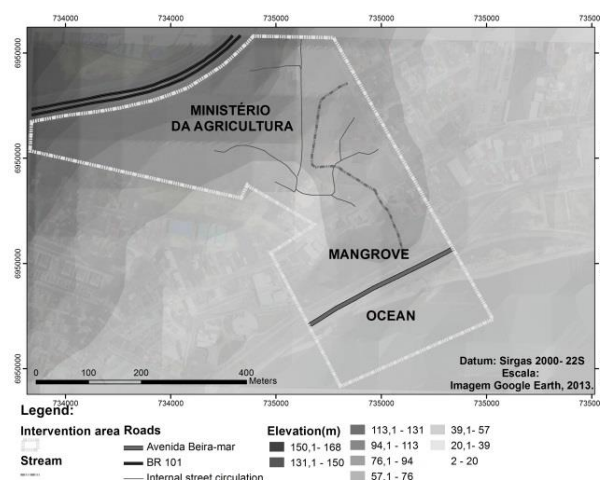


Figure 6. Hypsometry and access (source: Authors, 2013).

Art. 181 To the hydrographic elements also applies to federal competent legislation, such as, water code, forest code, decree-law 9.760/46 and notable subsequent legislation (MASTER PLAN, 2013).

However, even appears on the zoning map and uses the mangrove area and, much less, the identification of PPAs, both referring to the mangroves as the water course that comes from the Ministry of Agriculture (Figure 7). As demonstrated above, have the occupation of mangrove areas by urban buildings that gradually exert pressure, decreasing the mangrove and causing serious environmental impacts. Ironically, there are buildings of the Ministry itself that do not respect the PPA 30m of the river that passes over your area.

It should also be mentioned, among the zoning defined by the said Master Plan, in section VI, about the criteria and determinations as to municipal Green Areas (GA), establishing them as their purpose. The Leisure Green Areas (GA) should take advantage of native vegetation where it exists, to publicly consecrated areas or adjacent to community equipment. Even contained in Article 146: "The greater the GA over its location should be linked to natural factors of morphology, vegetation and aquatic elements."

And in Article 147: "In exceptional cases the Green Recreation Areas may be located within the protection zone buffer maritime margin (marine lands), subject to the provisions of the Law of Installment Land".

Forest Code

Another important conditioning is the Brazilian Forest Code, which is regulated by Law Nº 12,651, of May 25, 2012. On this contain the PPAs regulations and Urban Green Areas.

Moreover, it complements the previous article with the Art. 4º and delimits the PPAs as areas of sandbanks, as dune fixers or stabilizing mangroves, throughout its extension.

As to guarantee the protection and restitution of vegetation of PPAs, it is Article 7º that provides the stay be mandatory vegetation in such areas by the owner of the area, possessor or occupier for any purpose, individual or juridical entity, the public or private law.

In case of suppression of vegetation, it is for the owner of the area, possessor or occupier for any title, the obligation to provide the restoration of vegetation, except for the authorized uses provided for in Law (public utility, social interest or of low environmental impact hypotheses).

In Art. 9 the access of people and animals to Permanent Preservation Areas to obtain water and to perform low-impact activities are allowed.

It is noteworthy also that in Section III defines the Regime for the Protection of Urban Green Areas:

Art. 25º. The municipal government will, for the establishment of urban green areas with the following instruments:

I - the right of preemption to acquire relevant forest remnants, pursuant to Law nº 10,257, of July 10, 2001;

Confrontations: Spatiotemporal analysis x national and municipal laws

To better understand the studied space, was made a spatiotemporal analysis considering three periods, based on aerial and satellite images of the years 1957, 1978 and 2013, in order to identify the urban dynamics and processes of expansion. The following figures show the evolutions of study area and allow you to make some considerations.

When conducting an analysis from the current situation based on old information about the area, it is noticed that today, although mangroves are protected by laws of national and municipal level, their protection and maintenance have been negligence by Municipal authorities, as the population living around it. Residential buildings and primarily commercial occupy part of mangrove, bringing significant environmental impacts arising from the construction area in last decades. These exert pressures on mangroves, progressively reducing its length, as well as being responsible for pollution, dumping of waste and sewage that

compromise the vitality and expansion of mangrove and, thus adversely, affect the flora and fauna characteristics of this habitat, such as crabs reproduction, numerous species of fish and bird feeding. See figures 8, 9 and 10.

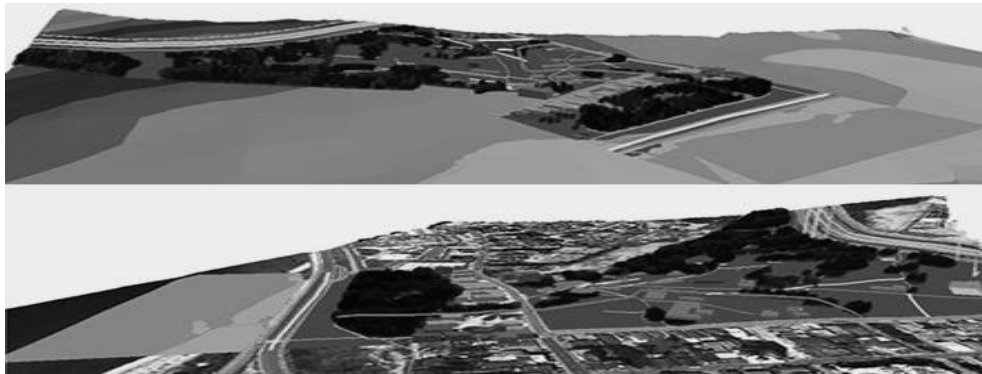


Figure 8. 3d use and current (source: Authors, 2013).

Another problem identified was the construction of traffic lanes, of the Beira-mar (coast), in the mangrove area only with the opening of two channels that allow the passage of salt water (sea) reaching the mangroves and vice versa. However, this passage is insufficient to ensure an environment of salinity along the water of the river, as is relevant to the vitality of the same process. See Figur.

Note that, by law mangrove areas should be protected and preserved. However, with the urban dynamics and disorderly occupation, we find several residential and commercial occupations settled in the mangrove area that, over time, were being cleared and paved. See figures 12 and 13.

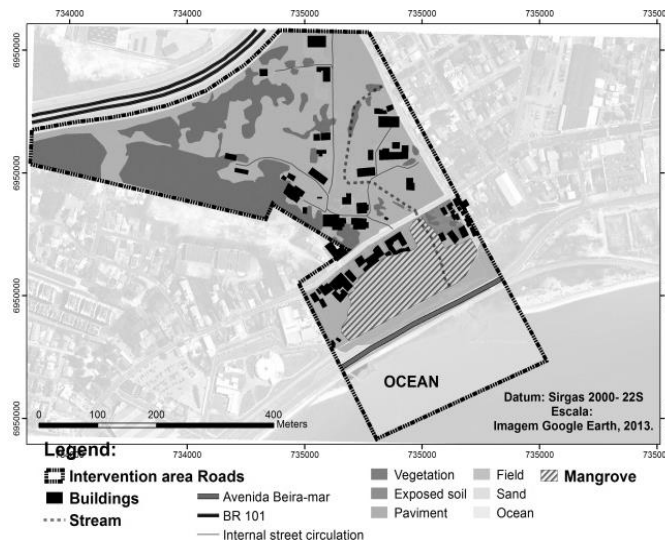


Figure 9. Use and occupation 2013 (source: Authors, 2013).



Figure 10. Panoramic showing occupation of mangrove área (source: Authors, 2013).



Figure 11. Openings for passage of seawater to mangrove (source: Authors, 2013).



Figure 12. Map of the mangrove and inadequately occupied areas (source: Authors, 2013).

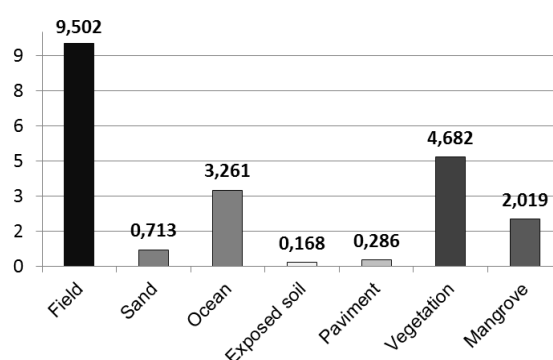


Figure 13. Land use 2013: Area (há) (source: Authors, 2013).

In the watercourse that runs to the mangrove there is disrespect for PPAs, whose Forest Code establishes as 30meters protected area not edifying, when the river has a width of up to 10m. Therefore, the illegalities occur most significantly in the field of the Ministry of Agriculture, where only 27% of PPAs have vegetation cover, which is more significant because of the

mangrove. Of the remaining 73% are disrespected and comprise field, exposed soil and paving. See figures 12, 13 and 14.

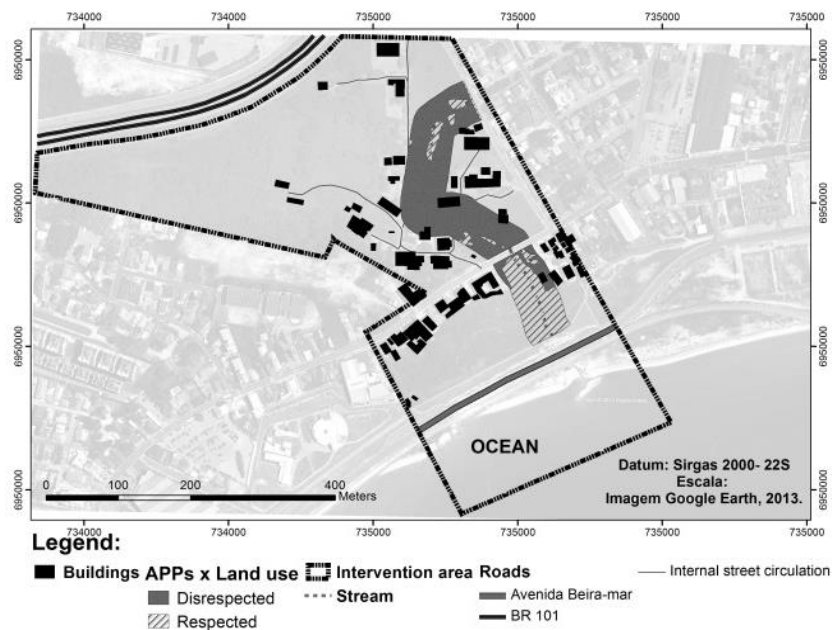


Figure 14. PAs x Uses (source: Authors, 2013).

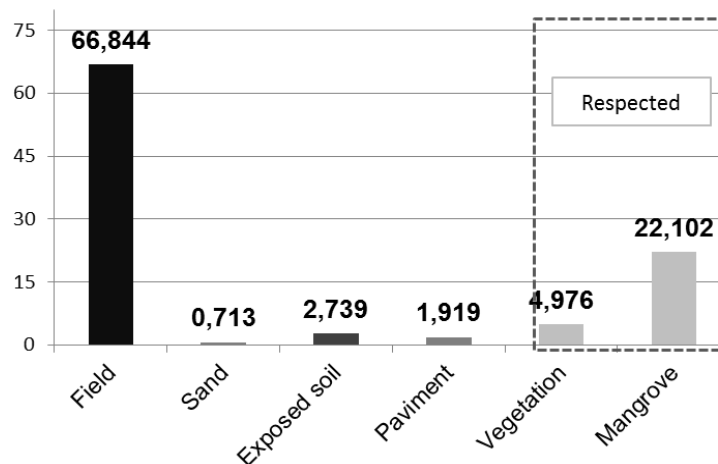


Figure 15. Land use 2013 x PPAs: Area (m²) (source: Authors, 2013).

By analyzing the use and occupation of this area in 1978, it is noticed that the coastline had its threshold along the Joaquim Antônio Vaz street. In its entirety the cut consisted of field and some fragments of vegetation. The fragmented mangrove area was permeated by a sandbar. Since that time, there were irregular buildings in mangrove areas contravening existing laws. See figures 14 and 16.

Taking the last review period, the year 1957, it is observed that it was during this period that most of the buildings belonging to the Ministry of Agriculture were built. In this sense, the deployment area is characterized as vast green fields together some fragments of vegetation and presence of exposed soil area between the buildings. It is noteworthy, too, that in this period there was no appropriation of the mangrove area where their boundaries were demarcated by

Joaquim Antônio Vaz street. See figures 15 and 19.

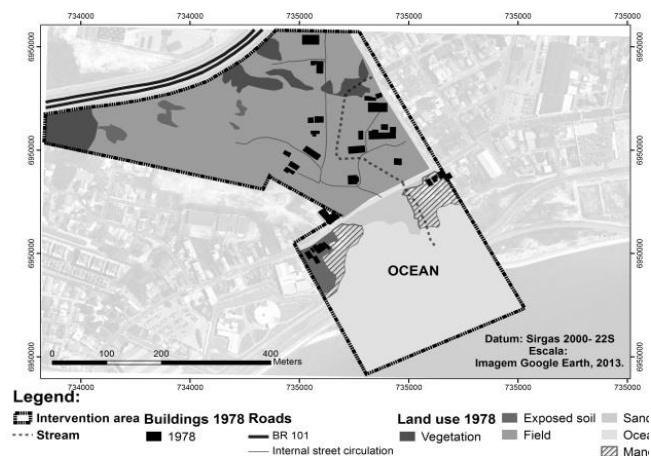


Figure 16. Use and Occupancy 1978 (source: Authors, 2013).

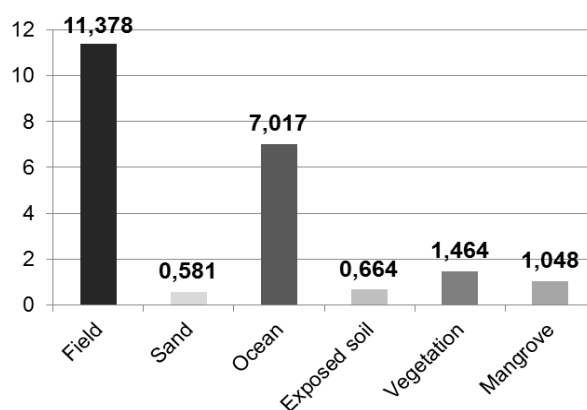


Figure 17. Land Use 1978 - Area (há) (source: Authors, 2013).

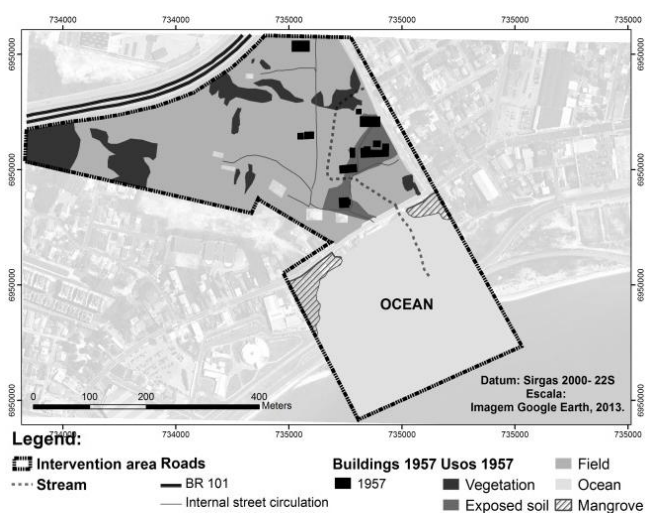


Figure 18. Use and Occupation in 1957 (source: Authors, 2013).

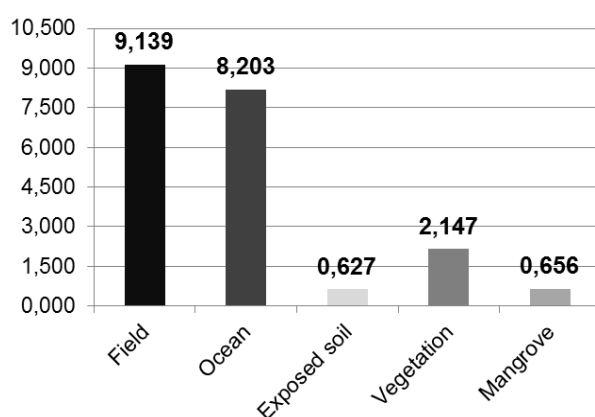


Figure 19. Land use 1957- Area (há) (source: Authors, 2013).

Thus, from the analysis of space-time is possible to diagnose it over the course of years the mangrove area increased, but being isolated in the urban area, because the processes implanted landfill. The occupations began in 1978 and had its intensification in later decades. Another unusual fact, by the reality experienced by most cities, is on the increase in areas with vegetation cover and areas of exposed soil before becoming field. See Figur.

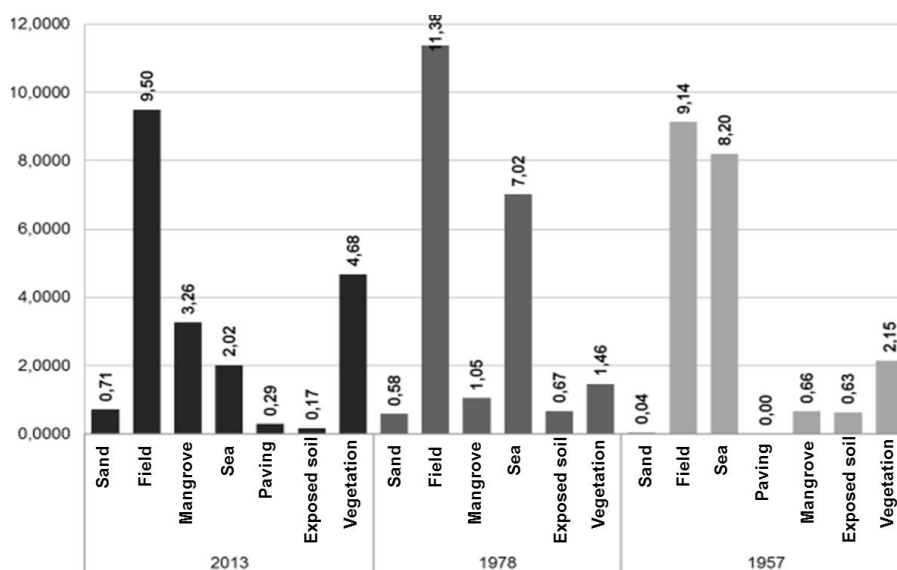


Figure 20. Analysis of alterations 1957, 1978 e 2013 (source: Authors, 2013).

Final considerations

Seen the importance and training of an ecosystem with its own characteristics, which are essential to develop projects and initiatives that establish the revitalization, sustainable use and, above all, compliance with national and local laws concerning the guarantee and protection of mangrove areas.

Thus, as a first consideration on existing laws would propose the eviction of houses and illegal trades of PPAs. In this sense, interventions begin by recuperation of these areas and recovery of these environments by means of specific actions for integrating these spaces as a whole.

As mentioned earlier, with the implementation of the landfill were reduced flows along the saltwater marsh. Therefore, it is necessary to increased permeability, with more openings for channeling water to enable the passage of seawater and thus introduce again the relation of tidal flows that pervade the vital functions of mangrove areas, forming a large lake with direct influence, returning it an environment of high salinity, essential for the development of vegetation.

According to Alves, (2001) and Silva et al (2005), the mangrove has essential role in the dynamics of the estuary areas, with a space of sedimentation of the material carried by the rivers and sea. Such an environment enables the development of vegetation with protruding roots that perform the fixation of the transported material. This process contributes to increasing the shoreline and an increased range of vegetation.

The typical vegetation for mangrove area, in this process, is predominant, because when you enter the front lake for a direct influence of the waters to mangroves, makes you create a transition band from an environment that has changed, again, vulnerable. In this case, it is essential to implement vegetation typical of mangrove protection as, for example, the Praturá-grass, considered a marine grass genus *Spartina*, that functions as a protection filter estuary areas that can remove pollutants and heavy metals. Consequently, ensuring the survival of mangrove vegetation typical, there will be the development and diversification of animal species such as crustacean, fish, crabs and resident and migratory birds. For (Costa, 2006), these animals make use of that space for shelter, means of reproduction, growth and maintenance.

Besides the mangrove area is interesting to note that the strong relationship of the river on the area of intervention is present in its entire hydrographic contour. Thus, it is necessary to deploy along the river lakes openings to improve the flow and the flow right next to its utilization for environmental system.

Among the aspects to be considered, there is fragmentation of green open spaces. These, mainly result from appropriations and anthropic pressures exerted by the urban expansion. According to Collinge (1996), fragmented green areas lead to the configuration space in a kind of island, whose striking factor is the loss of biodiversity, because it ends up isolating animal species and vegetables and favors the invasion of exotic species. Moreover, it contributes significantly to the deterioration of vegetation along the waterways, compromising the quality of it and making it areas susceptible to processes of sedimentation and erosion.

Thus, it is necessary to seek the revitalization and preservation of existing large green areas, as well as the creation of new and restoration of riparian vegetation along the streams, in order to requalify spaces, provide them with environmental quality and ecosystem balance (Collinge, 1996, Gurrutxaga et al., 2010).

Among the main mechanisms of intervention and minimize these impacts there is the use of techniques related to landscape ecology, more proper, the use of ecological corridors. Responsible for reestablishing the connectivity of fragmented areas, play important for quality of life, especially in a city, since they allow the spread of animal and vegetation, are configured in the lungs of urban spaces and promote spaces for recreation and appreciation to the surrounding populations (Chang and Chao, 2012, Kupfer, 2012).

Another relevant to the recovery of the mangrove area strategy would incorporate it into the daily life of local people and highlight their tourism potential. Thus, the value of social appropriation could be experienced through the creation of public open spaces, insertion of trails, viewpoints and park paths that circumvent the mangrove and the river banks, providing opportunities for collective living, leisure and enjoyment, tours, rest and contemplation of protected areas, and especially knowledge about this peculiar habitat.

In response, it intensified the need for intervention projects for mangrove areas along the areas of the Ministry of Agriculture, in order to adapt their environmental potential with beneficial actions and proposals that foster local identity, the connection between the Management and the environmental issues inserted in the urban environment.

It is a complex and necessary process, whose transformations arise from the direct relationship between Management and population as an essential source of care and

understanding of the importance of this habitat to the city, because it takes better care of what one knows and loves.

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Urban growth and hydrography: convergences on landscape morphology

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Abstract: *This work identifies the relationships between urban morphology and natural landscape as a result of urban growth articulated to the spatial scale of hydrography based on the assumption that in the long-term and in macro spatial scales city and environment could reduce spatial conflicts. The main focus is to outline an urban growth dynamic articulated to natural landscape in which water resources are understood as tipping point to phase transitions in urban growth morphologies. This theoretical statement is applied in the urban growth simulation framework CityCell through the potential-centrality model in a dynamic cellular automaton. The urban modelling mechanism captures the "edge effect" on water resources buffers, parametrically distributing urban growth in axial and diffuse tensions. Associated with urban modelling, the theoretical statement was empirically tested in simulations, replicating the urban growth reality of the city of Pelotas, RS, Brasil for the period from 1815 to 1965. In the framework of systems theory, by empirical, theoretical and methodological approaches, the urban modelling results can be replicated in future urban growth simulations, especially to study the relations between urban form and natural landscape.*

Key Words: urban growth; hydrography; cellular automata; city edges; urban systems

Introduction

Traditional approaches in landscape planning have difficulty to address city dynamics and natural environment based in their mutual influences. Traditional ideas of urbanism performed structural interventions on water resources in order to drain and clean up the environment; thus enabling the process of urban expansion on behalf of the compact city (Jenks e Burgess, 2000). On the other hand, environmental planners suggest water resources as structuring urban growth process based on idea that urban waters are vital to sustaining human life on the planet. (Alberti *et al*, 2003).

Approaching urbanism, urban ecology and landscape ecology, in a broader framework, environmental science paradigm is on articulated urban form and urban growth studies on natural landscape support. Thus, urban science will be applied to better understand compatibilities of urban form with natural environment and water resources system.

Supposing city as a complex system, with urban form emerging in different spatial patterns, this paper aim to identify urban form relationships with natural landscape scales defined by hydrography

This work suggests a space-time convergence between urban growth morphology and landscape scales defined by hydrography. The main contribution is a theoretical statement that describes a urban growth dynamic that occurs alternating concentric and diffuses external morphologies spatially oriented by hydrographical formations.

In this sense, assuming that natural landscape would able to support urbanization in different spaces, urban growth dynamics defined by compression and fragmentation movements would be spatially articulated with water resource's environmental fragilities and urbanization resistances.

Theoretical Approaches

Ecological Approach: emergence, self-organization and urban resilience

Analogies between Urban systems and ecological systems were first applied in urban science by Chicago's school authors (Park e Burgess, 1925). These authors were based on ecological theories, as cooperation and competition mechanisms, to better understand intra-urban organization forces able to leave the urban phenomenon in a socio-spatial order.

Differently, today there is a consensus that, precisely, these competition and cooperation mechanisms that keep urban system in constant imbalance. In times that simultaneously ecology and urbanism starts to investigate the balance breakdown, as a way to maintaining internal vitality and dynamics, intrinsic features in respective systems (Alberti, 2003; Forman, 2008; Marzluf, 2008).

Contemporary, urban ecology's paradigm are systems theory and self-organization sciences, with common concepts in natural science and social sciences, indicating the city as emergent phenomenon. Until the mid-20th century, complex structures as cities were assumed ignoring the overlapping high degree and randomness that occur in their subsystems (Portugali, 2000; Alberti *et al*, 2003; Buzai, 2003). Currently, there is a change in cities and societies approaches, like complex organisms that continuously grow and its modifications can only be focused, induced and rarely designed in top-down sense. In urban science, it has been assumed its urban growth as an emergent phenomenon from thousands agents action, resulting in a complex structures behaviour (Batty, 2007; 2013).

Urban self-organization studies has indicated cities as the largest human action artefact (Portugali, 2000) and over 3,000 years of history show that must withstand throughout time (Vale and Campanella, 2005). From this viewpoint, urban sustainability is associated with intrinsic properties as a complex phenomenon which gives it self-organizing and resistance abilities through times. In complex sciences, self-organizing structures are able to handling in adverse situations, which in urban ecology has been referred in terms of urban resilience (Alberti *et al*, 2003; Vale and Campanella, 2005).

In this sense, urban form self-organization proprieties are not associated with geometric arrangements (such as it occurs in other complex systems), however urban sustainability are discrete structural properties shared by cities in resilience terms (Portugali, 2000).

Urban theories, growth dynamics and natural landscape convergence

In short and recent history, urban science has explored the urban phenomenon through models and theories (Batty, 2013).

Urban growth has been studied since pioneers locational theories, until mid-century XX, where several authors have attempted to explain the city based on cause-effect logic, from a single viewpoint: ecological, economic or social. Recent statements have approached city growth as complex systems and self-organization theories framework, and even more contemporary, approaches about urban form discontinuity and convergences to natural landscape. (Batty and Longley, 2004; Czamanski *et al*., 2008; respectively).

The first urban locational theories launched in later XIX century by von Thünen, based on profit maximization economic principle are replicated in Alonso's monocentric city model (1964, Figure 1a). A disc-shaped Central Business District (CBD) and surrounding residential region served as a starting point for urban model analysis.

A concentric urban model was also associated with ecological logic by the Chicago School (Park and Burgess, 1925 Figure 1b) and later related to accessibility in Hoyt's sector model (1959, Figure 1c). Also, the city concentric thought was proposed by Christaller (1933, figure 1d) in Central Place Theory, differing by regional scale approach and polycentric occurrences.

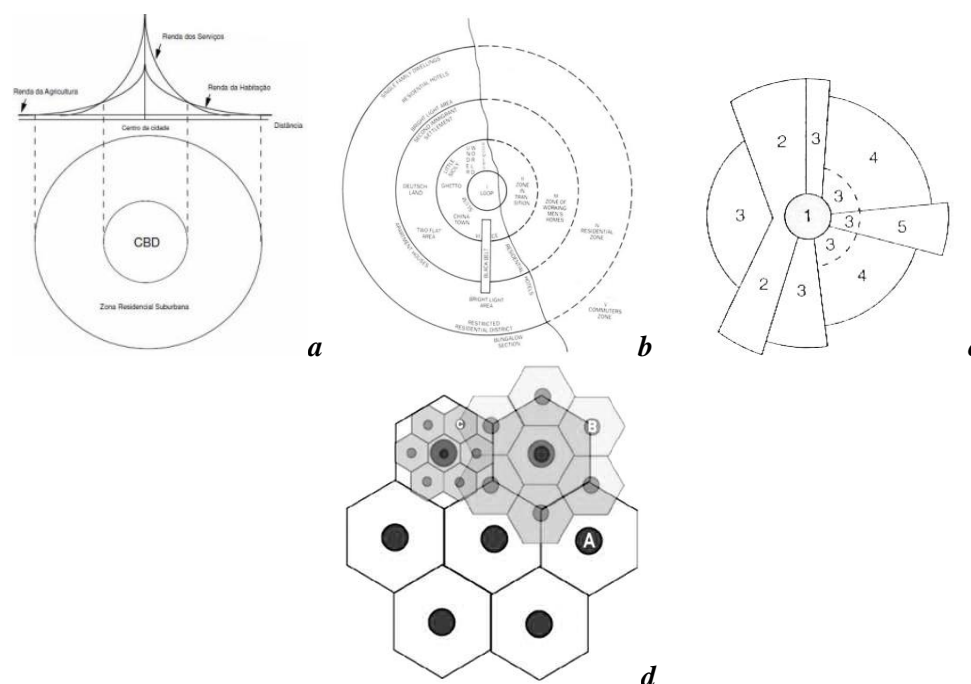


Figure 1. concentric urban models:
a) Alonso, 1964; b) Park and Burgess, 1925; c) Hoyt, 1959; d) Christaller, 1933.

However, these primal urban locational theories were unable to describe the urban growth dynamics and temporal approaches, mainly by static configurations. These important theories are replicated in contemporary geographers and economists studies, authors like Fujita and Mori (1997), in complexity framework, featuring the New Economic Geography theoretical approach (NEG). The "evolutionary approach to urban systems" (Fujita and Mori, 1997) suggests the urban theory validity from a evolutive approach, relating it to Darwin's evolutionary process. From NEG evolutionary approach, researchers such as Janoschka (2002) have (has) been explaining successfully the spatial discontinuity and the suburbanization phenomenon in Latin American cities. These works have (has) been supported by dynamic resummptions of classic locational urban theories, a evolutionary-historic read about Alonso's, Hoyt's, Park and Burgess' and Christaller's models (illustrated in Figure 1, above).

Currently, more studies dedicated to external urban growth dynamics and the correlated morphological fragmentation are produced, with recent studies with natural landscape scales integrated into urban approaches (Czamanski *et al.*, 2008). In this way, after featured studies on urban sprawl and fractal dimension of Tel Aviv, Benguigui, Benenson, Czamanski, Portugali and others researchers from the Research Lab Complex City (<http://www.eslab.tau.ac.il/>) have achieved important advances in theoretical approaches to better understand urban spatial discontinuity, specially associated with a growth dynamic called leapfrogging. (Benguigui *et al.*, 2001).

Leapfrogging originates in a child's game to perform jumps driven by obstacles over other child. This theoretical approach has also been absorbed by economic theories to approach economic growths in unfavourable situations by innovation actions.

Urban growth associated to leapfrogging ideas corresponds to an urban morphology dynamic able to set up successive open spaces, similar to fractals geometries and urban sprawl theories. Thus, urban spatial discontinuity may be explained by articulation with landscape fragilities or environmental value, thereby reducing the urban footprint effects (Czamanski *et al.*, 2008).

In a recent editorial for Environment and Planning: B, Batty (2009) presents the catastrophic cascades idea, which proposes a challenge to contemporary urban theory. The challenge to

studies about urban change and dynamics should be to extend our understand of discovering discrete subsystems that catalyze the dynamics through a called catastrophic cascades. According to the author, urban dynamics derive from multiple attributes overlaid that are able to influence the global order and urban spatial discontinuity. These multiple attributes associating economic, social and environmental issues, shape the urban morphology in a complex way and enable triggering abrupt changes on urban dynamics. In this work Batty proposes a challenge to urban science, that is in overcoming studies to indentify attributes that composes urban system as a complex system. Contemporary urban studies should be applied to identify the tipping points where occurs the transition phase in convergence with all the system.

However, for effective integrated approaches between city and environment, we should overcome traditional ones based on isotropic plain assumption (Nystuen, 1968). The landscape isotropy concept is an abstraction of the environment, widely applied in classic urban theories, which disregards urban landscape aspects where the natural environment does not provide any kind of resistance to urban growth.

In fact, natural landscape represents the predecessor environment around the city, operating as an irregular field exerting different resistance intensities. Natural landscape directly influences the morphology of urban growth in the short and long term, both at micro as at large scale. (Polidori, 2004).

The landscape irregularities are able to impose greater or lesser restrictions on urbanization, and hydrography attributes assumes a crucial role in landscape shaping. Rivers, streams and drainage lines feature places usually flooding, in general unhealthy and the land has low capacity to urbanization. Moreover, on hydrography natural scales, watershed ridge lines are generally places for local environmentally friendly urbanization. Ridge lines are in essence the higher locations in a basin, with better drainage and usually away from challenges imposed by drainage adjacent areas.

Urban Growth and Hydrography: empirical approach to Pelotas case [1815-1965].

Pelotas is a city located in southern Brazil , on state of Rio Grande do Sul (RS). In the UTM coordinate system (Universal Transverse Mercator) is located in zone 22 south, 373,081 meters at east and 6,482,330 meters at south.

In southern Brazilian cities the water systems - rivers, lakes and ponds - were decisive factors in land-use process. The low altitudes, slopes and wetlands in abundance configured a landscape of difficulties to urbanization and displacement on territory (Souza, 2000).

Specifically in Pelotas region, natural landscape attributes were dominant in the urbanization process. This area was found as undeveloped and appropriate to implement a salt meat process called *charqueadas*. At the end of the eighteenth century the *charqueadas* were attracted to the region by possibilities of disposing the production and the waste by water ways (Gutierrez, 2004).

For the first urban core location, in 1815, was chosen a shortly elevated terrain to run off water and better drain the streets. From original core, in 1835, a concentric second plan to expand the city was (Weir) located yet on slightly elevated terrace. As it is shown in figure 2 below, this plan expressly avoids the low areas along water resources, places with constraints to urbanization.

After this period, the city maintains concentric growth morphology urbanizing low areas next to water resources.

Occupying wetlands adjacent to streams, at same time, allotments occur in small scale and diffused on landscape. At this time, urban growth morphology occurs beyond limits defined by water resources and located on terraces adjacent to watershed ridge lines (Gutierrez, 2004).

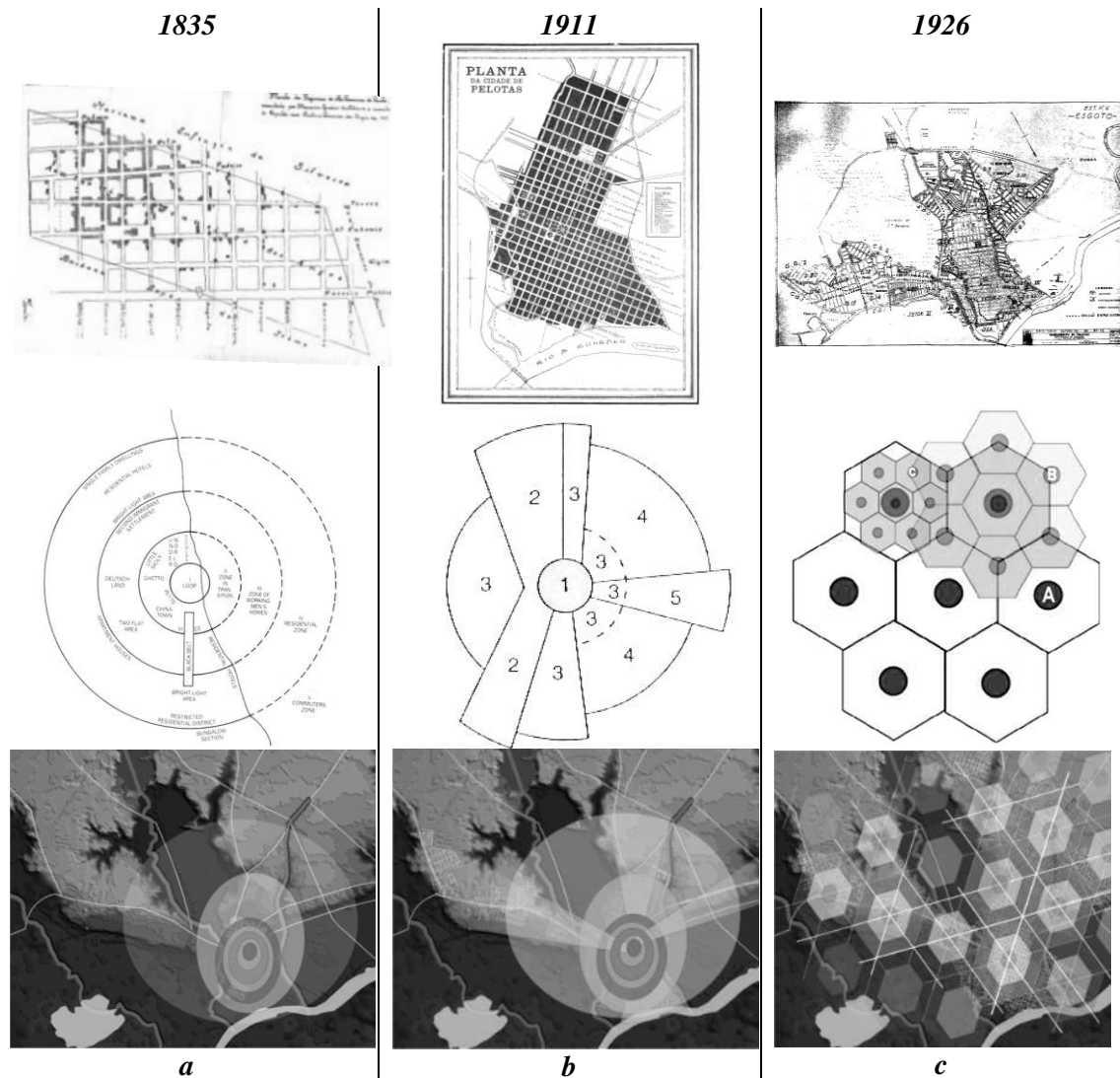


Figure 3. table showing theoretical convergences between "evolutionary approach to the classical models of urban theory" and urban growth stages of Pelotas city:
a) 1835 x concentric model; b) 1911 x sectoral model; c) 1926 x multi centralities model.

This outcome suggests recognizing urban voids as structural city component and urban morphological changes convergent to natural preservation. Urban growth forms articulated with hydrography can be understood as a mechanism for city self-organization, giving it ability to sustain through time. (Alberti et al., 2003; Polidori, 2004).

Urban Modelling Approach: urban growth simulation in a CA context.

As urban growth methodological approach this work assumes the spatial differentiation possibilities of Potential-Centrality Model (Krafta, 1994). Originated from Uneven Geographical Development theory (Harvey, 1985), Krafta's Potential-Centrality model enables to approach the urban loads over urban space representing the system into a imbalance spatial state.

From original Potential-Centrality Model statement (Krafta, 1994) a continuous research has been developed to improve city comprehension by production and reproduction of internal

mechanisms. This efforts have been undertaken by Configurational Urban Systems Group in Graduate Program in Urban and Regional Planning, PROPUR-UFRGS and in Graduate Program in Architecture and Urbanism - PROGRAU-UFPel.

In other words, the Potential-Centrality Model measures the spatial relationship in urban systems internally, describing urban morphology at a given moment but indicating also the spatial system imbalance. Places with higher Centrality are places in convergence to urban changes occurrence. This convergence can be assumed as measure of urban growth Potential (Krafta, 1999).

The Potential-Centrality Model should not be taken just as a static morphological portrait. It can be assumed as an imbalance measure in urban system able to configure a set of urban growth vectors in near future. Growth potentials occur in greater economical opportunities, so in places with large centrality differences in surroundings (Polidori, 2004).

Originally Krafta's model operated from graph theory and could be adapted in a cellular automata (CA) urban modelling environment by Polidori (2004).

Graphs and cellular automata resources integrated in model set it up to explore urban morphologies by global and local relations. While CA works with spatial relations and neighbourhood relations, graph theory works the connections between different spatial units remotely. Thus, Potential-Centrality adaptation in a cellular environment (Polidori, 2004) allows advances on Krafta's original ideas (Krafta, 1994) once spatial relations are not limited through the graph path. Thus, Based on such these ideas, an Urban Growth Simulator development (Polidori, 2004) allows urban morphology replication in axial, polar, and diffusive forms.

In an iterative way, cellular centrality distribution configures spatial opportunities landscape overlaid on a resistances field of natural environment. There is an urban growth dynamic emergent from semi-deterministic and semi-stochastic logics. (Polidori, 2004).

As the city grows, it tends to interface with natural values and environmental resistances. These interfaces are overlaid places by urban growth potential and natural landscape attributes. This occurring urban growth potential on water resources attributes are natural-urban conflict places, setting a called urban edge effect on environment system. This edge effect can be associated with urban resilience idea, an index of urban-nature conflicts and a tipping point to morphological urban growth changes (Polidori, 2004).

Furthermore, as edge effects are shaped in linear forms, if natural landscape are approached by hydrography and streams, the edge effect is evidenced by overlapping urban potential and water resources resistances fronts in their linear forms.

In short, the edge effect on hydrography streams are convergent urban and natural places. This edge effect can be assumed as tipping point of a catastrophic cascades urban dynamic, as proposed by Batty (2009). Besides this(Further), such morphological urban growth interchange can be approached with complex system terms like phase transitions.

On urban modelling methods this work develops a simulation procedure operating sensitive to landscape hydrography. This procedure captures the urban growth potential on hydrography attributes. Thus, the related edge effect (Polidori, 2004) on water resources adjacencies.

$$wl = PotBuff / PotTot$$

$$wl = D$$

As read:

“waterland factor” is equal to the ratio between urban growth potential incident on hydrography buffers and urban growth potential's total.

“waterland factor” is applied as perceptual of diffuse urbanization forms, in each model interaction.

The procedure called "Waterland factor" (z is a ratio of urban growth potential on hydrography stream's buffers). According to Equation 1 the "Waterland factor" ("wl", in the model) corresponds to the percentage of Urban Growth Potential's total (in the model, PotTot)

incident on hydrographical spaces (in the model, PotBuff). In the Urban Growth Simulator this ratio is applied as an index to diffuse urbanizations in the urban growth dynamic.

Urban growth simulation integrated to hydrography: urban modelling in Pelotas city case [1815-1965].

In sequence, this work concerns on developed simulation growth procedure in validation and application terms. Studies are applied to urban growth of Pelotas case [1815-1965] empirically described in this paper's third title.

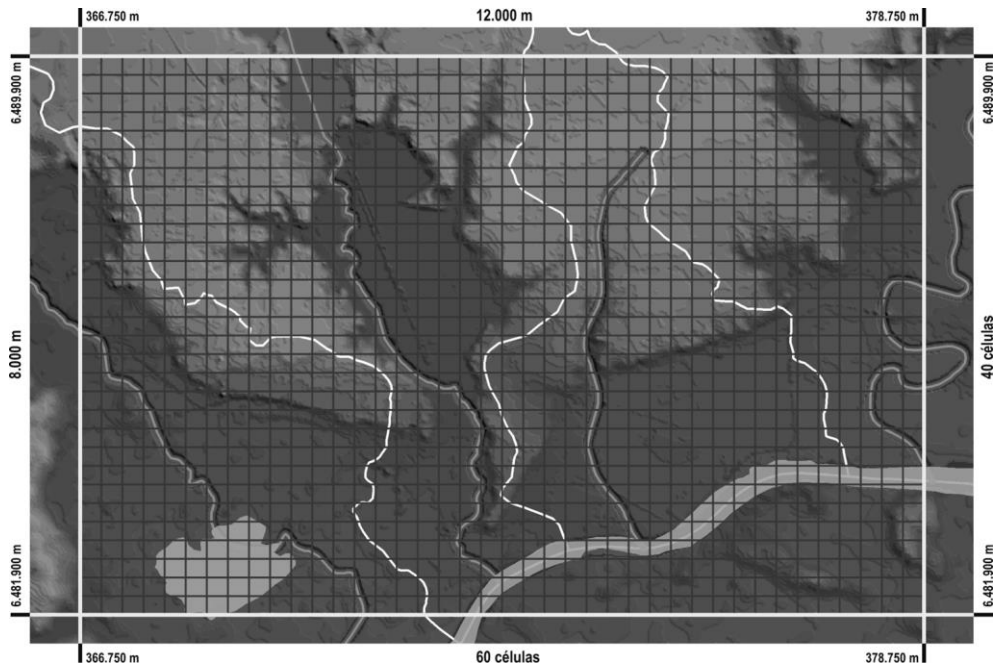


Figure 4 spatial delineation and simulation's disaggregated scale to Pelotas case, regular red grid represented on hydrographic landscape.

The spatial delineation and simulation's disaggregated scale are defined by a regular grid (red lines in Figure 4 below) with 40 rows by 60 columns, defining 2,400 square cells with 250m side. The surface is 96 km². A rectangle of 8 km side in north-south direction and 12 km side in east-west direction. The limits in UTM coordinates are on zone 22 south: a) northern: 6,489,900; b) southern: 6,481,900; c) western: 366,750; d) eastern: 378,750.

From vectorial data on a Geographical Information System (GIS) individual grid inputs were set up, as shown in Figure 5 and described in following:

- a) urban core (atrator, mutable; figure 5a): urban attribute loaded in two levels (weight 1,0 and 0,5, in red and light red);
- b) hydrography streams (resistance, mutable, weight 1; blue and light blue in figure 5b): resistance to urban conversion but removable on simulation process;
- c) external city space (resistance, freezing, weight 1; figure 5c): institutional attribute that prevents urbanization on external space to Pelotas municipality;
- d) hydrographic landscape (resistance, mutable, weight 1; figure 5d): environmental attribute, natural resistance matrix differentiated into five classes by interpolation between the drainage lines (higher resistance level 4, in green) and watersheds ridge lines (smaller resistance, level 0, in brown and white);

e) flooding areas (resistance, mutable, weight 1; figure 5e): environmental attribute, natural resistance matrix distinguishing flood tendencies by binary values (0 values in white or 1 values in pink).

f) random attribute (resistance, mutable, weight 1; figure 5f): resistance matrix differentiated randomly with values interpolated between 1 and 3.

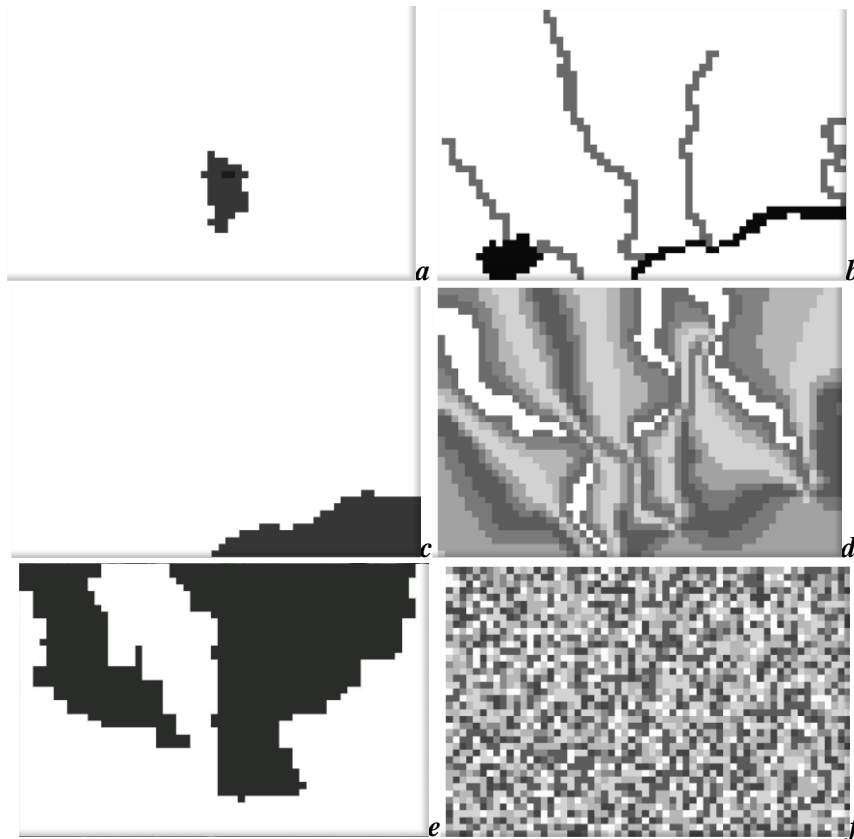


Figure 5. regular grid inputs with 60x40 cells: a) urban core in two levels; b) hydrography streams; c) external city space; d) hydrographic landscape matrix; e) flooding areas; f) random attribute.

Below, the model outputs are shown on figure 6 and described below, which in sequence will be resumed to numerical correlations in simulations: CellType, representing the urban phenotype; CentABS, absolute cellular Centrality; CentR1, cellular Centrality normalized by mean values; CentR2, cellular Centrality normalized by max values.

From control scenarios a cell count (UrbanCount operation in model) of urban phenotype (CellType) could be calculated annual cell conversion rate, adjusting the simulations speeds. These values composes an urban growth rate of 1.88% percent annum, calculated for 130 years period. The simulations proceedings are set to occur in 50 iterations. Thus, the cellular conversion rate parameter is 4.95% by interaction.

After processed the urban growth simulating, in figure 7 are shown the outputs of CellType, Centrality, Growth Potential, Natural Resistance (CellType, CentR1, ResistE, respectively). Illustrated 8 of 50 total iterations (iterations 1, 8, 15, 22, 29, 36, 43 and 50).

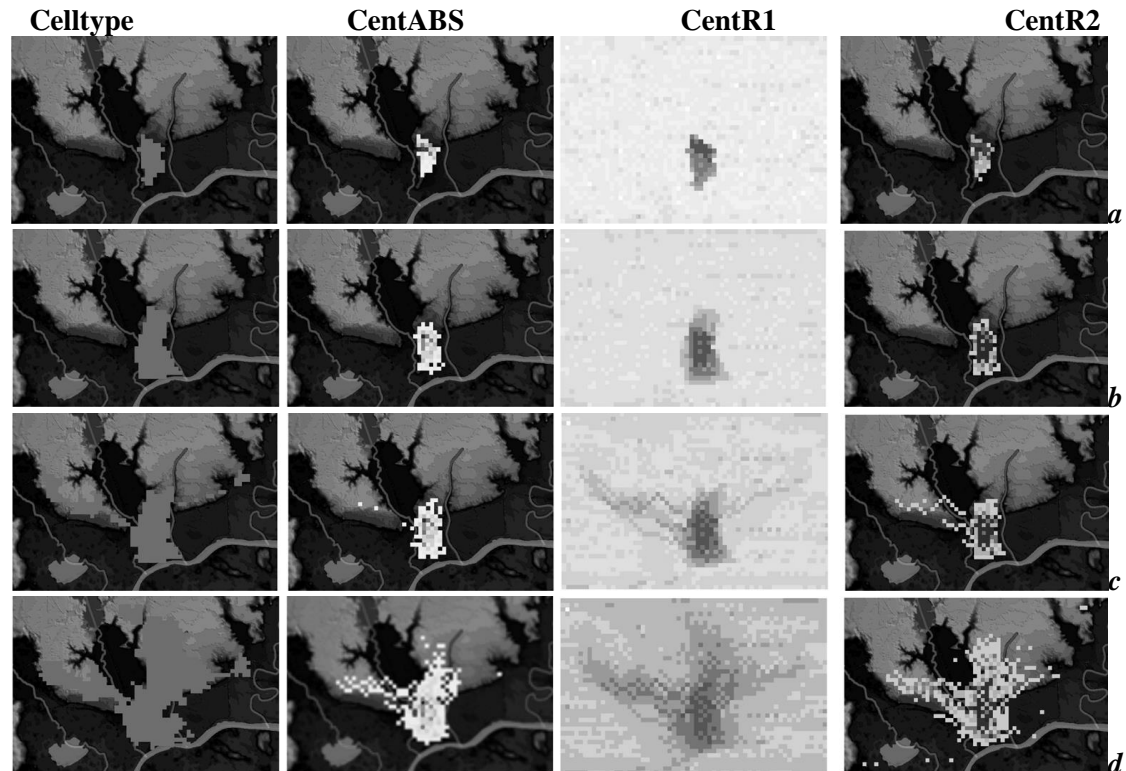


Figure 6. model outputs of CellType, CentABS, CentR1 e CentR2; control scenarios to a) 1835; b) 1916; c)1926; d) 1965.

Numerical Correlations

Performed the simulation procedure that reply alternations in urban form on growth dynamic with visual evidences and similitude with Pelotas city in empirical reality between years 1815-1965. To forwarding, the urban modelling results need a numerical correlation with control scenarios to an effective validation of model mechanism developed.

To make results numerical correlations, the output iterations are associated with control scenarios through number of urban cells (UrbanCount). That is, from CellType number of each control scenarios (presented in Figure 6) is indicated an iteration with similar number of CellType, and thus proceeded a kind of dynamic correlation.

Accordingly, the correlation for the year 1835 is iteration 01; for scenario year 1916 the iteration 09; for scenario year 1926 the iteration 38; and year 1965 is correlated with iteration 50. The figures 8, 9, 10 and 11, shown below, represent the dynamics correlations from the Absolute Centrality (Figure 10), Centrality type 1 (Figure 11), Centrality type 2 (Figure 12) and urban phenotype, CellType (Figure 13).

In addition to visual correlations, the grid's numeric data can be compared with control scenarios by linear correlation (R^2) and plotted scatter diagrams (as shown in figure 12).

In the chart below, Centrality type 1 data points are plotted in a scatter diagram. Four distinct control scenarios are overlapping in crescent blue colour scale.

In scatter diagrams, the proximity between points and tendency line indicates best results. The best result achieved is Centrality type 1 with 0.79 of correlation, a significant statistic value.

The table 1 below shows numerical correlation results for outputs: Absolute Centrality (CentABS), Centrality type 1 (CentR1), Centrality type 2 (CentR2) and Urban Phenotype (CellType). Comparing numeric correlations between simulation procedure and control scenarios, a dynamic understanding is possible and better results could be compared.

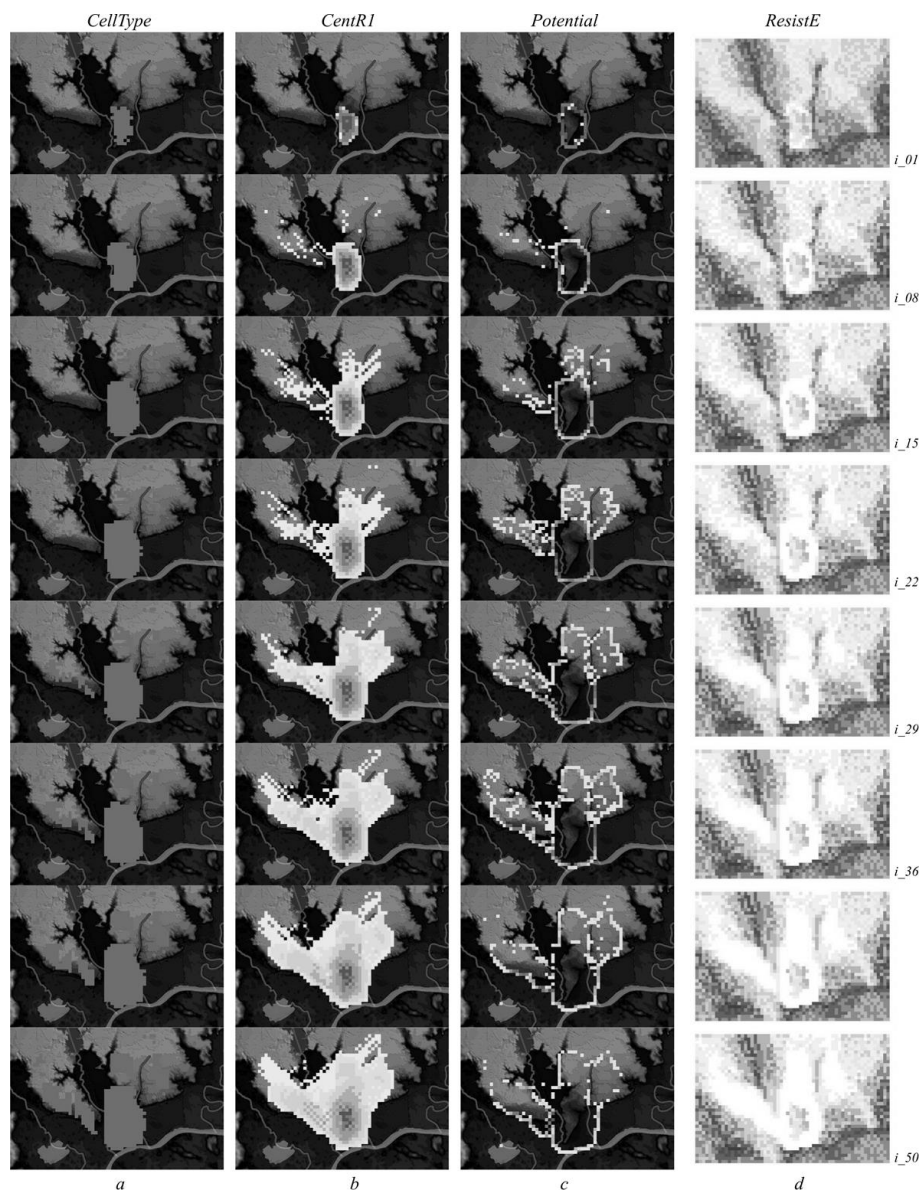


Figure 7. simulation outputs with active waterland factor; shown 8 of 50 iterations:
a) Celltype; b) CentrR1; c) Potential; d) ResistE.

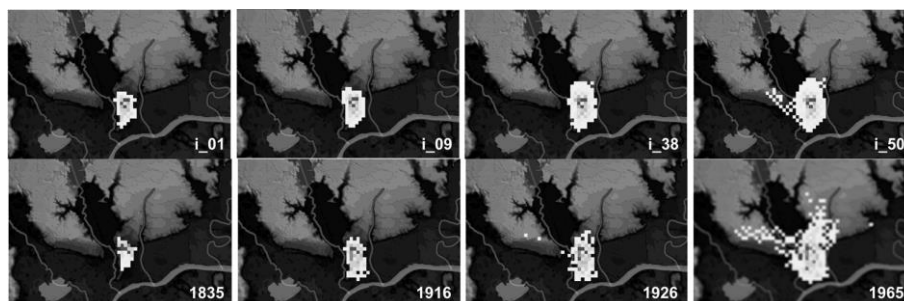


Figure 8. dynamic correlations between simulation and control scenarios to Absolute Centrality output.

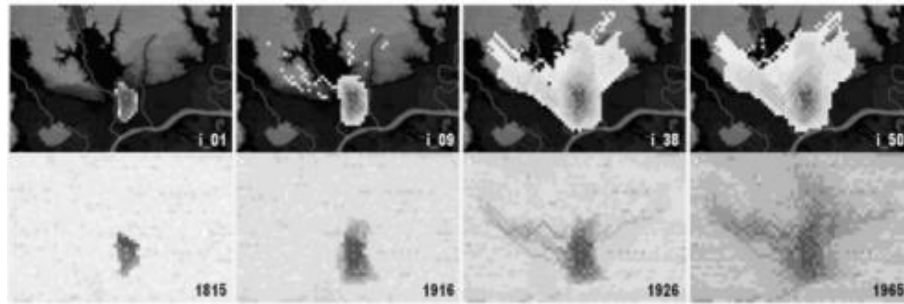


Figure 9. dynamic correlations between simulation and control scenarios to Centrality type1 output.

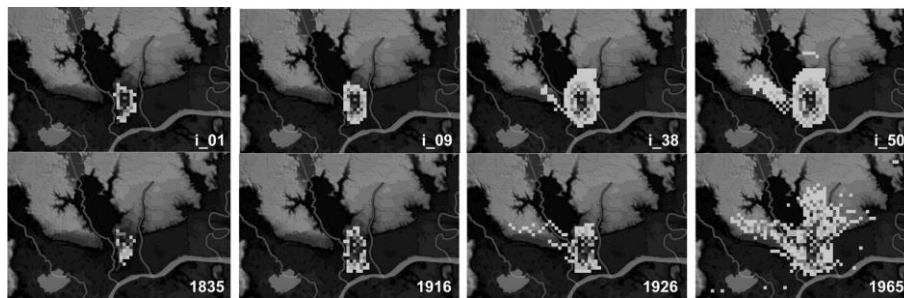


Figure 10. dynamic correlations between simulation and control scenarios to Centrality type2 output.

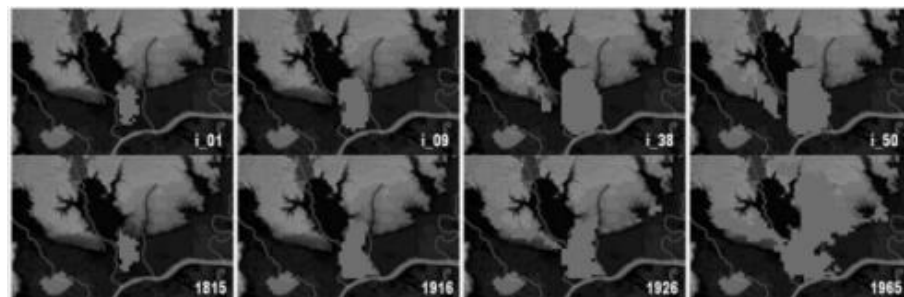


Figure 11. dynamic correlations between simulation and control scenarios to CellType.

In Table 1, for each control stage are highlighted in deep blue the maximum values and in red the minimums. In the last column are indicated a scenario formed with mean values and the maximums values are highlighted in last line.

It is possible to observe that the majority of the maximum values happens in the Absolute Centrality type (CentABS, mean 0,85) and the minimum results are to urban phenotype (Celltype, mean 0,66).

The data showed in this chart was presented in linear graphs that allow to demonstrate the evolution of the numerical correlations for each of the outputs (centralities in variations of blue and urban phenotype in red). The graph of drawing 4.30 indicates better results for the results of centrality, that besides happening with larger values (means, 0,85; 0,79; 0,85), the comparative horizontality of the lines indicates a trend to occur constantly. This means that, during the process of simulation, (larger the horizon simulated, smaller the control of the data), the centrality correlations are almost the same.

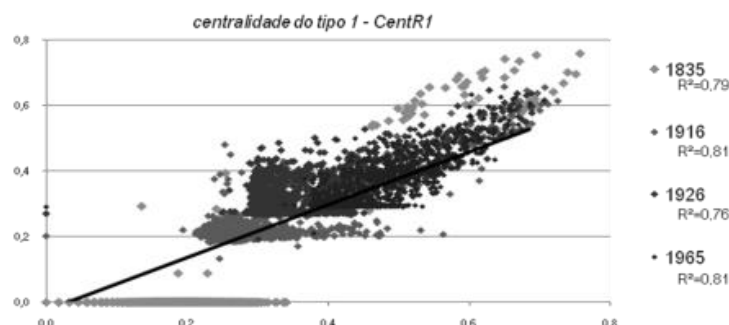


Figure 12. scatter diagram from Centrality type 1 output data, overlaid scenarios 1835, 1916, 1926 e 1965, in crescent blue colour scale.

Table 1. Numeric correlation values for each output in four control stages

R ²	1835 x i_01	1916 x i_09	1926 x i_38	1965 x i_50	Média
CentABS	0,81	0,90	0,87	0,82	0,85
CentR1	0,79	0,81	0,76	0,81	0,79
CentR2	0,86	0,90	0,84	0,80	0,85
Celltype	0,90	0,53	0,52	0,48	0,66
máximo	0,90	0,90	0,87	0,82	0,85

Conclusions

Approaching urban growth and hydrographic landscape this paper approaches objects traditionally from different epistemological fields: city and natural environment. Furthermore, this paper main highlight is the approach from three different scientific bases: theoretical, empirical and methodological. From these three approaches the results are converging into a common result, reinforcing the statements proposed throughout the work.

Can be highlight too the explored relationships between urban growth morphologies and hydrographic landscape. From a widely perspective in a systems approach the watershed attributes influences urban dynamics in a complex relationship, overcoming cause-effect linear relations.

Thus, the work also overcoming landscape attribute approach operating as a simple urban resistance, merely constraining the urban form resultant. In fact, what is proposed is the urban form spatial discontinuity as an inherent growth dynamic characteristic. In this complex relationship hydrographic attributes are discrete, operating as a tipping point on urban-environment system.

The spatial convergence between urban voids and water resources are a way of ecological preservation on urban growth dynamic. Thus, the work sought to contributes to overcoming pessimistic views about urban futures. Traditionally urban futures have been summarized by the negative morphological impacts on natural resources. Rather, the results proposes the city as richest human artefact with intrinsic properties of vitality and expansion, associated with resilience and permanence factors over time.

In more specific terms, some discussions from this work can raised, as described below:

a) urban form fragmented and coincidence with natural landscape.

The results appointed the urban form fragmentation as an intrinsic characteristic to urban growth, emerging from multiple subsystems convergence.

The urban form fragmentation does not nullify the natural tendency of concentric urban growth. Contrariwise, this fragmented and concentric morphologic changes indicates cities

grow by both movements synchronously, featuring a dynamic that essentially defines as a complex phenomenon.

The occurrences of the fragmented urban form allows that the urban voids can match spatially to places of interest of the natural environment. Due to this, the dynamics of growth and the spatial discontinuity can be actually a path to better interact urban systems and natural ecosystems.

However, in order to occur in fact the city articulated to the natural landscape, before it is necessary to indicate a scale to foster the urban fragmentation and the urban voids effectively match to the important places of landscape ecology.

In this sense, some authors have anticipated and presented the integration between transport systems and the hydrological basins as a possibility to reduce costs of implementation of infrastructure and reduce the impacts of urban growth over the natural landscape. It is in such perspective and spatial scale that this work is integrated

b) spatial discontinuity intrinsic to the urban growth dynamic and the water resources role.

Urban theory has been applied to understand the spatial discontinuity of urban form.

In this context, statements from the New Economic Geography make possible to improve the understandings of the dynamics of growth and the spatial discontinuity from an evolutive approach of the urban theory path (Fujita e Mori, 1997). Due to the lag between South American and European history cities, this theoretical approach are applied successfully in Buenos Aires city by Janoschka (2002). Alike, as in this paper the NEG's "evolutionary approach to urban systems" is also valid for Pelotas' case, that urban growth is associated with concentric, sectoral and multi centrality evolutionary stages.

In terms of complex sciences this morphological changes has been referred as a phase transition dynamic, occurring as a catastrophic effects. Urban science would not just discover the attributes that characterize cities whereas complex system (Batty, 2009). In this sense, this paper take on the hydrographic attributes as tipping points in the complex system, where the environment converges to promote a dynamic.

c) urban growth morphology watershed's articulated.

On hydrographic urban sub-basins, the hydrologic properties configures wetlands in adjacent areas to drainage streams, defining constraints spaces to urbanization. This urban-resistant places are in contrasting with environmental amenities on terraces and watershed ridge lines.

In a watershed scale, original urban cores tend to occur due to proximity and distance with water resources. In general, looking for places in resemblance the idea of isotopic plans. Originated on environmental spaces like an isotropic formation, the urban core expands predominantly in concentric forms until confront with natural restrictions to urbanization. In the natural landscape, hydrographic streams are set as important attributes against urban built form.

In these places urban and natural interests are overlaid, configuring an interface where is restricted the concentric urban growth. To keep the urban spatial production is overcome the landscape restrictions and urban growth occurs in remote places. At this time, in general, diffuses urban nucleus tend to occur places resembling the original environment. Urban growth seek for environmental amenities on terraces and ridge lines beyond the hydrography's wetlands.

Repeating the original locational criteria, repeats urban growth expansion form and sets up an iterative and dynamic process, successively.

d) urban morphology, sustainability and performance.

This paper assumes the morphologic urban growth dynamic articulated with hydrographic landscape as a discrete property that gives cities a permanence factor over time, which in terms of urban ecology has been called in resilience.

However, that in fact occurs, the urban permanence also depends on the internal performance and difficulties imposes on social and environmental structures.

Certainly concentric city has the performance facilitated by enabling endless interactions occur internally, promoting accessibility to all spaces and socio-spatial relations with proper intensity and equity.

Though, the compact city model pursued by urban theory has not shown able to reducing the urban social costs and the human environmental footprint. Furthermore, concentric morphological models do not allow the natural landscape articulation, urbanizing indiscriminately environmental attributes and contributing to internal urban-environment problems.

On the other hand, urban fragmentation that a priori presents greater restrictions on urban efficiency, has been presented as an alternative to reduce the indiscriminate conversion of the attributes of the natural landscape, promoting preservation practices and ecological valuation on the city.

However, there are strong evidences that discontinuous urban form tends to maintain urban facilities in an unequal distribution and promote spatial segregation. In fact, like the tendency to promote diffuse urban growth, the spatial inequity is intrinsic to urban phenomenon and needs to be confronted by urban science.

That is, if in the contemporary city coexists: the socio-spatial segregation and urban the interaction; the urban artificiality and environmental nature; the morphological fragmentation and concentration. Urban science must develop a model that involves both efficiency, equity and environmental quality, simultaneously. Construct a new science paradigm that ensures the urban sustainability and permanence over the times, in fact.

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Epistemology of public spaces: a cultural approach

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Abstract. *Cultural aspects of urban settings require developing methods of description of public spaces. The current paper addresses the problem of a theoretical exploration of the analysis of public space from a dual perspective: morphological and anthropological. It claims that the void constituting a physical manifestation of the public realm is a common element which is in the scope of interest of both disciplines. For public life to occur in urban areas necessary conditions are required. Anthropologists endow forms of urban spaces with meaning, treating them as a form of communication. Inversely, claim may be made that a lack of formal definition of urban situations results in a decrease of meaningful communication itself, thus, as a consequence, public life withers in outdoor spaces. The quest for methodology for description of public spaces, including their physical form, becomes crucial in this perspective. The description of culture based differences of appearance of various outdoor spaces requires detailed analyses of cues pertaining to the notion of atmosphere perceived in distinguishable settings. The current paper conveys some entry points to a more systematic exploration of public spaces.*

Key Words: *Urban design, public spaces, urban morphology, enclosure.*

Introduction

The Postmodernist shift of approach towards research in the field of urban design requires the development of an exploratory framework for the epistemology of the public realm. The current paper aims at a trial to review the main threads related to the epistemology of urban open spaces. While studies in urban morphology have flourished recently, after the period of Modernist stagnation the paucity of theory on morphology of urban open spaces is still perceivable. Morphologists recognise that "(...) *the city or town can be 'read' and analysed via the medium of its physical form*" at the same time pointing at the tight and dynamic interrelationship of urban structures shaping and being shaped by social and economic forces (Vernez Moudon 1997, p.7).

In order to establish the epistemological position at the outset, it is necessary to recognise the lack of theory which may convey the explanation of relations between the way people use open urban spaces and their physical form. Gauthier and Gilliland (2006, p.44 after Levy, 1999, p. 79) suggest that comprehension of the urban fabric in terms of 'urban form' should assume treating elements of urban structure as linked together and creating a whole, governed by an 'internal' logic. This postulate recalls the structuralist position within anthropological research, namely the concept of 'the order of orders' discussed by Lévi-Strauss (p.332).

The requirement to include culture related aspects of urban structures into the normative theory of urban design should be recognised. The author tries to fill in this gap, in the quest for common threads enabling the commensurability of the theoretical framework of anthropological studies and the epistemological approach of urban design and urban morphology. This paper identifies some threads in urban design writing which refer directly to the description of urban settings that may be characterised as culture related. It looks for their overlap with anthropological theory, namely the structuralist approach presented by Levi-Strauss as well as ideas developed by the archaeology of space.

The paper is organised as follows: after this introduction, the explanation of structuralist theory is presented with regard to urban settings. Further on, a review of urban design writing is

performed. The last section discusses the perceived overlap of the two theories and potential future research avenues. It also summarises conclusions from the paper.

Links between anthropology and studies of urban morphology

Levi-Strauss attributes different aspects of social life to the unconscious activity of the mind, which consists in imposing forms upon content (p.30). He discusses "(...) *interpreting society as a whole in terms of a theory of communication*" (p.89). This endeavour may be undertaken on three levels: the rules of kinship and marriage, economic rules and linguistic rules. (p.89). In his opinion, it is legitimate to search for homologies between these levels, as well as to look for reflections of social structure in the spatial organisation of human settlements - again on various levels (pp.290-291). He distinguishes direct and indirect communication and points at rules of communication games which constitute an important element of culture (pp.296). Social institutions find their projection in the space around them, which refers not only to primitive societies but also as Levi-Strauss ephasizes: "*most modern cities present spatial structures which can be reduced to a few types and which provide certain indexes of the underlying social structure.*" (p.329). He discusses "*the order of orders*", which "*is the most abstract expression of the interrelationships between the levels to which structural analysis can be applied.*" (p.332). The question raises which physical features of urban spaces evoke what kind of notions and how these phenomena function.

The anthropological concept of walking, elaborated by Certeau (1988, p.98) as a space of enunciation and his comparison of the usage of space and urban structures to speaking in a given language, provides a valuable asset for analysis of the way urban spaces are created through embodied practices and read. A desirable harmony of urbanscapes requires congruency of the form of structures and of human behaviour. Certeau (1988, ix) discusses a concept of singularity – in this approach defined as the scientific study of relationship - that links everyday pursuits to particular circumstances.

Morphological approach

The principles of morphological analyses assume analyses of the form of physical elements at different levels of resolution and taking into account their changes in time (Vernez Moudon, 1997, p.7). The resolution of analysed structures corresponds respectively to the levels of a building/lot, street/ urban block, city/ region. They are the subject of analyses of the three different main schools of urban morphology: (1) Conzenian, following the thought of M.R.G. Conzen (Whitehand, 2001) - mainly British and German, although developed as well in the neighbouring countries, (2) Italian, continuing the tradition of Muratori (Cataldi et al, 2002) and (3) French, started by Panerai and others (Panerai et al, 2009).

The classification of research in urban morphology (Gauthier, Gilliland, 2006) places the oeuvre of morphologists, who incline towards an anthropological method (Rapoport, 1969, 1990, 2003; Rykwert, 1989; Mumford, 1989; Lynch, 1994), on the border between the cognitive and normative approach, which provides characteristics both of existing places and looks for normative theory in the field of urban design. Detailed analyses of open urban spaces were conducted as an element of plot profile analyses by the French school of urban morphology, such as studies of tenements in Versaille by Castex and Celeste (Panerai et al, 1974).

The recognition and characteristics of elements of urban structures as defined by Lynch (1960), namely: nodes, paths, regions, edges and landmarks, introduces analyses of outdoor spaces from the cognitive point of view, in a more holistic approach. Lynch and Rodwin (1991, p.361) distinguished two basic classes of urban structures: the built up plots and open outdoor spaces. When looking for the description of 'a system of activity pattern' they point at the requirement to concentrate on two basic aspects: flows of men and goods and spatial patterns of

'localized activities', including: exchange, recreation, sleeping and production. When concentrating on physical patterns, this breakdown may be transpositioned to the description of the physical form: "(a) the flow system, excluding the flow itself; and (b) the distribution of adapted space, primarily sheltered space." (Lynch and Rodwin 1991, p.361). In the first group there are roads, paths, pipes, wires, canals and rail lines - that is all the elements which "are designed to facilitate the flow of people, goods, waste, or information". The second type consists of all spaces that "have been adapted in some way to be useful for someone or several significant non-circulatory activities." (Lynch and Rodwin 1991, p.361-362). In this group, apart from urban structures, understood as volumes, there are also the open spaces of squares, markets, streets, parks, etc.

Definition of enclosure

The notion of enclosure should be evoked here as it constitutes a physical representation of open, publicly accessible, outdoor space. It has been present in the language of description of landscapes since 1235, that is since the Statute of Merton (Holmes 1910, p.479). It further developed on the ground of landscape architecture. In the classic handbook by Hubbard and Kimball (1917, after Böhm 2004, p.12) *inclosure* or *enclosure* is defined as a result of plan composition, which provides, thanks to the introduction of proper divisions, an impression of interior regardless of the location of an observer. Ashihara (1983, p.34) underlines the importance of walls in western culture. Ramparts of medieval castles created a "centripetal order ruled by the wall".

Outdoor spaces are physically delimited by a boundary consisting of facades of buildings, fences, greenery, etc. The void defined in this way is an element commonly perceived as a physical manifestation of a public realm, thus, may be considered as providing an opportunity to apply a theoretical framework stemming from anthropological studies and urban morphology. Cullen (2008, p.29) describes enclosure as "the most powerful, the most obvious, of all the devices to instill this sense of position, of identity with the surroundings." He emphasizes the role of enclosure in defining the idea of *Hereness*. In this context the concept of place which is distinguished from space by means of meaning and recognition (Tuan, p.73) acquires more physical shape. The singularity of definition is one of the features enhancing the 'imageability' of an urban environment which is strongly emphasised by Lynch (1960) for whom the sharpness of a boundary or presence of an enclosure is one of the possible ways how singularity may be achieved.

Ashihara (1981) discusses concepts of positive and negative space, in which tensions are directed respectively inward on the centre or outward from the centre. He claims that, from the viewpoint of space theory, planning is an activity which consists of the determination of boundaries and then building of an order inward, towards the centre. Many postmodernist theoreticians point out the same distinction. Krier (2011, p.169-170) rejects public spaces created without a conscious concept of definition of boundaries (N-type) as accidental and chaotic.

Streets as well as squares, piazzas, etc., conversely to 'empty ground in the Gestalt scheme' of wide spaces between buildings in mass-scale modernist planning, may demonstrate the qualities of Gestalt figures, in this case the boundary, which separates the interior and exterior space, becomes the 'inside wall' of the enclosure (Ashihara 1981, pp.141-142). Observation by Norberg-Schulz confirms that in order to become a true form, the street must possess a 'figural character' (Norberg-Schulz, 1963, p.83, after Ashihara 1981, p.142).

Space is experienced in a dynamic way, urban spaces are examined from an endless number of viewpoints along with movement of an observer through sets of consecutive enclosures. The return of sequential analyses of urban spaces, which address perception from a pedestrian perspective, including changes in observer position - that is perception in time - started with Sitte (1996). In parallel, the continuation of the British Picturesque tradition was developed by

Cullen (2008), who referred to more subtle notions, that is, visual perception, but also to other parameters of settings, including multi-sensual perception: tactile, acoustics, smells, etc. Further more contemporary development of the theory in the Anglo-Saxon tradition has been carried out by, e.g., Venturi et al. (2001) with regard to urban strips.

Nowadays concentration on the human perception of cityscape has become quite a common approach within a field of urban design. This group of analyses also contains psycho-geographical examinations of a cityscape, (e.g.: Debord, 1955, Nold, 2009). The current shift from the 2d approach to planning of urban areas, towards emphasis of perception from the pedestrian's perspective is another reason for the increased attention paid to the appearance of 'spaces between buildings' (Gehl, 1987).

Culture related character of public spaces

Ashihara (1981, 1983) pays attention to the differences between the appearances of public spaces in various cultural contexts. In his work (1983) he concentrates on the way outdoor space is approached in Japanese culture and European tradition, namely Italian. The obvious distinction between Japanese culture, with its characteristic visual incorporation of external spaces into interiors, and Western spatial order (Ashihara 1983, p.34) indicates the presence of various "*spatial orders*". More detailed analyses allow us to notice the much less obvious distinctions, which express themselves in variations of rhythms of facades, heights of buildings, their distribution and distance from streets, ways how streets profiles and silhouettes are shaped, etc. These observations are congruent with Rapoport (1990, p.89) who claims that "*the ordering principles of fixed-feature arrangements have meaning, although one group's order may be another's disorder*". Lynch and Rodwin (1991, p.355) point at the custom as one of the reasons for "*choice of form*" in the design process.

Rapoport (1990, p.49) argues that one of the channels of visual communication is the built environment and emphasises its meaning (1990, p.91). He points at the presence of '*visible and stable cultural categories*' made by physical elements and moreover he states that there is the possibility to decode the meaning of urban settings under the condition that '*they match people's schemata*.' (Rapoport 1990, p.15).

Anthropological perspective

The anthropological approaches confirm the observation expressed above. According to Hall (1989): "*structures provide context, which enables communication*". People must have the ability to interpret codes embodied in the built environment which is possible when they represent the same culture. The factor which intercedes between the cognitive absorption of perceived visual stimuli and the creation of new environment is visual awareness. Hall (1966) distinguished three main types of elements which undergo changes as a result of a culture specific communication processes: (1) fixed-feature, (2) semifixed-feature, (3) nonfixed-feature ones. The way fixed-feature elements are organised, their spatiality, size, location and arrangement transform meaning, especially in traditional cultures. The territorial distribution and exchange of nonverbal cues serves the communication purpose and usually certain semantics may be attributed to it (Goffman, 1959). Anthropologists developed elaborated theory on ways in which a site is converted into a meaningful 'place', by inscribing human activities into the surroundings.

Important indications on how physical settings may be 'read' and understood may come from the field of archaeology, where anthropological theory and practice are being abundantly developed (Hodder, Hutson, 2010). Special attention is given to the notion of meaning of material culture objects: "*the idea of meaning is making sense of the situation*" (p.157).

Following Hodder, all objects of material culture, including physical settings, are entangled in some activities and it is impossible to consider them separately (Hodder, 2012).

The overlap of theories coming from the two disciplines

The concept of situation, which is essential for current considerations, was defined in the 1920s as a “*constellation of the factors determining the behaviour*” (Thomas, 1937, p.8 after Schumacher, 2011, p.420). Goffman (1959, p.18) explains the notion of situation as “*the full spatial environment anywhere within which an entering person becomes a member of the gathering that is (or does then become) present*”. The term is understood in anthropology as a theatre of human activities (Perinbanayagam, 1974). In the morphological approach, the above concept is reflected by the notion of habitus (Panerai et al, 2009) characterised by a set of identifiable cues, which may be qualified as culture-specific. They refer to physical space, including features like: “*quality, size, shape, enclosing elements, paving, barriers, and links, etc.*” (Rapoport, 1990, p.106). Rapoport emphasises the role of physical settings “*(...) it is the social situation that influences people’s behaviour, but it is the physical environment that provides the cues.*” (Rapoport 1990, p.57)

The relationship between people and sites encompasses both: attaching meaning to space and “*recognition and cultural elaboration of perceived properties of environments in mutually constituting ways through narrative and praxis*” (Lawrence, Low, 2009, p.14). Hillier and Hansen (1984, p.224) ponder on the method of investigation of encounters as morphic languages, concluding that the aim is to establish how encounter systems acquire differential properties which would have different manifestations in space. Hillier emphasises the role of human cognition in the creation of cities, at the same time also pointing at the culture based differences in their structure (Hillier, 2009). His research, in cooperation with ethnographer Jean Cuisenier (Depaule 1995, p.30), encompasses the relation between urban composition and 'social logic of space'.

The social cues discussed hereto may be twofold. First they are related with some prescribed rituals, unique for a given community and thus belong to conscious activities. Second, the nonverbal communication cues associated with the group behaviours and proxemics issues, including interpersonal distances and distribution of people in communication situations, affect the form of physical settings as well (Hall, 2009). The claim is made that the rules which govern the non-verbal communication component of the human group behaviour, its intrinsic organisation and arrangement, constitute the internal order which lies behind distribution of cues in urban settings. They both represent the same culture of space usage.

Methodology of the description of physical spaces - state of the art

In order to make the case for a more systematic appreciation of the physical attributes of open public space, arguing that such attributes trigger cognitive and behavioral responses associated with deeply seated cultural meaning, a review of current practices is further provided. The basic method of gathering data for projects both in urban planning and urban design is the inventory and analyses of urban landscapes. Direct contact with the environment enables observation and validation. Rapoport (1990, p.97) suggests direct observation, analyses of existing studies, and an analysis of descriptions and the like as a method of verification of the thesis on nonverbal communication role of the environment. He provides a comprehensive list of potential cues, which should serve as a basis for description (1990, pp.106-107), which includes elements of vision, sounds, smells but also social aspects, such as characteristics of people, activities and uses and objects present in outdoor spaces.

The theoretical body for this kind of studies is derived from Lynch's theory (1960). Further classification of the two basic categories: adapted spaces and flow systems, should pertain to the

following features: (1) element types, (2) quantity, (3) density, (4) grain, (5) focal organization and (6) generalised spatial distribution (Lynch and Rodwin 1991, p. 362-363). The typologies of public spaces were the subject of investigations by many authors, e.g., Krier (1975) undertook a trial to formulate a typology of squares, based on their shape and Jacobs (1995) provided an elaborated typology of streets. Discussing these typologies in relation to the culture of usage of space, it is necessary to take into account cognitive aspects of form, which precede the creation of physical objects and notions which are related to these concepts (Caniggia and Maffei, 2001, p.50).

Another characteristics of urban enclosures is connected with their proportions, which also influence both perception and understanding of settings. Ashihara (1981, p.41) analysed changes of proportions of street profiles in various periods. He bases his approach on the relation of building height (H) to street width (D) and further also to the width of the facade (W) (Ashihara 1983 p.141). The D/H factor emphasises Gestalt qualities of exterior urban landscape composition. The qualities of contextual design advocated by disciples of Sitte's oeuvre reendow it with proper significance.

The analogous theory of urban composition was developed in Polish architectural writings by Wejchert (1984). He discussed a similar set of elements of urban structure to Lynch, though based on the epistemological ground of urban composition. He is widely recognised for the comprehensive theory of urban enclosures. He introduced the notion of central angle, defined as an angle between a horizontal plane parallel to the floor at the height of 1,5m (the medium level of sight for humans) and a line going through the highest point of the building defining the closure in a given profile. The point belongs both to the silhouette line and to the cross-section. Wejchert (1984) provides general rules for classification of enclosures basing them on the description of heritage sites which are widely recognised for their great proportions. According to his classification, enclosures may be divided into complex and simple, elongated and neutral - close to square. He discussed also openings - breaks in a line of facades, which he classifies into narrow, neutral and large, and following their content: architectural or natural. Among other concepts defining a composition of urban landscapes, there are notions of leading and retaining (stopping) lines and planes, rhythms, visual axes, vantage points, landscape openings, etc. (Wejchert, 1984, Żurawski, 1962).

In order to define the understanding of a city as consisting of multifarious "*sensuous experiential orders*", a concept of an atmosphere has been introduced by Böhme (2004, after Andersen, 2012) defined as "*a spatial character we experience through our bodily presence*". In the architectural praxis a "*phenomenological survey*" of cityscape is conducted, which allows distillation of "*sensuous quality of space*", which finds further application as input standards for transformations. Following definition by Andersen (2012), atmosphere belongs to the interstice between an articulating physical object and a sensing human body. Böhme claims atmosphere to be evoked by "*orientation, suggestions of movement (and) markings*" creating "*concentrations, directions, configurations in space*." (2002/2005, after Andersen 2012). He points at four main factors pertaining to the way an object is sensed by a human body and what emotional response it elicits: form, colours, proportions and texture.

People develop a better understanding of the world through experience, starting from early childhood, the abilities to assess 'gravity, hardness, surface character, thermal conductivity' together with the geometry of shapes (Rasmussen, 1964) is acquired. This deftness is a result of experience collected by a youngster along with the culture of usage of space. A phenomenological survey should point out a number of properties of a buildings' facades pertaining to an overall spatial character: (1) contour, (2) shift (like shift of cornice providing dynamic transition between neighbouring facades), (3) colours palette, (4) profile - (e.g. of the cornice), (5) relief, (6) plasticity - twists of line of construction, corrugation, (7) rhythm - of facades, windows, lamp posts, etc, (8) framing as emphasis of architectural elements, (9) pattern - touchable, increasing tactile qualities (Andersen, 2012). The above listed distinctive building elements pertain to form, colour, proportions and texture qualities of an open space.

Conclusions and further research

The challenge, stated by Hall (1989, p.55), is that, in a globalising world, humans should discover ways how “*basic cultural systems such as time and space are used to organise behaviour*” have become popular in contemporary urban design thought, as numerous studies show (Schumacher, 2011). At the same time, the studies of urban morphology are going through a period of intensive revival after a break associated with the activities of modernists and attract the attention of numerous researchers all over the world, as Gauthier and Gilliland (2006) point to in their survey.

Outdoor open urban spaces provide settings for the social life of a community. They convey the framework for social situations endowed with cultural meaning. The characteristics of enclosure, including its scale, profile, definition, the character of walls and floor as well as characteristics of space: odours, temperature, etc, make up the perceived image of these places. The requirement to grasp the physical attributes of outdoor space in a more systematic way has been recognised, in respect that such attributes elicit cognition embedded with cultural meaning. The heretofore research on the character or atmosphere of urban outdoor spaces were mostly descriptive ones and were carried out on the basis of historical studies. An extensive set of such culture dependent features as well as some theoretical assumptions were introduced by Rapoport (1990) and Rykwert (1989). Valuable observations referring to the quality of public spaces come from urban design theory, namely the works of Lynch (1960), Lynch and Rodwin (1991), Wejchert (1984), Ashihara (1981, 1983). In all this research the importance of the definition of space in the form of enclosure is emphasised. The ability of a boundary to be read as a profile or set of profiles based on the Gestalt theory is underlined as the one which especially influences human perception. Some normative approaches towards the examination of urban structures (e.g.: Andersen 2012) include phenomenological: tactile and sensual experience, essential for perception of architecture. The creation of atmosphere which refers to the character of urban outdoor spaces remains central in the design process.

The urban settings are the subject of elaborated research in the field of anthropology. As Hall states (1966 p.88) “*(...) settlement pattern both relates to the core values of the culture and contrasts with the other patterns around it.*” The meaning of space is explained by contextualisation provided by the built environment which should help citizens deal with the overload of information related to certain cultural settings. The social cues may be twofold: the first related with some conscious activities and the second, unconscious, reflecting the group behaviour related with proxemics. This ‘*spatial order*’ may be interpreted as a set of rules lying behind the way urban spaces are unfolded in urban settings of various cultural backgrounds.

The necessity for more systematic research on the relations of the two spheres - human activity and physical settings framework has been recognised. Further research is envisaged, including different approaches to the analyses of urban silhouettes and profiles, the sequences of views over time and the character of the buildings themselves as well as the verification of analyses of various types of visual cues through the analyses of a case study.

Acknowledgements

The current research is financed from the National Science Centre of Poland funds, project: UMO-2011/03/D/HS3/01630.

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The interaction between urban form and public art. Two examples on Lisbon's waterfront

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Abstract: *In our contemporary cities, public art plays an important role, in urban regeneration processes and in the construction of social identities. Its placement on the public space raises several questions: which spaces are elected for the implementation of public art? In those spaces, what kind of relations are established between its morphologic characteristics and the new interventions? Finally, is it possible to identify models of placement? Despite the lack of systematization of these themes, some authors focuses on the interaction between urban space and public art, in a framework that positions it across different disciplines. In Lisbon, the criteria for the placement of public art are not always evident. Most of the times, there is not a true spatial integration. In this sense, this paper proposes an analysis of two artistic interventions, on Lisbon's waterfront: The intervention in a viaduct, by Eduardo Nery (2003); The work Lisbon (a tribute to the builders of the city), by José de Guimarães (1999). By the way as they dialogue with its context, both interventions are in the opposite attitude of an understanding of public art as decorative objects on the public space. In fact, both contribute not only to the physical, visual and symbolic enhancement of the place, but also to the monumentalization of the waterfront.*

Key Words: *public space, public art, urban form, Lisbon, waterfront*

Introduction

Throughout the second half of the 18th century, public art has enhanced the city's public spaces. In such a context, the production of monuments or smaller works like busts or statues has been interwoven with the urban design processes. Progressively, across the 20th century, the public art monumentalization paradigm has changed, but still the values of monumentality remained, assuming new ways of expression. Recently, urban regeneration actions have included public art programs as a way of providing new public spaces of symbolic contents.

The placement of public art in the city raises several questions: which spaces are elected for its implementation? In those spaces, what kind of relations are established between its morphologic characteristics and the new interventions? Is it possible to identify models of placement? Finally, is it possible to relate different historical moments with certain paradigms of monumentalization?

Despite the lack of systematization of these themes, authors such as C. Sitte (1889), Stübgen (1906), Jaussely (1907), Hegemann & Peets (1922) and more recently Kostof (1991), focuses on the interaction between urban form and the placement of monuments, in a framework that positions public art across different disciplines.

In our contemporary cities, some spaces seem to have a greater readiness to host public art interventions. Thus, it appears frequently in historic centres, in areas of urban sprawl, in gardens and parks, in new residential districts, among others.

In port cities, the inherently symbolic nature of waterfronts makes them privileged spaces for the placement of public art, and Lisbon is no exception (Remesar, 2002; Ochoa, 2012). Its waterfront is a large repository of built heritage. This display of Lisbon and that of Portuguese legacy contains historical and emotional value that reinforced the strong symbolic character enclosed in the city's waterfront. As a result, not only the city's identity is bounded in this area but the nation's character as well.

Retrospectively, and directing now a perspective upon chronological events, Lisbon has hosted two significant events that both enclosed ambitions of affirming national identity in two very different political contexts (Matos, 2013).

The first was the Exhibition of the Portuguese World, held in Belem in 1940, that celebrated the Nation with two centennial events: the eight hundred years of the Foundation of the Portuguese State (1140) and the four hundred years since the Restoration of the Independence (1640). The once densely industrialised area transformed into a cultural and leisure area, which promoted great symbolic expression through several emblematic buildings and monuments related to the Portuguese discoveries.

Almost six decades later in 1998, the Lisbon World Exposition (Expo'98) took place on the eastern side of Lisbon that celebrated the wonder of the discoveries with the theme 'the Oceans, a Heritage for the Future'. Expo'98 also aimed at rehabilitating a long extension of obsolete and disjointed areas in Lisbon leading to the creation of a new centrality.

The public space network that is enclosed within Lisbon's waterfront offers a wide range of opportunities for public life, socialisation and communality. As an example, recent investments took place that resulted in urban renewal and rehabilitation projects¹⁶⁵ within various particular areas of the waterfront. In particular, one can address the examples of: (i) the construction of the new 'Museu dos Coches' near Belém¹⁶⁶; (ii) the new public space of 'Ribeira das Naus'¹⁶⁷ next to Praça do Comércio; and, (ii) although still in its initial phases, the cruise terminal at Campo das Cebolas¹⁶⁸, offering a greater and wider variety of public spaces.

As previously discussed, Lisbon's waterfront is a privileged space for the placement of public art and, in particular, monuments of strong symbolic nature. In turn, the placement of public art is also a way to value the inherently symbolic nature of the waterfronts and to emphasise its monumentality¹⁶⁹. A predominant example of this is the strategic placement of the Equestrian Statue of D. José I¹⁷⁰ in Praça do Comércio (as part of the 'Baixa Reconstruction Plan'¹⁷¹), in clear owe and representation of the King's power. This monument is currently a symbol of the city, due firstly to its referential value, and secondly because of its relation with the surrounding urban space. Furthermore, other relationships are of particular interest such as that with the square, and with the Tagus River. Lastly, its surrounding permeability is of significant value owing to its monumental axis of articulation with the riverfront, and from Rossio (also reconstructed by the same plan) to Cais das Colunas (at the same time, a physical and symbolic entrance door to the city).

The monumentalization of Lisbon's waterfront. Two examples of public art integration

Along Lisbon's waterfront, one can find a wide variety of works of public art, regarding its physical characteristics (scale, size, shape, materials, colours, and so on) and also the type of

¹⁶⁵ Initially lead by 'Sociedade Frente Tejo S.A.' and succeeded by the municipality of Lisbon.

¹⁶⁶ Architecture: Paulo Mendes da Rocha + mmbb + Bak Gordon Arquitectos; project date: 2008-2009.

¹⁶⁷ Project Consortium: João Gomes da Silva GLOBAL, João Ferreira Nunes and Carlos Ribas PROAP; project date: 2009.

¹⁶⁸ Architecture: Carrilho da Graça Arquitectos; project date: 2010.

¹⁶⁹ However, it is important to remember that the monumentalisation of the waterfront is, in many cities, conflicting. As S. Kostof states, 'the issue of monumentalizing the water's edges is complicated by functional arguments. To the extent that a river is a working watercourse with a port, there is a definite conflict between those who make use of it for trade-related activities and those who would turn into a work of art' (Kostof, 2005: 41).

¹⁷⁰ This statue was executed in 1775 by Joaquim Machado de Castro, according to previous drafts by Eugénio dos Santos.

¹⁷¹ After the Earthquake of 1755, the Reconstruction Plan of Baixa is directed by Eugénio dos Santos and guided by Sebastião José de Carvalho e Melo (Marquês de Pombal). The new Praça do Comércio redesigned the previous Terreiro do Paço, through a U-shaped square, open to Tagus River.

relationship established with the respective public spaces (Ochoa, 2012). However, the criteria for the placement of public art are not always evident. In some cases, there are thematic correspondences between the works and the respective places, but most of the times there is not a true spatial integration. Finding this sense of integration, it is here proposed an analysis of two interventions on Lisbon's waterfront:

1. The "Intervention in a viaduct", by Eduardo Nery (2003);
2. The work "Lisbon (a tribute to the builders of the city)", by José de Guimarães (1999).

Both artistic interventions are positioned at the intersection between the waterfront and the urban axes which give access to it (Fig. 1). However, as the physical characteristics of the works are also quite different, the relationship with the place is also expressed in very distinct ways.



Figure 1. The placement of the two analysed works, at the intersection between the waterfront and the urban axes which give access to it. (From top to bottom): a) "Intervention in a viaduct"; b) "Lisbon (a tribute to the builders of the city)".

The Nery's intervention starts on Avenida Infante Santo and integrates two types of situations (Fig. 2): i) the application of a composition of tiles in some of the walls that define the access to the waterfront, between Avenida Infante Santo and Avenida da Cintura do Porto; ii) the painting of the viaduct and its walkways, on Avenida 24 de Julho.



Figure 2. "Intervention in a viaduct", by Eduardo Nery (2003)

Although it is also visible from the walkways, this work is more related with the roadway. It is important to note the continuity of this work with a sequence of other interventions, from several artists, on the beginning of Avenida Infante Santo. By the way that it stands along this path, all this set of public art interventions has the effect of underlining this axe of connection with the water.

In this underlined structure, the public art emphasizes the waterfront along the axis of access to it. One detail of this work is the application of colour on the viaduct. Thus, rather than accentuate the view of the water, public art also underlines/highlights the way to get to it.

By this way, public art has her a direct relationship with the place of which it belongs. In this case, it is not about existing or not an interaction with the urban space; or of the work being thought to be located on that place. This work could never be replaced, simply because it is in direct relation to the walls of the Avenida Infante Santo and with the viaduct. We cannot

imagine it any other place. Thus, this is undoubtedly a case of public art's integration with its surroundings.

Its abstract character does not have any theme or memory recall. However, without this intervention, the viaduct would certainly have a different expression on urban space. Thus, this intervention has as effect a enhancement of that place, defining a first paradigm of interaction between public art and urban space: the highlighting of a place through public art.

The José de Guimarães intervention is located at the Praça 25 de Abril (next to Doca do Poço do Bispo) and consists on a set that integrates (Fig. 3): i) a sculpture with strong colors (red, green and white); ii) a pedestal with seven steps; iii) a pavement design.

The sculpture is aligned with the access axis to the waterfront and centred on the square. The physical characteristics of the work (the scale, the strong colours and the fact that it is very elevated in the square, through the 7 steps) and the physical characteristics of the axis (based on a straight line and descending towards the waterfront) provide a visualisation of the water, along the route. As in Eduardo Nery's intervention, public art has also a constant view along that route, although differently: here configuring a fixed point, at the end of it.

The descending towards the water has also as a consequence that, in the beginning of the axe, the sculpture and the water are at the level of the eyes. As we descend, the sculpture, that represents a seated woman, goes up, relatively to the horizon line, until in a certain point where she is "seated" on the water.

The pavement design is only visible in its nearby, after arriving to Praça 25 de Abril. Only from a higher level – after climbing the 7 steps – it is possible to perceive the drawings in the floor.



Figure 3. “Lisbon (a tribute to the builders of the city)”, by José de Guimarães (1999).

The place of this intervention as the designation of “square”. However, as it is possible to confirm in the territory, this space doesn't function as a real square, because it has no permanence on it; in practice, it works like a roundabout. We know the existence of the project Jardins de Braço de Prata, contemporary to this artistic intervention and that supposed

collaboration between the Sculptor José de Guimarães and the Architect Renzo Piano. Perhaps, that project would include another kind of space experience, or even another kind of work placement.

In terms of placement in urban space, this work has similarities with the previously mentioned Equestrian Statue of D. José I. Both works are placed on a pedestal, in a square near the water, and both are not exactly centred on the respective squares, they are rather closer to the water, probably with the intention of favouring his framing. However, if D. José I has an “advocativo” sense (Remesar, 2011), in a clear owe and representation of the King’s power, the work Lisbon is a tribute to the builders of the city, but also to the city itself.

With a strong symbolic content, the tribute to the builders of the city also chose an emblematic place in the city. Being Lisbon a riverside town, the choice of the waterfront, next to one of the entrances to contemporary event “Expo'98”, seems very intentional. Thus, we have a celebration of Lisbon and of its builders through the placement of this the work, in that site. On the other hand, the site is also celebrated, through the work.

i) The creation and the design of a new public space (a square in the waterfront); ii) the decision on the placement of the work; iii) and finally, the work itself; all these aspects define a second paradigm of interaction between public art and urban space: the celebration of something that establishes a symbolic relationship with a place, through public art.

Conclusions

Waterfronts are privileged spaces for the placement of public art. However, in Lisbon, the criteria for its placement are not always evident. Most of the works do not profound the relationship with the place. Few situations promote a true morphologic and visual symbiosis between the public art and its context, limiting it to some thematic associations.

Also the time lag between the making of the works and their placement in the public space, or the removals and dislocations of some works (Ochoa, 2012), sometimes to completely different contexts, confirm that the relationship with the place is not always considered.

In the opposite attitude of an understanding of public art as decorative objects, the two analyzed examples represent an interaction with the place, according to two distinct paradigms:

The highlighting of a place through public art (“Intervention in a viaduct”);

The celebration of something (a fact, an event, an important person) that have a symbolic relationship with a place, through public art (“Lisbon (a tribute to the builders of the city)”).

These two ways of public art integration relate not only to the waterfront (horizontal logic), but also with the axes of articulation with the city (vertical logic). Both contribute not only to the physical, visual and symbolic enhancement of the place, but also to the monumentalization of the waterfront.

We finally conclude that, although the placement depending on the thematic – trough the toponymy, or trough the association of certain persons or facts to a place – already represents a way of symbiosis between public art and its environment, its implementation in the urban space should seek for a deeper integration; promoting, whenever possible, relations with the urban morphology, but also with the social reality to intervene. Public art should be it in relation to its environment, not as an isolated object. Its integration in the urban space and the dialogue with its physical and social context are essential for the construction of meanings in the city.

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The impact of urban form on wind energy potential

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Abstract. *Developing wind energy in built environment is an old topic for sustainable city dwellers. With improvement of computer science, CFD simulation with complex building configuration or city models becomes accessible. This paper tries to analyse urban wind energy potential by urban form research. Two groups of idealized models were experimented for analysis of the impact of building size configuration and courtyard configuration in a semi-urban environment. Results show that the impact of building length on wind potential over the roof is much important than the building width. In addition, three typical urban form types in community scale were chosen and a set of morphological indicators were defined. The cross-comparison on wind energy capacity over the whole examined area for each urban tissues was taken. The great difference of wind energy capacity over different urban morphology features and different wind inlet directions confirmed the important impact of urban form on wind potential layout.*

Key Words: *urban morphology, CFD, urban wind energy.*

Introduction

Increasing need of energy resources and great environment problems caused by over-used fossil fuel, demand for the development of renewable energy. Wind electricity as a relatively cheap green energy has been well developed over last two decades. According to the Eurobserv'ER Database, global wind power capacity at the end of 2013 has been multiplied by 18 times from 2000. However, most of the wind turbines are located in rural or off-shore areas. Favorable zone for future development is getting fewer and fewer. Their extra drawbacks like over-production for accessible consumers and great loss in long-distance transportation, propel new wind energy adapted to urban environment. In fact, some European countries have made great efforts to the research of wind energy for built environment since 1990's. In 1998, a project named WEB (Wind Energy for the Built Environment) was launched and a new architectural and aerodynamic model was invented as the prototype of UWECS (Urban Wind Energy Conversion Systems) (Campbell and Stankovic, 2001). Later, another European Commission project named WINEUR (Wind energy integration in the urban environment) were elected for more detailed investigation of wind energy development in an urban environment, like suggestions for turbine installation, economic analysis and detection of potential social problems of small wind generators in urban areas (Cace et al. 2007). Apart from the projects mentioned which are rather oriented towards an overview of the real world situation (market, policy, social and economic

aspects), other research has explored the technical domains such as wind turbine design and application (Mertens, 2006; Chong et al., 2013).

With the great rugosity of urban context, urban environment usually has great turbulence and low velocity. However, some special building configurations can have concentrate wind flow, e.g. building edges, passage between two buildings. Research found that, ‘the concentration effect of buildings and the heights of buildings could enhance wind power utilization by increasing the wind power density by 3–8 times under the given simulation conditions’ (Lu and Ip, 2009). High buildings are among the most favourable sites to capture wind energy, where the wind can be much stronger and less turbulent than lower levels. Increasing researches are aiming at roof mounted wind turbines (Blackmore, 2008; Mithraratne, 2009; Ledo, 2011; Balduzzib, 2012; Bashirzadeh Tabrizi et al., 2014) and high-rise building wind catcher (Lu et al., 2009; Poh and Fazlizan, 2012; Lu and Sun, 2014). In addition, new wind turbine technology like Darrieus Turby model, and some successful examples of architecture integrated wind turbines like Strata SE1 tower in London, have shown great confidence for future urban wind energy.

Urban morphology is the study of urban form, which is defined by Kevin Lynch as a part of generally identified urban area corresponding to a homogeneous area in morphological point of view (Lynch 1960). As great urbanisation processing and complex urban system immersing, urban morphology becomes a popular and effective method in the domain of urban planning. Like the built form, urban form can also be determined by two forces: physical and non-physical environment (Sharag-Eldin, 1998). In fact, in the physical environment, urban form is a important impact in city problems like energy consumption and development (Ratti et al., 2005), wind comfort (Bottema, 1993; Ng et al., 2011), air pollution (Edussuriya, 2006; Sun et al., 2012), etc. With the development of Computational Fluid Dynamics (CFD) technology, wind simulation in complex built environment is becoming possible. Even though there exists still problems like turbulence model instability, inexactitude or divergence, many numerical simulations work well and validated by wind tunnel results. Actually, some Best Practice Guidelines (BPG) have been given for the case of wind flow in a built environment by researchers through their rich CFD simulation experiences (Franke et al., 2004, 2007; Tominaga et al., 2008, Blocken et al., 2007, 2012). With CFD simulation, Campos-Arriaga (2009) analysed the optimisation of wind energy development for a specific urban site. Bell (2011) has explored more on wind energy development in urban environment like CFD simulation, turbine design and some sites evaluation. All these literature will be a good reference for our further research on wind energy development with urban morphology. In this paper, a well used CFD code -- FLUENT is used for analysing the impact of morphological indicators on wind flow around some idealised urban tissues, and then some real urban tissues in community scale were chosen for more presentation and discussion.

Simulation settings and validation

To ensure a satisfactory result of a simulation, reasonable settings are of great importance. In this sense, a careful parameter study of CFD code was taken before start a simulation for urban morphology. Actually, a benchmark was applied with one of the wind-tunnel experiments performed by the Architectural Institute of Japan (Yoshie et al., 2007). The test model was a building of width 5 m* length 20 m* height 20 m with a scale $R_s = 1 : 100$ for the tunnel test. Inlet flow data was simplified as a power law:

$$U = U_0 \left(\frac{Z}{H_0} \right)^\alpha \quad (1-1)$$

where U is the inlet velocity at height Z , $U_0 = 7.84$ m/s is the reference velocity (horizontal, of axis X) at height $H_0 = 100$ m and $\alpha = 0.25$ is the power law exponent. There were 109 test points in the central vertical section parallel to the wind (Figure 1).

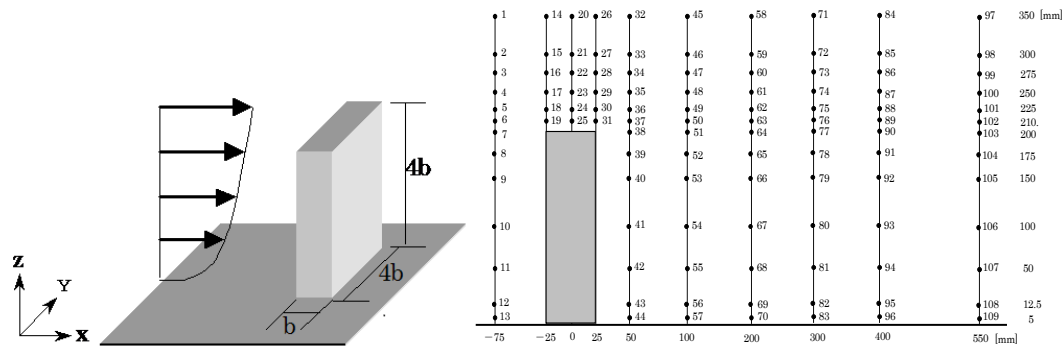


Figure 1. Schematic view of tunnel test model (left), vertical section (Y=0m) and its 109 test points (right)

The ANSYS 12.0 Workbench integrated with FLUENT was used for the CFD simulation. 57 tests were conducted for choosing the proper parameters in geometry, mesh, boundary condition, turbulence models and solution method. Best parameters were chosen under the balance of time cost and comparative errors. $k - \epsilon$ Standard model for the turbulence calculation with double precision and 2 order discretization solution were used finally. The diagram of *Figure 2* is a velocity comparison in the central-line section between the ones measured in the experiment and the ones calculated in the CFD simulation, applied with the best parameters found from the study. Note that the horizontal distance from the vertical base line (grey, where locate the test points, as also shown in *Figure 1*) represents the magnitude of the velocity and a reference length of 5 m/s is given. Results to the right of the base line signify positive values and results to the left are negative. Agreement between the CFD simulation and the experiment is generally rather good. Then these parameter settings were maintained for forward simulations, except for some necessary adaptive modifications like domain size change or mesh number control when modelling a large urban form.

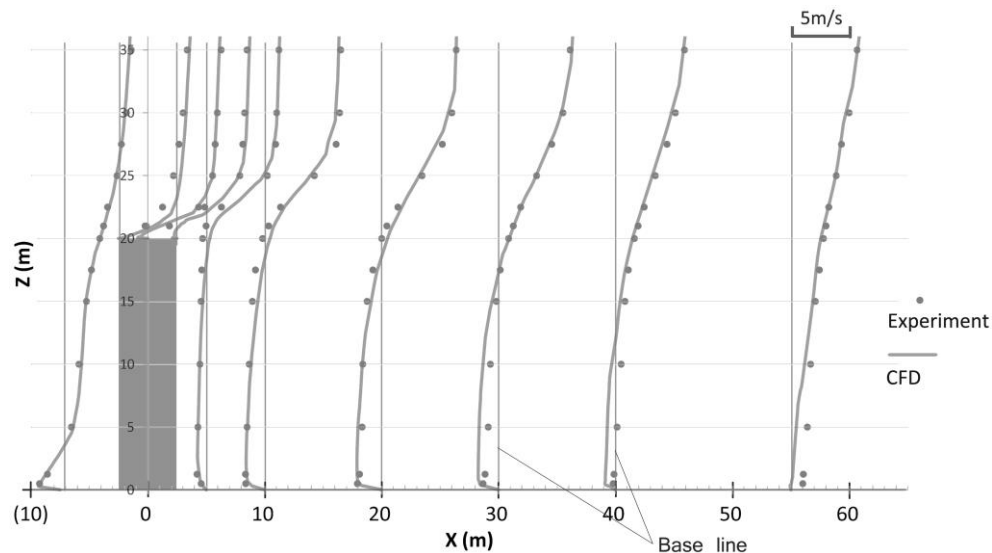


Figure 2. Velocity comparison between experiment and CFD simulation in the vertical section.

Simulation of idealised forms

Before working with actual complex urban tissue, some idealised models were considered to analyse the relationship between the wind flow and building configuration. Here a test reference model with a group of building units (width 12 m* length 30 m* height 20 m) was chosen. Wind domain and building dispositions are presented in *Figure 3*. Note that the group of buildings is symmetrical on the central line, parallel to the wind inlet direction. However, the distances between each row are not all the same. Actually, we did that in expecting for some more various results, as chose the staggering pattern. Wind energy over the roof is the main evaluation object. Two altitudes (5 m and 10 m, over the roof) were considered and the calculation zone was the projecting size of the building plan (*Figure 3, right*). Considering the analysis of the wind intensity over different altitudes with different wind velocity, the velocity rate U/U_H is used where U is the model wind velocity and U_H is the reference velocity in the free wind (same environment but without building) of the same altitude.

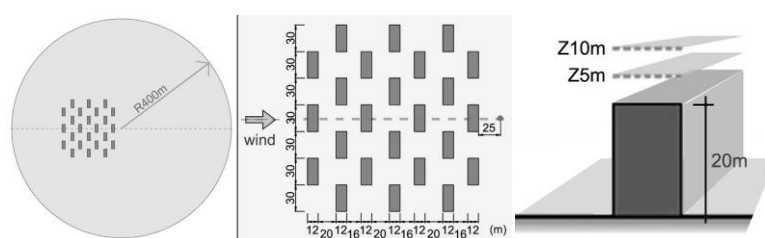


Figure 3. Wind domain (left), building disposition in plan (middle), evaluation zone over the roof (right).

Impact of building size

To analyze the impact of building size on the wind flow, we considered five models with different building size (length and width) for all the 24 buildings of each group. Another four models with different size configurations only for the central 12 buildings were compared. An extra model (A') which cuts down the central four buildings each into three small parts in the same environment is compared with the reference model. New building sizes and different densities (building coverage ratio) were given (*Figure 4*). All the buildings are at the same height.

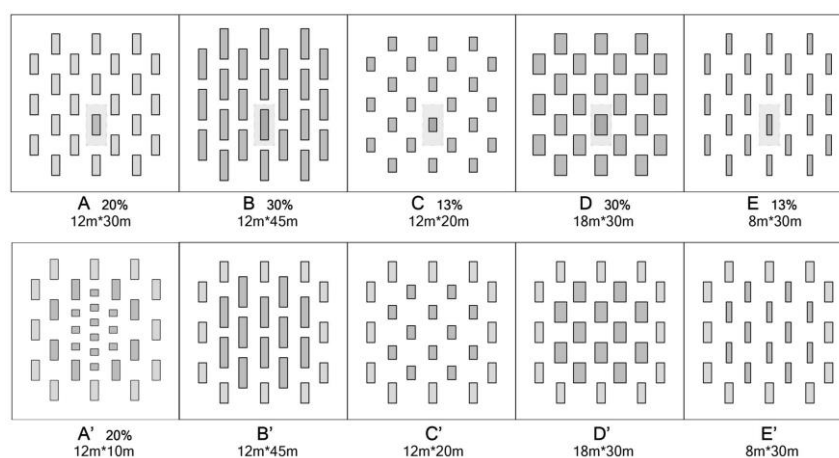


Figure 4. Models in plan with different building size configurations and densities.

By averaging the velocity rates (U/U_H) over all the central 12-building roofs in two evaluation altitudes, the differences among the different groups can be seen (Figure 5): (i) For the modification of fragmentation within the same space, the sum of wind potential over the roof shows less than before (between A and A'). (ii) For the models with different building lengths facing the wind (A, B, C and A', B', C'), the one with shorter length buildings (therefore a smaller density) has higher wind potential over the roofs. Moreover, the wind flow in central zone was greatly influenced by the peripheral buildings, as the change amplitude of the wind velocity ratio from group B to C is much larger than that from group B' to C'. (iii) Among the models with different building widths (A, D, E and A', D', E'), the differences of wind velocity over the roofs are very small, and the changing tendency is not clear. (iv) For the pairs of models with the same building densities (B and D, or C and E), the model with a smaller building length (B and E') has always a higher wind velocity ratio, that is to say, the impact of the building length is much more influential than that of the building width.

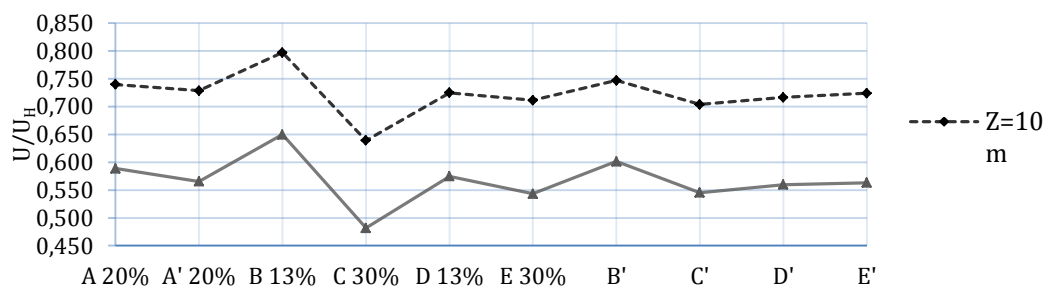


Figure 5. Average wind velocity rate for different building-size group models.

Impact of courtyard

To analyze the impact of courtyard on the wind flow, we considered six models with different courtyard configurations in partial or whole of the buildings for each group. The sizes of courtyards and different porosities (compared with reference group) were given (Figure 6). All the courtyards are down to floor.

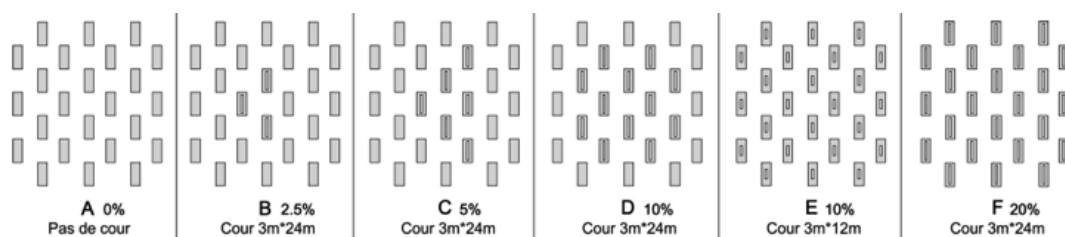


Figure 6. Models in plan with different courtyard configurations and porosities.

By averaging the velocity rates (U/U_H) over all the building roofs in two evaluation altitudes, the differences among the different groups can be seen (Figure 7): (i) Generally, the models with partial courtyard-buildings (B, C and D) are less windy over the roofs than the reference model without courtyard; (ii) Models with all courtyard-buildings (E and F) are slightly windier than the reference model without courtyard. In addition, the model with small courtyards and small porosity has a higher wind velocity than the one with big courtyards; (iii) Between the models with the same courtyard porosity (D and E), the one with all buildings installed

courtyards is much more windy over the roofs than the one with only partial building installed courtyards.

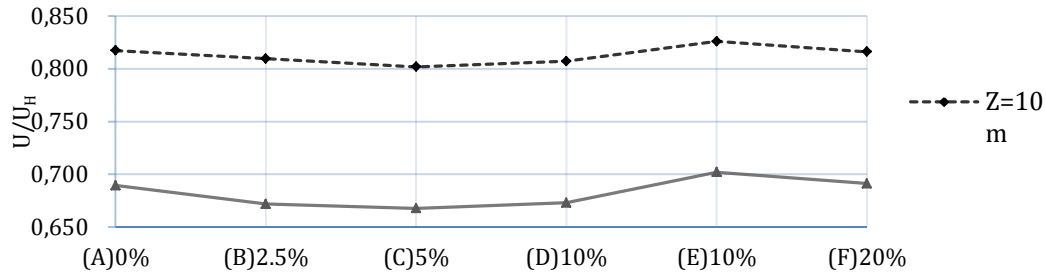


Figure 7. Average wind velocity rate for different courtyard group models.

Simulation of real urban tissues

Morphological indicators

For the issue of wind energy evaluation, we chose only some morphological indicators that have close relationship with wind flow. Hence, apart from well-known urban planning indicators like Building coverage ratio (CR) and Building floor area ratio (FAR), Average building height, rugosity, Porosity and Occlusivity are used for extra analysis. The definitions are given as follows:

- (1) Building average height, the average height of all the buildings in discussion.

$$\bar{H} = FAR * \Delta H / CR \quad (1-2)$$

where ΔH is the average height of a story, usually taken as 3 m.

- (2) Rugosity, a parameter to describe the roughness of a surface to resist the free wind. Absolute rugosity is the average obstacle height over the whole examined area.

$$R_u = \bar{H} * CR \quad (1-3)$$

- (3) Porosity (absolute), a ratio of the emptiness volume to the entire volume.

$$P_o = \sum_i V_o + k \sum_i V_c / V \quad (1-4)$$

where V_o is the volume of a open space (street, park, etc.), V_c is the volume of a courtyard, k is the openness coefficient of the courtyard and V is the whole canopy volume of the examined urban area.

- (4) Occlusivity, a parameter of the distribution of the built to un-built perimeter against height.

$$O_c = \frac{\sum_N (\sum_i L_b / L_o)}{N}$$

(1-5)

where L_b is the perimeter of a building in the horizontal section and L_o is the perimeter of the correspondent non-built area in the same section, N is the number of horizontal sections. (Adolphe 2001)

Here we choose three different types of urban tissue from three different cities of the world: Barcelona, Toulouse and Bombay. A community scale of 450 m * 450 m is taken for analysis (Figure 8). The information for each form case is given in the Table 1. The general initial conditions are all the same for the three and the validated simulation parameters mentioned above were applied. Local climates were neglected and a 360° round of inlet directions of every 45° were used for analysing an average impact of urban form on wind potential accumulation.

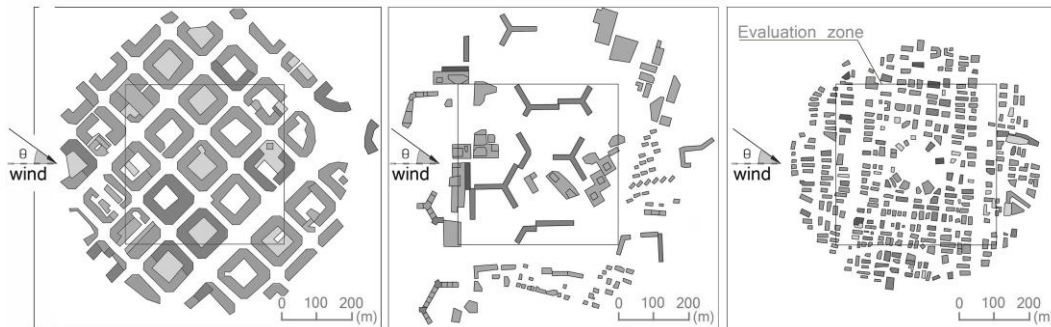
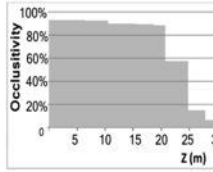
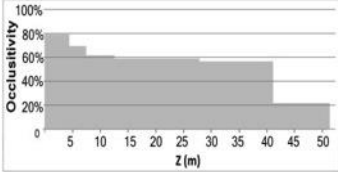
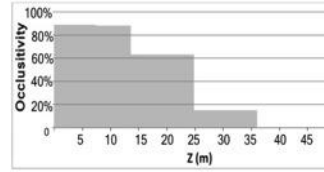


Figure 8. Different urban tissues in plan (from left to right : Barcelona, Toulouse, Bombay).

Table 1. Urban form information for each tissue

	Barcelona	Toulouse	Bombay
Urban form type	City centre core	Collective residential area	Individual building area
CR	56.87%	18.66%	22.08%
FAR	2.94	1.18	1.08
Average building height	18.1 m	21.0 m	16.0 m
Rugosity	10.3 m	3.9 m	3.5 m
Porosity	32.04%	68.26%	78.64%
Occlusivity (relative)	21.27%	26.71%	20.12%
Occlusivity (absolute)			

Simulation result and analysis

As the accessible wind-exploitation heights and areas for different urban tissues are all different, only comparison of wind intensity (as evaluated by the wind velocity ratio U/U_H) is not sufficient to describe the wind capacity of a certain urban tissue. Then, we tried to evaluate with another indicator: Total wind capacity. As we know, wind turbine power is given by the equation:

$$P = C_p * 0.5 * \rho * A * v^3 \quad (1-6)$$

where C_p is the coefficient of performance, ρ the air density, A the area swept by the blades and v the free wind velocity. Therefore, in our case, to evaluate wind energy, a simplified indicator M was defined as:

$$M = \sum_{i=1}^n (A_i * v_i^3 \theta) \quad (1-7)$$

where A_i represents the area of the corresponding velocity v_i . For the wind capacity of an urban tissue, here we only consider the wind potential at a certain height over the roof. From the code FLUENT the area-weighted average wind velocity on the defined planes areas over the roof of those wind-promising buildings (usually the highest buildings) can be found directly. In addition, with the corresponding planes areas calculated in the software AutoCAD, the indicator M for different urban tissue at the height $Z = 15$ m (15 m over the roofs) were figured out (Figure 9).

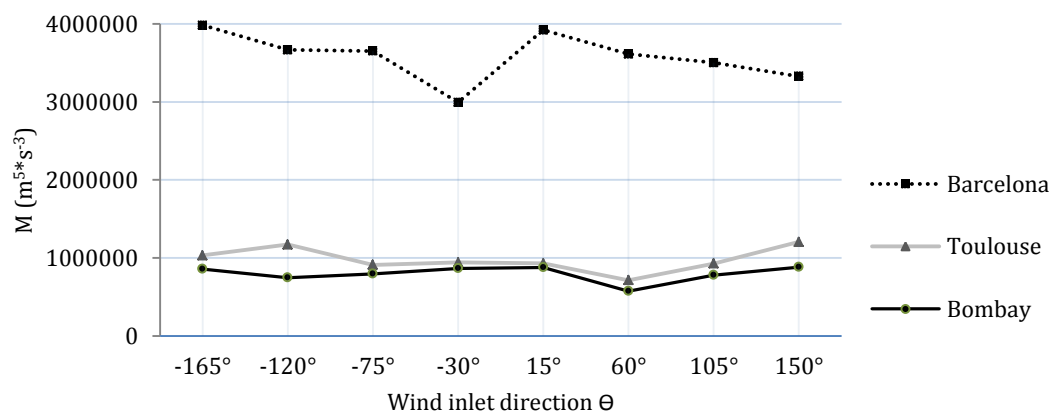


Figure 9. Comparison of wind potential capacity for different urban tissues.

From the Figure 9, it can be seen that: (i) 1. The wind capacity in the urban tissue of Barcelona is much higher than in the other two. This is due to the large gap over the accessible roof area and roof height. In fact, from the Table 1 we can see that the CR and FAR of the Barcelona urban tissue are both around 3 times of those of the other two cases; (ii) The wind performance from different inlet direction is clear for each cases: the best inlet angles for Barcelona case are -165° and 15° , while for Toulouse case they are -120° and 150° , and for Bombay the 15° and 150° ; (iii) The ratio of the amplitude to the average M value can be found out: Barcelona 28%, Toulouse 50% and Bombay 38%. In fact, according to the impact of urban morphology on wind direction, it reveals the different anisotropic properties among these cases, with the anisotropy level from high to low: Toulouse, Bombay and Barcelona.

Conclusion

Based on a parameter study with a reference wind tunnel experiment, the choice of turbulence model and other parameter settings of the CFD code are validated. Then the paper conducted a series of idealised models with a group of 24 buildings, in search for the impact of building size and courtyard on the wind energy layout over the roofs in the semi-urban environment. Main results include that: (i) the impact of the building length (facing the wind) is much more influential than that of the building width; (ii) the fragmentation of building form within the same space hinders the wind flow; (iii) to ensure a big sum of wind energy over the whole area, courtyard should be distributed evenly rather than partially. At the same time, the wind energy outcome shows no linear dependence to the courtyard size.

Furthermore, three real urban tissues were chosen for morphological analyse and wind potential evaluation. Results of different wind capacity values over different type of urban tissues and in different wind inlet direction, confirmed the great impact of urban morphology. Some macro character of the urban tissue like anisotropic property is discussed. For future work, more types of urban tissues would be considered and more morphological properties like porosity can be discussed for better contribution to the wind energy development in urban environment.

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Heritage, infrastructure, structure and urban form. Challenges for Brazilian historical cities and/or colonial matrix

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Abstract. *In this paper we propose to glimpse potentialities and challenges as a process and acquiring meanings for the construction of others and news practices related to what you can name common and also the uncommon. Taking considerations about the relationship between infrastructure and structure, the presence of collective educational equipments in the urban form with heritage sites, we propose to inquire the ways that the urban investments can and should happen to subsidize the sense of the common as the uncommon. How can conceptual delimitations and/or definitions of the territory, as heritage area limit and/or expand the fields of action? In which way can we apprehend, transform and reconstruct practices, uses and functions with distinctive and different parameters for the common sense? Which future and common in terms of urban morphology can we put as necessary and unpredictable? In Brazil, the challenges are related to the infrastructure and the urban structure on the measure that it would be the elements that can allow cohesiveness as urban quality. This is an attempt to indicate parameters to give an orientation to take decisions in the direction of the common and the uncommon future.*

Key Words: urban morphology, heritage, infrastructure, urban planning.

Introduction

This paper / essay seeks to relate the general theme of 21st International Seminar on Urban Form: *Our Common Future in Urban*, with the specific theme *Multidisciplinarity in urban morphology: The formation of new areas of knowledge* and also to research, education and extension works we developed in the last five years.

We believe it is important to point out that since we start our studies in Urbanism (PROURB / UFRJ) and Urban and Regional Planning (IPPUR / UFRJ), our approaches have been directed towards multidisciplinarity, thinking about limits and challenges not only as theoretical but practical and therefore real.

Another pertinent question to be placed here is about our professional and academic experience that have been displaced from large scale (Metropolitan, Rio de Janeiro / São Paulo axis in Brazil), triangulating towards vector internalization southeast toward Belo Horizonte, for the medium and small scales, although considered regional scale (Brazilian and also the state governamental one) by we became professors at the Architecture and Urbanism Course at the Federal University of São João del-Rei¹⁷² in Minas Gerais. This change of scale-space-time show problems in complete different points of view, notably the real and particular ones of the city and the region.

¹⁷² Course implantation with beginning in 2009, we serve coordinating (ATA-UFSJ) and engaged with Groups (LAUS and OBEDUC) in Research Projects involving multidisciplinary themes related to urban and public spaces, as well as thematic studies of form and urban relations via guidance for the production of different surveys and preparation of unpublished reports on SJDR, both associated with the teaching, as with the extension projects.

Taking into consideration the relationship between infra and structure, the presence of collective educational equipment in the *urban form* (Panerai, 2009) with heritage sites (Choay, 1988, 2006), and their preservation and transformation, we intent to raise questions on the *ways* (Nascimento, 2009) that the urban investments can and should happen to subsidize the sense of the common as the *uncommon* (Pietromarchi, 2005).

The diverse experiences and practices of urban management can contribute as parameters to think about how to proceed in this direction. However, based on our studies, including some conducted on specific SJDR sites, we understand that it is not just playing with unquestionable practices and processes, but rather develop tools and instruments to contribute in fact to the quality of life of the population, as with the urban morphology.

These factors, inseparable in our view, could contribute towards thinking about the city and its intersectoral issues. Thus, we ask:

Which future and common, in terms of urban morphology, can we put as necessary and unpredictable?

Another inevitable approach proposed here concerns the interrelation between urban and cultural production, between *action* and *work* (Arendt, 1972; Nascimento, 2009), and accordingly, forms spatiotemporal *structured* and *structuring* (Bourdieu, 2002) and therefore, infra and structural.

Regarding the methodological question of scope developed here we start from morphological debate associated with that presented by Lefebvre (1995 [1966]) on *formal logic*, as well as a selection of authors from diverse disciplinary fields, in order to contribute to a multidisciplinary approach to spatial question (CHOAY, 2006) still in process, not only in our studies but also for approaches that seek to extrapolate and reevaluate such notions in a formation field – multidisciplinary - (Panerai, 2009; Bourdieu, 2002; Krauss, 1984) and bringing further contributions to enable the theme proposed herein.

This way, we propose to glimpse potentialities and challenges to be faced as a process and acquiring meanings for the transformation and the construction of others and news practices related to what we can name the common and also the *uncommon*.

Heritage

As we understand the historical question does not restrict the shape of the city, but imbricates by practices that, appellants, can transform and rebuild the uses and functions in the cities that are beyond the scholars' ones. In which way can we apprehend, transform and reconstruct them with distinctive and different parameters for the common sense?

Thus the heritage question to be crossed by debates that go beyond *levels* and *dimensions* (Lefebvre, 2008) formal and spatial suggested by *letters* and patrimonial practices, which produced mostly in developed countries, eventually approaching the theme of virtually unfeasible mode on your whole, especially economically (Harvey, 2013).

Choay (2006) reinforces what we understand about the aspects and qualities of form, which remain to be desired on spatial values in everyday life. Thus, studies of urban morphology continue to have effect (Panerai, 2009) not only for their technical character, but especially by those speculative, not in the financial sense, but analytical and purposeful.

In fact the issue of Brazilian cities that arises is adversely and simultaneously in construction, given absences and distances between theories and practices, between formation and apprehension, between public policies and management.

The speed of change in the urban form is disparate in relation to political and cultural debate in recent decades in Brazil and is not synchronized and much less associated with positive changes. Even the creation of forums for heritage debates not yet cover a broad and coherent manner, either by training distances, by practices and oversight.

By stating that there was a direct relation between the action, the work and the product Hannah Arendt (1972) lead us to understandings about the senses of action from critics and

doubters placements. Using the *distinction* and the *direction* of actions, Arendt tell about the differences concerning the consumption and the expression from the senses of actions, of memory and the subjective investments.

Thus, attempts to preserve in SJDR end subject and related only to the shape of the buildings and their interiors, without considering broader urban and spatial aspects - related to the built area on the lot, the relations established between solids and voids, forms and content¹⁷³, which also correspond to the time-space questions.

How conceptual delimitations and/or definitions of the territory, as heritage area, can limit and/or expand the fields of action?

Urban Form

The question of urban formal logic / morphological in this paper seeks to address the multiplicity of possible and able relations to allow dialogues between different urban areas: central, transition, and expansion of the urban edges, because they all belong to the urban form and if that is not clear, there could bring about many mistakes.

Studies carried out over the city of Sao Joao del-Rei generally have almost exclusive visions about its historical centrality, under a nostalgic ideology, which was lost, somehow throughout the twentieth century and, as if it were a unique temporality and exclusionary related to the colonial matrix of Portuguese origin. Despite all attempts at preservation in the city, these are limited to the historical center and emphasize fleeting urban readings, and that does not even include any guidelines or debate about the intangible.

This understanding of what takes place on and in the historical city and its shape is not repudiating the meager attempts to rescue significant cases. However, it ends up being restricted to a matter of class and / or elite that invests to possess the means to maintain assets. Actions developed by the city managers organs to meet the different levels and dimensions of the problems correspond to isolated attempts and staggered by the lack of data, studies and by not being configured as projects, plans or government programs.

Thus, the urban form when restricted to its historical centrality and exclude other spacial temporalities and temporary uses ends up losing indispensable qualities of the common.

Understanding¹⁷⁴ and imagining studies of urban form associated with planning are able to add other parameters to formal. They are geared to meet both legislative deficiencies, as the practices and which relate to other inputs such as socio-economic-cultural basic data, urban density and registration (enrollment) permit match the plural circumstances present over time in urban structure, and may in fact contribute to a broader and more comprehensive joint.

On the Brazilian case and its historical cities, we understand that the challenges are related to the infra and the urban structure on the measure that it would be the elements which can allow cohesiveness as urban quality. It isn't just about quantity, but also about qualities, in a lathing between time and space (Rossi, 1988; Argan, 2005).

Infrastructure and structure

The separation between infrastructure and structure is not out here on purpose. It has an immediate-mediate and / or progressive-regressive intention of moving both exposed by Lefebvre (1995). We understand that the terminology composed infrastructure is precisely its interconnection and / or juxtaposition of complementary issues. However, we understand that as

¹⁷³ The debate about the relation form-content appears both in our dissertation, as in the article written for the PNUM 2013.

¹⁷⁴ Observations on the experiences acquired during the period from 2010-2012 in which we operate as a representative member of the UFSJ in the City Council Preservation on Cultural Heritage of São João del-Rei.

separate categories, they remain virtually treated in urban reality of Sao Joao del-Rei, contributing to the senses brought to their understandings. They could be treated alone at first, then to be reconnected and therefore practically transformed.

It is a process of reframing, and hence, formation, auxiliary to what relates to what refers to the structure as a basis, and the infrastructure associated with the above, or to what outside or on the surface would relate to buildings and equipment intended for use and functions of the collective (Choay, 1988).

In the relation of infraestrural question in Brazil, we understand that the precariousness and the improvisations even with legislative efforts and instrumental approaches for updating qualitative and quantitative transformations, still necessary in large scale.

Thus, the debate proposed towards the Right to the City (Lefebvre, 2001; Harvey, 2013) remains today, especially in what corresponds to the urban and existing centralities, as well as other, not recognized, still in process and / or under construction, even without local planning and / or immediate needs.

Concerning the position of the central location of certain associated community facilities to public spaces, it is important to bring to the debate a case study of one of the first public schools established in the city of SJDR, located in the historical fabric.

As structural and structuring element of urban space it could serve as an educational parameter both for their formal, spatial and property aspects. However, what might serve the most expensive formation of intentions through comprehensive education, to be devoid of its qualities and mischaracterized spatially contributes only in its most primary sense: as a place of shelter.

Relation to equity, infrastructure and urban form is treated as a separate thing, we hardly chance for some less common and very unusual, especially in cities, for its historical richness, still preserve memories, tangible and intangible, in shares, plural times and spaces.

Challenges for Brazilian historical cities and/or colonial matrix

Regarding challenges for Brazilian and / or colonial matrix historical cities, due to distance and the gap between rights and duties (Nascimento, 2011), between theory and practice, between infrastructure and structure, these are many.

Our approach is *tentative* (Bourdieu, 2002 ; Lefebvre, 1995) to indicate parameters that add time and space, that means to give an orientation to take decisions and, finally, of practices that can be in the direction of the common and the uncommon future, because it's not done yet.

In addressing urban and local-global issue, not global-local, we believe pointing directions and questions about weights and values that different in its various scales and speeds allow, if placed on the agenda, scroll and break with hegemonies.

There it comes, bearing simple challenge, but above all, necessary utopias (Ribeiro, 2005; Lefebvre, 2008). Utopias as answers to consider the actual and possible (socio-economic and cultural) in the plural sense, spatial, urban, common and unusual qualities.

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Morphological structure and system of community facilities

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Abstract. *This article focuses on the relations between the Morphological Structure and the System of Community Facilities at several scales of the human form, seeking the understanding of connections and possible interdependency between the two systems. Starting from the conceptualizations of Urban Morphology and System of Community Facilities discusses the case of the city of Navegantes in the coast of the State of Santa Catarina, southern coast of Brazil. In regards the said city, one can identify that the understanding of its formal structure related to the system of community facilities leads to the deepening knowledge of its present urban form and future possibilities. Furnishes both the verification of its spatial patterns in several scales like listing situations and locations where new community facilities and spatial patterns would potentially be capable of establishing new and qualified relationships between different scales. From one side one would have better conditions of attending the basic needs of the population, in which the devices are essential providing, possibly, an increase in the quality and vitality of urban life. Of another, it would strengthen urban structure, able to potentiate the permanence of meanings and identity of the city.*

Key Words: *Community facilities, urban morphology, city of Navegantes.*

Understanding the urban morphology

The importance of urban morphology and its verification is acknowledged by the majority of scholars of urban form. But the conceptions of what a morphological study is are not coincident, but the conceptions of what a morphological study do not coincide, there being a diversity of definitions and understandings on how to approach the form on which elements should be studied, and on which are the possible and necessary analysis for the recognition of shape.

The morphology one can say is initially related to what is seen - to the appearance - or by what our visual perception appropriates on the immediate level, since the shape is what first, generally, amazes our senses. This seeming aspect of things refers to an arrangement of objects, a pattern or structure or formal organization that can be interpreted and where we can identify the presence, the potentiality and capacity for social life.

We highlight our understanding of the city as one of the most important patrimonies and property of the material culture which in its great inertia acquires social factor conditions, and not only a result or consequence. The permanence of forms is crucial on this issue, by being one of the most remarkable features of form phenomenon, which makes it also be, an agent in the relation between crystallization and Changeover of social life. The city, seen as asset of material culture, is a structured form, where situations and places - with different durations - compose the dynamic (and the tension between) of permanencies and changes that creates and recreates the meanings and identity of the city. In the analysis and in the city intervention, understanding it as in a constant and dynamic social process, the form cannot be seen as an isolated phenomenon, because, historically, it is both a consequence and factor of evolution or transformations.

‘For the definition of the scales and the elements to be investigated, and at last, for the understanding of urban form, one should understand it as an extensive phenomenon and, at the same time, with local occurrences, from which elapses the morphological study on the global scale and on the scale of parts and, furthermore, one must consider the growth issue and historical development.’ (Assen de Oliveira, 1993: 24)

In the range of this essay, we embrace the study of morphology and identification of morphological structure through the study of relations between emptiness - the natural elements, the trace, the micro and macro subdivision and full - the buildings, their typologies, uses and collations, in order to identify the morphological structure of the city and speculate its relations with the location of equipment.

Thus, at the survey conducted that provides support for this essay, on the study of relations between morphological structure from the City of Navegantes, located on the south coast of Brazil, and community facilities it was used a methodology for morphological basis, denominated "Method of Apprehension of the city", developed by Professor Dr. Silvio Sawaya, in 1991. The choice to this method came from the premise of a method that enabled morphological analysis, without leaving aside other essential issues to the understanding of the city - Usage flow laws, regulations, appropriation and meaning.

This way, the method gives support to the morphological analysis, allowing a work of thorough research, focusing on the community facilities system, spaces that are seen as permanent in the city. The application of this method permitted, in the first moment, an analysis throughout the understanding the four layers that compose it: morphology, permeability, legitimacy and fundamentality to, in a second time, as a result of the crossing of layers previously studied, listing situations and locations where new community facilities and spatial patterns would potentially be capable of setting up new and qualified relations between different scales.

The implementation of the method of Apprehension of the City starts from the premise of the relation between the part and the whole, where the whole is not the simple sum of its parts, but on the contrary, they both contain themselves. Furthermore, it is argued that it is from within that one can visualize the set with greater clarity. The case of the City of Navegantes has had the understanding of the morphological structure of the city on its "whole", and the in-depth study of community facilities in the "part", comprising the subsystem for education equipment.

Understanding the system of community facilities

Aymonino (1975:49) presents the buildings as community services designed to meet the needs shown by the services, in other words, the specific needs of a particular society. Additionally, the emergence of equipment is in its relation to the services, since these two variables should not be analyzed separately. Meanwhile, these needs vary over time, according to the particular interests of such society. These amendments are connected to the transposition of a need or individual interest in collective, as one can also claim that the inverse is true.

Aymonino (1975:47-48) brings the definition of services proposed by GESCAL¹⁷⁵ center, however, argues as more pertinent the definition for services that brings the Italian Encyclopedic Dictionary, in which public services are divided solely on special and general services. Special services are defined by individual benefits that are paid by each user individually. Now general services have the concept of the collectivity in which the services are funded by taxes from such community.

It seems, therefore, more logical to set as service all appropriate elements to satisfy different human needs in a certain society, introducing, in the first place, a distinction by private or public qualification, thereby establishing a legal reference of the forms of property, appropriation and management. (Aymonino, 1975:49)

In Brazil, the subject of typification and definition of Equipment is treated in rules and legislations. The Rule NBR 9284/86, entitled Urban Equipment, defines them as being "todos os bens públicos e privados, de utilidade pública, destinados à prestação de serviços necessários

¹⁷⁵ GESCAL Laboratoty (Gestione Case Lavoratori), considers community facilities elements defined by its public character. This characterization brings the subdivision of the equipment according to the needs they aim to satisfy. (Aymonino, 1975:47)

ao funcionamento da cidade, implantados mediante autorização do poder público, em espaços públicos e privados.”¹⁷⁶ The rule does not distinguish urban from community equipment; it treats them as "urban facility" and subdivides it into a few categories and subcategories, according to their function.

The Rule NBR 9284/86 proposes the categorization of the equipment in: Circulation and Transportation, Culture and Religion, Sport and Leisure, Infrastructure (Communication Systems, Energy System, Public Lighting System, and Sanitation System), Public Safety and Security, Public Management, Social Assistance, Education and Health. Likewise NBR 9050/2004, revised in 2005 laying down criteria and technical parameters that must be observed on conditions of accessibility to public places, it also treats the equipment in a unique way, as Urban Equipment. Torres (2000) also adopts the definition of urban equipment, not to mention the term community facility, as the material support for the provision of basic health services, education, security, sport and leisure.

The Federal Law No. 6766/1979, in its Chapter II brings a distinction between community facilities and urban facilities. The Article 4º, 2º Paragraph, defines community facilities as being “os equipamentos públicos de educação, cultura, saúde, lazer e similares”¹⁷⁷. Article 5º, Single Paragraph, considers as being urban facilities “...os equipamentos públicos de abastecimentos de águas, serviços de esgotos, energia elétrica, coletas de águas pluviais, rede telefônica e gás canalizado”¹⁷⁸. The Federal Law 10257/2001, known as City Statute (Article 2), employs the same categorization about guidelines on Urban Policy, “...oferta de equipamentos urbanos e comunitários, transporte e serviços públicos adequados aos interesses e necessidades da população e às características locais”¹⁷⁹.

Besides these conceptualizations of urban and community facilities, Célson Ferrari (1977:417), characterizes as equipment material spaces that materialize the institution. So, to the author, the areas of urban space occupied by the material equipment of the institutions are referred to as institutional urban land uses¹⁸⁰. It is observed that, even though the legislation, at least since 1979 set as urban facilities only those from urban infrastructure and, as communities, the equipment for collective use by the community, Brazilian Association of Technical Standards makes no such distinction. Yet, unanimously, the authors consulted distinguish between infrastructure and community facilities adopting the term "institutional use" proposed by Ferrari (1977).

Exploiting the facilities location in the morphological structure of the City, Panerai (2002:215) states that the program definition depending on terrain must incorporate, beyond quantitative issues, such as volumes and distances, issues regarding to hierarchy to the city in relation to the immediate surroundings, with accessibility, in other words, questions concerning the monumentality and limits. Gouvea (2008) adds that “Equipamentos comunitários são elementos essenciais para o funcionamento da cidade. Sua localização na malha urbana deve obedecer a uma relação de uso (cotidiano ou eventual) [...]”¹⁸¹.

Aymonino, already in 1975, showed concerns about the location of community facilities at the city structure, with exposition of the concept of "edification typology" in its relation to the urban form as a guide for the insertion of these facilities location in space. The analysis field of

¹⁷⁶ "All public and private properties, of public utility, for the provision of services necessary to the functioning of the city, implemented upon authorization of the government, in public and private spaces." (translation of authors)

¹⁷⁷ "public facilities for education, culture, health, recreation and similar" (translation of authors)

¹⁷⁸ "... public facilities of water supply, sewerage services, electricity, rainwater collection, telephone and piped gas network." (translation of authors)

¹⁷⁹ "... supply of urban and community facilities, transportation and public services suitable for the interests and needs of the population and local characteristics" (translation of authors)

¹⁸⁰ Celson Ferrari divides institutional uses in: Education; Social, cultural and cultural; Recreational or leisure; Administrative.

¹⁸¹ "Community facilities are essential elements for the functioning of the city. Its location in the urban area must obey a relation of use (daily or occasional) [...] ". (Translation of authors)

the concept formation "edification typology" displayed by Aymonino (1975) takes place from the eighteenth century, period of the industrial city (capitalist-bourgeois) that constitutes the matrix of the contemporary city. (Aymonino, 1975:96). The study of the slow process of activities characterization allows to identify origins of what was defined by Aymonino as community facilities, and the emergence of new necessities - determined by economic, political and social development of a society historically defined, bourgeois society - that over its development convert into organized and socially necessary activities.

When these activities reach in their organization, a more complex and articulated stage, with the tendency of turning into permanent activity, in other words, stable over the years, there is a need to define a suitable space, able to consolidate and develop certain activities through the same architectural expression. Only then one can speak of equipment, such as the original nucleus of the modern "edification typology" non-residential character (Aymonino, 1975: 97 and 98).

When addressing on typology, its concept and formation, Aymonino (1975) adds that a very positive aspect of modern functionalist movement was an extension of the thematic related to residential relations, as a way to address the problems of flow, and function. Now the buildings facing the community facilities need, the author argues, to transcend the issue of typology and be conceived in accordance with the surroundings is to result in an architecture that stands out or simply shapes to the existing, but mainly incorporating cultural and symbolic characteristics of society and location.

On the typology Argan in 1963 already envisaged that the type is materialized in the reduction of a complex of formal variants on a common basic shape.

By having the reduction of formal variations to a basic form to suit certain activity the building is disclaim of all symbolism and identity, even considering that the creation of the type is the synthesis of a complex of ideological demands or practices related to a certain historical situation in a given culture. Priority is given to meeting the needs through the activity such edification will perform. These considerations are of great value so that the insertion of community equipment has not been referenced only to the preconceived architectural typology, but the issues related to structure of the city, the relationship with the immediate surroundings, to its accessibility and potentiality of appropriation and meaning.

Contextualizing the City of Navegantes – SC

The city of Navegantes is located in the Micro-region of Itajaí, and form a continuous area of urban occupation and socio-economic logic that makes it highly representative, both regional and national (Figure 1).

The recent growth in the region, especially after the 1990s, understood as a reflection and social condition of the duplication of BR-101, influenced so that Navegantes International Airport became the second passenger terminal of the State. And, according to Infraero and information obtained at City Hall, the airport has already a project for its amplification and 70% of the necessary area already expropriated. The city also received a major investment with the implementation of the port terminal of Navegantes in the opposite bank of the port terminal of Itajaí.

The city has twice the population of the State cities average, corresponding to more than 60 thousand inhabitants by the count in 2010, which places it in 20th place, with density of 543.29 inhabitants / km², in addition to placing, in the period of 1991-2000, it has become the fourth city with largest demographic growth of the State, way above even the Brazilian average growth, explained by the recent implementation of the port terminal and industries of cutting edge technology connected to logistical issues brought by the Port.



Figure 1. Area of Urban Occupation in the Micro-region of Itajaí.
Source: Schäfer, 2009.

The data of population growth in the State of Santa Catarina show a large growth in the period 1991-2000. In the period 2000-2010, as predicted, but not as rapid as verified in the previous decade. However, even with the annual growth rate reduced and stabilized, the city of Navegantes presents an annual growth rate of 4.41 %, indicating a tendency of the city's population more than double, in the year of 2030 (a period of 20 years), reaching more than 143 thousand inhabitants.

The city of Navegantes has great economic representation, with a high GDP and a growing population rise. Though, it presents a Human Development Index extremely low compared to other cities of the micro-region and, even, nationally. The low level of human development can also be explained by the data on poverty in the city. The incidence of poverty in the city of Navegantes, according to IBGE (2010), shows very high, including if compared to other cities in the State of Santa Catarina, being the fourteenth city with the highest rate in the order of 38.20%. Compared to the cities of its micro-region, it is a city with the highest index. Thus Navegantes presents demographic rates on the rise, an extremely representative economic profile in its micro-region, but it has a condition of extremely low medium human development, indicating little income distribution, little longevity and low indexes of education.

The period that understands the evolution from 1970 to 2000 the city of Navegantes accrued an evolution of 80.8%. The biggest step forward was recorded in income dimension, than the same period grew by 215.7% and the lowest evolution was registered in education dimension, which grew by only 48.4%. This condition heeds to the understanding of the system of community facilities, with emphasis on education subsystem and its intersection with the morphological structure of the city.

The crossing of morphological structure system with community facilities

The structure of the city of Navegantes is verified with the aim of identify, fundamental areas in its configuration, containing the relation between permanencies and changes. The fundamental and most enduring components represent the structure of the city and, usually, are related to spaces for common use or the symbolism and identity that may be acquired to people and city residents.

“Toda realidad puede ser estudiada por meio de su estructura. La ciudad es uma realidad compleja: um hecho, uma experiencia e uma ideia. Es historia y proyecto, forma, lugar, lenguaje y cultura. Todos estos aspectos también pueden revelar su estructura.” (Munizaga Vigil, 1985 apud Munizaga Vigil, 1998:27)

When applying the method of Apprehension City, it was identified that the main structural morphological elements of the city, are: the conditioning of the hill covered with vegetation, the line of the Atlantic Ocean, the serpentine line of the river and constructed elements, airport and port (Figure 2).

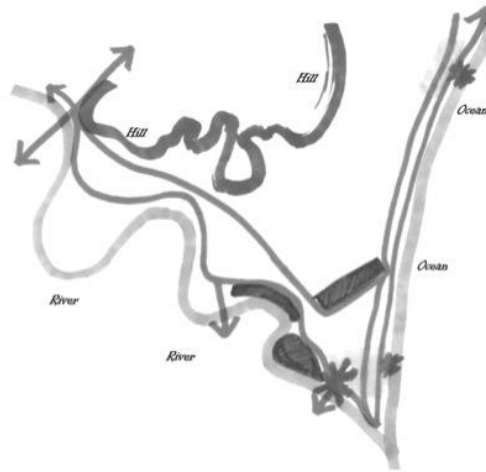


Figure 2. Schematic Morphological Structure of the City of Navegantes.
Source: Authors.

These elements seem to organize the growth of the city, representing the trend of expansion of earth built, which in turn seems to have the same logic of the growth of centralities. These elements seem to organize the city's growth, representing the expanding trend of the built mass, which in turn seems to have the same logic of the growth of centralities, the direction of flows and including the possible expansion logic of the system of community facilities (Figure 3).

It being the main elements that structure the city, represented in Figure 2 that reflect the morphological structure, summarizes other forces of fundamental importance for the city. (See Figure 4) The key elements are generally related to spaces of common use, and thereby the centralities-recognized as capable of containing the diversity and superimpose flows, uses, activities, people, cultures- show themselves as places where collective happens and ownership is recognized, even in Navegantes, at centralities are present the community facilities.

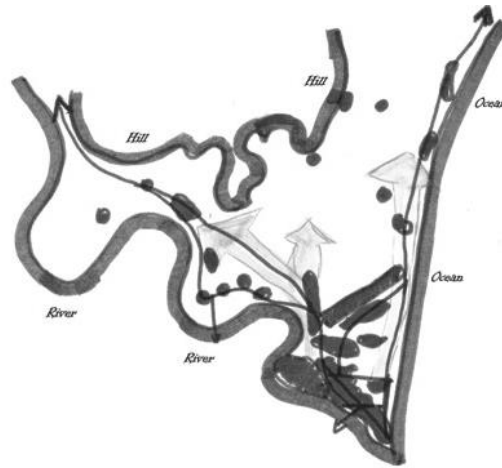


Figure 3. Schematic Axes of concentration of community facilities and possible expansion logic. Source: Authors.

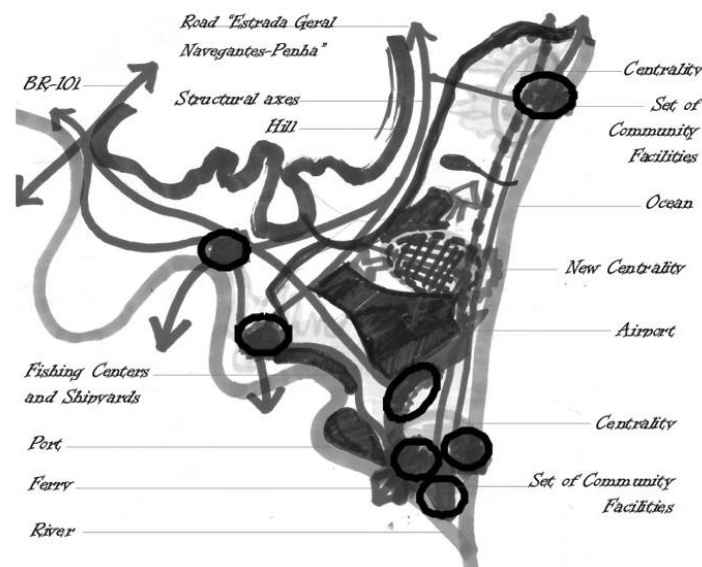


Figure 4. Synthesis of the City Structure. Source: Authors.

The forces of fundamental importance to the city of Navegantes and, therefore, structural shape of space are related to morphological configuration. These forces are:

Natural elements

In the case of Navegantes, Itajai-Açu River, the hills and the Atlantic Ocean are the major natural elements that, apart from being structuring elements and conditioning of the landscape, play an important role for local identity and symbolism. The city has emerged on the banks of Itajai-Açu River, which served as basis for the livelihood of fisherman families that lived there and, currently, this natural element supports the development of fishing industries, shipyards and the port which provide the city one of the higher gross domestic products of the state.

Moreover, the river also provides the city an extremely distinguished landscape by its serpentine motion, which is reflected in the urban occupation area. Itajai-Açu River is an element of the morphological structure, for permeability and also due to these historic features and presented identities.

Navegantes, when bathed by the Atlantic Ocean, gives rise to a waterside leisure and entertainment. The boardwalk built by the sea, along with the equipment that supports this axis, is the main attraction, for both tourists and locals.

Existing centralities and a New Centrality proposed by the current Director Plan

The superposition of scales, flows and uses provide to existing centralities a character of dynamism and enrichment of public space by the diversity of activities being developed there. All existing centrality are arranged by a main shaft, of morphological importance as well structuring the morphology, from which it has been branching along the same track or others connected to it.

Among the verified centralities stands out Downtown, besides the importance in the uses and flows of the city, also possesses characteristics that legitimize its importance in the city scale by the symbolic and identity character representing the citizens of Navegantes. In it are encountered the Square and the Church of Nossa Senhora de Navegantes and the main waterway crossing to Itajaí, town south, through the Ferry.

All existing centralities, besides being under axes of the city morphological structure, contain local scale of community facilities, the neighborhood and regional. The proposal for a New Centrality, by the City Master Plan, strives to overpower the discontinuity of the city urban occupation by reducing the vacant urban areas and, in this way, provide a positive gradation of the built area to natural elements. Another fact that reinforces this New Centrality and asserts itself as a very interesting alternative for the development of the city, as with the expansion of the airport that currently seems to be an accomplished fact (since more than 70% of the area is already expropriated) could create a large segregation between the northern and the southern part of the city.

Ferry, Square and Nossa Senhora dos Navegantes Church

The form has permanence degree higher than the uses and flows, however, some equipment, especially when pegged to public use, show themselves in the city structural areas, also due to its symbolism, they are: Nossa Senhora dos Navegantes Square, along with the church and the Ferry. They are equipment at the scale of the city of Navegantes representing its founder center and, the crossing through the Ferry, coming from Itajaí, the square and the church are landmarks of the space.

At Nossa Senhora dos Navegantes Square, are developed activities and events as Carnival and religious festivals that attract every year thousands of tourists to the region and state.

Port, airport and fishing and shipyards activities

The port and airport condition the urban occupation in Navegantes, are elements that morphologically present major vacant urban in the area. Are mobility equipment of national and international scale which provide great visibility to the city and high economic indexes, and optimize labor supply for citizens of Navegantes.

The tracing and Mobility Axes

BR-101 is a constructed element that has high degree of permanence in the system, as it has territorial scale. Other axes of the trace, with regional scale, form a connections system that promote north-south and east-west links of the city with its neighboring towns, as well as the centrality system and the urban and community facilities system within the city. The degree of permanence of these axes is elevated for being collective use and, mainly, for being public domain, materializing in spaces of way, of living, experience and socialization.

One highlights the importance which tends to take the Estrada Geral in Navegantes - Penha in the new structure that will incorporate the city with the expansion of the airport and the materialization of New Centrality. This route will hold the north-south flow in equal capacity, or perhaps larger than Beira Mar Highway.

Community Facilities System

The Community Facilities System is associated to centralities and is found at the main axes of displacement of the city, which represent the morphological and permeability structure of Navegantes. The sets of Community Facilities System, mostly, have at least some subsystems of uses of such equipment. Subsystems of education, social institutional, health, safety and public administration and leisure are found.

The approach in two educational institutions of the city strove for discussion of community facilities facing towards the inside and with little or no relation to the street public space. The connection between the equipment and the public space of the street is restricted to determined schedules for the ending and beginning of classes for students entering the institution and no longer keep in touch with public space. Being understood that in class schedule contact should be restricted to not disperse students' attention; however in situations of socialization one would be able to have the expansion to public space (Figure 5).



Figure 5. Images of students exit of Elementary School "Prof. Irene Romão": Appropriation and socialization in public space. Source: Authors (2012).

The sizing of Community Facilities from the radius of coverage is a first step to knowledge of the possible influence that equipment provides on the city area. But one must consider, in a second stage, the morphological features, especially the city layout, are of fundamental importance to check whether the equipment can really meet to the radius of influence, as well as the density of the locality. In the case of Navegantes, the parceling is perpendicular to Itajaí-Açu River and Atlantic Ocean and this feature evidences few connections in north-south direction. This condition is a characteristic that should be taken into consideration, primarily for leasing of local-scale facilities, like health centers and kindergartens.

Places of permanence as a basis for the implementation of the community facilities system

The understanding of the city structure, primarily morphological, but also in its relation to the permeability and legibility, synthesized by permanencies and changes, point out the of community facilities system as possible and important protagonist of the city of Navegantes. With its deployment the one hand one would be able to have better conditions of service for the basic needs of the population, in which the devices are essential providing, possibly, an increase in the quality and vitality of urban life. On the other hand, to would strengthen urban structure, capable of potentiate the permanence of meaning and identity of the city.

It is acknowledged the capability that equipment plays attracting people in different scales. Thus, it recognizes that there may be protagonists of public spaces and induce the greater

vitality of the place, but with a few caveats. It is done a merge of activities and uses, as each subsystem of community facilities schedule, which is often defined, on the basis of its complexity.

Understanding the centrality as spaces of permanence in the structure of the city of Navegantes, it is claimed that they provide the articulation between the built environment and the natural environment and, likewise, the implantation of community facilities system, as protagonists of different public spaces which develop at different levels of centrality, are likely to promote reaffirmation of the city morphological structure.

At central areas of Navegantes, can concentrate the equipment designed for the city scale in its different categories of uses, since it is recognized that sociability and the incentive to appropriation of public space occurs with the mix of the equipment activities. Nearby the natural elements have emphasis on large parks with culture activities, leisure and sports, and can meet the festivities of Nossa Senhora de Navegantes and Carnival, admittedly symbolic events and activities for residents.

Setting out a parallel between community facilities system and centralities, it results in a scheme that demonstrates that at maximum occupancy of centralities of Navegantes could develop equipment on the scale of the city and in the same way at the rarefied occupation, on the transition with the natural environment, they will develop the equipment on the scale of the city, including regional. In what represents the core between the maximum occupancy of the centrality and rarefied occupation, on the banks of the natural elements, the equipment would be on the scale of the neighborhood and location.

As it is understood that the rarefied occupation will be related to the natural elements of the city of Navegantes, this condition of occupancy of community facilities system will provide the contact of citizens of Navegantes with both centrality of trade and services (using equipment on the scale of the city as hospitals, cathedrals, administrative uses) as well as city contact with natural elements (with the use of equipment on the city and regional scale, as urban parks, sporting venues, cultural facilities) (Figure 6).

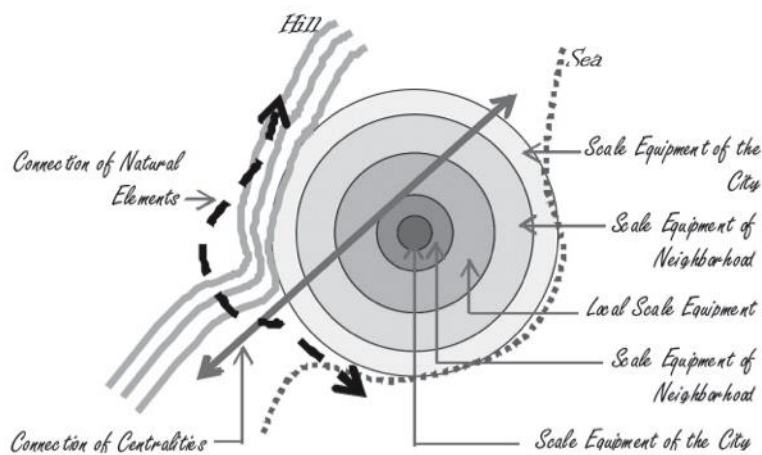


Figure 6. Relation Scheme Centralities x Scale of Community Facilities. Source: Authors.

The opportune places for deployment of community facilities are located along the morphological structure of the city and necessarily must contemplate the mix of trade / service activities, with the residential use, adding up the attractiveness of several subsystems of community facilities (education, health, social, administrative).

It is important to underline that the implementation of community facilities, can strengthen the identity and the promotion of sociability, that almost always associated to the existence of community facilities, such as places Secchi (2003), and that, in its turn, these community facilities (hospitals, cathedrals, schools, markets) are shown as space affirmation of public

space. Besides reinforcing the identity, the community facilities implementation, configured from the structure of permanencies the city of Navegantes, can also be understood as the possibility of providing more representative indexes of Human Development to the city and as an alternative to provide living spaces with urban quality.

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Housing development transformation: political directives and post-occupation life

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Abstract. *The housing policy adopted by the Belo Horizonte City Council over the last 20 years has produced housing parameters that have resulted in standardized buildings grouped together into housing estates. Although conceived and designed by architects, the construction of these buildings does not follow the premises on which policy and project are based. The process does not take into consideration the often accentuated differences in land characteristics of both shape and topography, resulting in large differences between built areas and open spaces. Despite free spaces being large because of pronounced gradients, they are not primarily destined for collective use, but rather they are used to make adjustments on the estates in the form of embankments and green areas. As these housing developments are occupied, the open spaces are transformed and buildings are isolated by fences and walls, compromising permeability, circulation and the internal landscape. In addition, the few spaces attached to the housing projects are used privately by ground floor residents who close them off completely. These manifestations underline the lack of articulation between the parameters dictated by the housing policy and the appropriation desired by the residents. This article intends to investigate the coherence in the relationship between the adopted housing policy and the housing development projects under analysis and will examine the transformations that have been taking place in the post-occupation process.*

KeyWords: *housing policy, project, transformation, housing*

Introduction

This article focuses on the research, "Open spaces in housing projects in Belo Horizonte (MG)", carried out by the Landscape Laboratory at the Architecture School of the Federal University of Minas Gerais (EAUFMG) and sponsored by the State of Minas Gerais Foundation for Research Support (FAPEMIG). The changes that have occurred in the free spaces allocated to housing units constructed in Belo Horizonte, from the 1990s, when urban policy became municipalized in the main cities of the country will be analyzed. The process of post- occupancy in 22 housing units and the housing policy guidelines over this period will also be examined.

In accordance with the municipalisation of housing policy, several guidelines for social housing were established, these being designed to meet immediate local need. For the construction of new housing estates which followed the general concepts of housing policies in the municipalisation process, the plan to build small estates, whose population would readily assimilate to the proximity and relationship with the city, was ratified. These housing estates were constructed in the urban areas available, originating in greater part from speculative retention. Thus, the cost of infrastructure and facilities could be reduced and future users could be provided with additional benefits regarding access to municipal goods (Teixeira, 2004).

At the same time, the programs originating from urban policy were distributed and applied in the municipalities in an attempt to meet housing demand. It is clear that local specificities demanded immediate action of a local nature, however, in practice the standards established by the federal authorities were maintained.

In Belo Horizonte the situation was no different. With the foundation of the City's Urbanization Agency (Urbel), in the early 1990s, the first estates were built in already urbanized areas, provided with nearby infrastructure and facilities and were composed of few units, in accordance with the characteristics of the available land.

As such land within the urban area was being occupied, it was necessary to seek less expensive areas near the outskirts of the city which made the implementation of the project feasible. Many of these plots had irregular topography thus compromising the construction of the blocks, the internal accessibility, permeability and pedestrian flows. As a consequence, the projects were marked by emerging disparities, particularly in relation to the external free spaces, and these form the primary focus of analysis in this work.

Currently, the demand for new housing projects in the city is great. The population of Belo Horizonte stands at 2,375,151 inhabitants (IBGE, 2010) and has increased 6.1% in ten years. Moreover, the housing deficit increased from 57,288 to 78,241 households, increasing by 36.7% over the same period (FJP, 2012). It is therefore of paramount importance that improvements in the construction of housing for the city's low-income population are sought.

Free spaces in housing estates

The research identified 22 (twenty two) housing estates, designed for low-income families and constructed by the Municipality of Belo Horizonte, under the auspices of Urbel, in the period 1996-2010. For analysis, estates accommodating a minimum of one hundred families were chosen since the relationships between free and constructed areas were deemed more tangible.

As the free areas of these estates were extensive, it became necessary to evaluate the transformation conditions resulting from their use (or not), from the design project up to ownership by the residents.

In general terms, Nogueira and Righi (2003) highlight the fact that free spaces in housing estates have often not received the attention they deserve having been misguidedly treated and appropriated as residues, rather than being designed as, places of social interaction, physical exercise, forums for the exchange of opinions and differences, rest and leisure. Such spaces need to be treated as areas where life takes place, and in which, the contribution of landscaping can provide enhancements to this particular environment.

Free spaces are of great importance in the design of housing estates and attend the specific needs appropriate for this environment and its inhabitants. The latter, especially children, need passive and active play areas which should be conducive to social interaction - an immediate benefit of good project implantation.

The design of the free areas in these estates, in the majority of cases, does not get to be executed. Existing vegetation is reminiscent of the original land, whilst amenities, which should provide a better quality of space and living conditions for residents, are improvised or not even constructed.

The lack of amenities in several of the analyzed estates can be offset by their proximity to urban facilities designed for collective use, which allow the practice of sport and more social interaction between residents: 3 (three) estates have no proximity with any municipal amenities for collective use; Three (3) are close to parks; Three (3) near plazas and thirteen (13) are near community football fields. However, despite their proximity with such municipal amenities, there is no original intention in the estates' architectural design to establish interaction or connection between them.

Within the estates studied, the wide differences between the free areas and those occupied by buildings are particularly noteworthy. The free spaces correspond to, on average, 75% of the total land area, in contrast to 25% built, as shown in Figure 1.

Although the estates have extensive free areas, they are not always intended and designed for the collective use or social interaction of the residents. Seven estates have no free spaces for social interaction, and in fifteen of them, the average area devoted to these activities corresponds to only 3.65% of the total land area. The proportion of open space used by the population is very small.

The estates' social amenities are composed of plazas, small squares, nurseries, small football fields or community centres. In most of them there is no maintenance.

The circulation of vehicles and pedestrians, which for the most part is facilitated by ramps and stairs, corresponds to 22.45% of the total land area. Parking areas make up, on average, 7.15% and the embankments, which are vegetated by grass, shrubs, trees or no vegetation, correspond to 41.75% of the total land area.

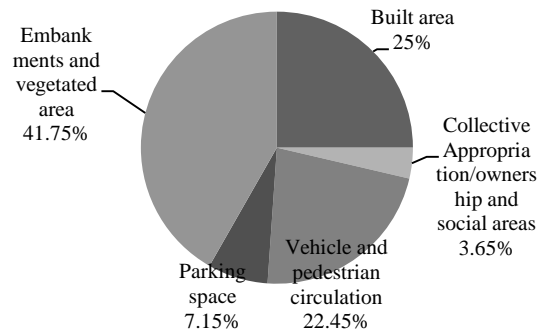


Figure 1. Proportion of built and free areas in the housing estates studied.
Source: research carried out by the authors, 2014.



Figure 2. Ramps and stairs in the open spaces of the estate R2 DRENURBS
Source: Authors' archive, 2013.



Figure 3. Fences and barbed wire - Coronel Jorge Dario housing estate Source: Authors' archive, 2013.

The architectural project adopted and the high gradient of the land on which the blocks were constructed are two common features of most estates. They are, furthermore, important factors for the type of configuration the free spaces follow.

All architectural projects are standardized and have no relationship with the site on which they are constructed. Blocks are pre-designed, four-floor, "H" or "I" format, arranged and adjusted on the ground in order to obtain the maximum number of housing units. On average, there are 188 housing units and 12 blocks per estate. The estates are surrounded by a combination of bars, walls, and barbed wire which impairs visual permeability and integration with the rest the city.



Figure 4. Fences, walls and barbed wire São João housing estate. Source: Author's Archive, 2013.



Figure 5. Implantation of AR03 housing estate generating embankments, supporting walls and residual spaces. Source: Author's Archive, 2013.

All estates were constructed on land with high or average gradients, which led to adaptations of the terrain such as embankments, retaining/supporting walls and even residual spaces. These are the same elements which therefore form the majority of open spaces and impede and hinder appropriation by the residents. Moreover, collective and social spaces are neglected both in

architectural projects and their execution and landscaping is not even considered in the construction of the estates.

Appropriation and transformation

As the projected space is appropriated by the residents, new interventions occur in the territorial configuration, reflecting the way of life of these people. Naturally, to represent their physical and social characteristics, new manifestations of appropriation are being constructed by the residents which portray the changes made to the original design.

Palhares (2001) clearly recognizes this fact and adds that the act of modifying living space can be understood as an intrinsic characteristic of human nature and the alterations, although de-characterising the formal and spatial architecture, allow residents the freedom to construct, "improvements in the quality of life" (Palhares, 2001, p.74).

The appropriation of free spaces is favoured due to several characteristics such as the elements of nature, the diversity of these elements, the form in which they are deposited, the interaction between the natural and the exterior, and the way that the affirmation of identity happens within this space. Coelho (2013) lists three reasons for the appropriation of free spaces:

1. Environmental - where integrated and contiguous green areas provide environmental suitability.
2. Functional - characterized by improvements in privacy and spatial demarcation.
3. Effective - consists of the development of psychological, emotional and sensory influences able to relieve states of depression and stress - creating spaces that can potentially generate the peace and satisfaction of the user.

The transformation of open spaces is encouraged by the segregation of urban space and by the construction of large spaces in the urban environment, as noted by Aragon (2006). Caldeira (2000) observed, when speaking about housing estates, that transformation occurs commencing with given spatial configurations and their instruments and this makes us value the importance of the project and take due care over its execution.

Therefore, one of the main reasons for the changes arising from appropriation is due to the shortcomings of the project. Ferreira (2012) adds that the socio-spatial, environmental and topographic conditions are rarely considered in the design of housing estates and this generates larger transformations in collective spaces starting with appropriation by the users.

However, Ornstein (1991) states that the inadequacy or viability of the appropriation of open spaces in housing estates revolves around three factors: legal regularization, the project and the management. Legal regularization consists of granting ownership rights to the residents, which is not always effective in reality. The project, for its part, encompasses how the blocks are arranged on the land and the way these buildings relate to free spaces. In most cases, this integration is neglected and seldom regarded by architects and public authorities. Management, in turn, constitutes the presence or not of a residents association/condominium and is related to how the residents organize maintenance, safety and cleaning of the buildings and common areas. This participation in the maintenance process makes clear the involvement and social relations between residents.

In the post-occupation process, ownership of the open space within the housing estates does not always correspond to that specified in the original design. In contrast to that idealized on the drawing board, amenities, when implanted, are used inappropriately or even destroyed. The maintenance of green areas is not carried out effectively - the vegetation is poorly maintained in most cases, resulting in neglected environments and ones that are poorly integrated into the landscape. Consequently, residents isolate the interior of their homes rather than engaging with the estate.

As to the form of free space ownership in the estates studied, we observed that residents carry out various activities: in every 22 (twenty two) estates, children play and people converse; In 11 (eleven) of these the residents have barbeques, wash cars and leave clothes out to dry; In 4

(four), residents have periodic parties. These activities are not always carried out in places designed or intended specifically for the purpose - one clearly sees a demand for spaces designated for children's use.

The main transformations resulting from post-occupation are the erection of isolating railings or walls between blocks; the transformation of some gradients into retaining walls; the privatization of parking places that are surrounded and covered and the appropriation of spaces adjacent to some of the blocks by ground floor residents. These are sometimes locked off and often have improvised openings and unauthorised new access to public roads.



Figure 6. Clothes hanging in free spaces on the CDI Jatobá housing estate. Source: Author's archives, 2013.



Figure 7. Isolation between blocks on the 'Via Expressa' housing estate. Source: Author's archives, 2013.



Figure 8. Privatisation of free space for parking CDI Jatobá housing estate. Source: Author's Archive 2013.



Figure 9. Privatisation of free space by residents on the ground floor - Jardim Leblon housing estate. Source: Author's Archive 2013.

In addition to these observations there has been an increase in residents requesting Urbel to individualize blocks, expand the parking area, improve accessibility, expand access and even remove social and leisure facilities in isolated areas within the estates. Residents consider that these spaces encourage a concentration of people involved in inappropriate activities such as prostitution or drug use. Such demands have been reflected in the design of the most recent projects.

It is also possible to observe a trend towards the privatization of blocks, reduction in common recreational areas, expansion of parking spaces and incorporation of these areas at the rear of buildings, rather than in front .

Management and Maintenance

The management, which is one of the factors highlighted by Ornstein (1991) for the inadequacy or viability of the appropriation of open spaces, was also observed in the estates studied. In the cases analyzed, the management of each of the estates is undertaken by a general trustee/caretaker, who is responsible for all blocks and / or an individual caretaker responsible for each block. Thus eighteen (18) estates were investigated, while in 4 (four) of these, precise information was not forthcoming. In the eighteen (18) analyzed the situation is as follows.

Table 1. Management of estates : general caretaker v individual block caretaker

Is there a general caretaker?	Is there a caretaker in every block?	Total of estates
Yes	Yes	8
Yes	No	2
No	Yes	7
No	No	1

Source: the authors, 2014.

In seven (7) estates, management is undertaken by caretakers responsible for each block which confirms the desire to privatize open spaces - isolating blocks by means of railings and fences, as mentioned earlier (Table 1).

The maintenance of estates is undertaken, in the majority of cases, by the residents themselves as shown in Table 2 below. This reflects the financial situation of residents who are generally low income and who, by self-maintaining the estate, may exempt themselves from service charges.

Table 2. Estate Maintenance

Activity	Who does it ?			
	The residents	The CONDOMÍNIO	EXTERNAL	Nobody does the maintenance
Gardening	On 14 estates	On 3 estates	-	On 5 estates
Cleaning	On 16 estates	On 4 estates	On 1 estate	-
Renovation	On 6 estates	On 6 estates	-	-

Source: the authors, 2014

The difficulty of managing and maintaining spaces for socializing and collective use, as well as, the grassed and landscaped areas, which in most cases are in a precarious condition, are worthy of attention. It may be further observed that the situation of free space in estates that have a general caretaker is generally better than those that do not, even with the deficiencies presented.

Final Considerations

The plots of land used for the construction of the estates under analysis are far from the centre but are located near commercial areas and services and have some nearby space for leisure activities, especially football fields.

The blocks were constructed on land with excessive gradients and are therefore less suitable for the realisation of the strict architectural typologies suggested. In fact, Urbel imposes the adoption of design and construction projects which require adjustments in the topography in the form of railings, stairs and ramps and which do not always manifest adequate landscaping and optimal conditions of accessibility.

A significant area devoted to open spaces within housing estates, representing more than half the total area of land in all estates studied, has no leisure facilities that can attend residents' needs, such as a plaza, internal square or playground. It is noteworthy that in some of the estates they are nonexistent.

Most free space is allocated to embankments and vegetated areas that are underutilized by residents because of the gradient. For the same reason, the circulation of vehicles and pedestrians also occupy a significant area of the project. Thus, the free space destined to be permanent and for collective use is reduced and little used for socializing by the residents.

The inadequacy of free space projects on estates, combined with the difficulty of estate management, generates transformations in these areas. In general, a trend to privatize the free areas which become separated by bars between the blocks and the demarcation and individualization of parking spaces was observed. The phenomenon is repeated in most estates at the solicitation of the residents who justify it by the need for greater security and privacy.

Although the area of open space on the estates analyzed is representative, this does not imply good environmental quality. A hierarchy between the constructed spaces for socializing or movement of vehicles and pedestrians has not been established - they are merely a consequence of the insertion of the blocks on the land. Moreover the socio-spatial, environmental and topographic conditions of the land on which the estates are constructed were not considered.

The individualization of blocks constitutes transformation that has its origins in the estate management. As most estates have a caretaker in each block, residents demand from Urbel the right to close each off their respective areas. Moreover, the constant conflicts among residents that are referred to the agency have induced new solutions for the implantation of separate blocks.

At the same time, because users do not have property ownership rights they have no sensation of being homeowners and take little involvement in the maintenance of the buildings - soliciting Urbel when renovation is necessary.

It was shown that after appropriation, the free spaces undergo significant transformation. These changes are the result of the social housing production process which involves: the selection of the land; the project conception; the execution of the works; the ownership and the maintenance of the estates.

The transformation of free space already manifests itself in the construction of the estates as the amenities projected are not executed under the justification that the costs would be too high. The most obvious changes are related to use, for example, eliminating playgrounds which represent one of the most important requirements of the local population. Improvised parking, invasion of collective areas or amenities has also been common, which in turn affects the landscape and the permeability of the land, as well as, limiting the possibility of residents living together harmoniously.

A curious fact with regard to parking is that space is located on the flattest part of the estate. Sometimes the movement of earth necessary was used to justify the high cost of construction to the detriment of collective amenities.

The transformation of the free space in the estates, due to the inadequacy of the project, can still be seen in the appropriation of the spaces for pedestrian circulation. There are cases where spaces are closed and others take over this function. An example of this is present in the San José estate which received a makeshift ladder so as to allow people to climb over the retaining wall installed and have access to the other side of the estate.

Finally, the free space in housing estates are residual areas, little utilised, often privatized in their form of appropriation and that generate needs, not only in terms of landscape, but mainly in the need for leisure and social areas, especially for children.

Although, on the one hand, housing policy tries to address the quantitative problem of municipal housing with the production of many housing units, on the other, the quality of housing, the inclusion of these houses in the municipal context and the concept of decent housing have remained only a desire in the projects and their respective execution.

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Unsustainable empty by inadequate use of urban space

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Abstract. *Studies of the Middle Ages tells of deforestation, since man saw the forest as barbarism, and reduced as a benefit to civilization for crops and rearing of herds. (Dorst, 1973). But, also, there is evidence of respect and admiration for nature the forms of buildings, urban landscape, vegetation and agricultural production in other cultures, as the Incas. (Bingham, 1911). Different paradigms, who built the various stages of human civilizations, explain the current situation that leads many urban centers in a significant deficit in environmental sustainability, a lack of resources for planning the shape of the urban landscape. Urbanism is to provide sustainable built man in his habitat, with comfort and environmental infrastructure to supply water, food, shelter, heat and light. This proves that man is capable of transforming the natural environment without destroying their livelihood condition, because the planned space is the best solution in the growing demand for food, housing, jobs and mobility of families, congregations, markets and armies. Governments around the world create managements to ensure sustainable human life on the planet, with the maintenance of corporations and lucrative markets in the global system. But the vulnerability is evident in various forms, such as natural phenomena and accidents in built space with large numbers of human casualties and loss of economic output. Experts say that the planet is finite, and does not support the artificial transformations, by an infinite lifetime warranty and urban production on Earth.*

Key Words: urbanism, environment, landscaping, sustainability, urban mobility.

Introduction

This research work reflects on the functions and uses in urban areas of Brazil's capital, in particular the City of Rio de Janeiro, my hometown, which will host two major world events in the period 2014-2016. The City of Rio de Janeiro today prepares the landscape of urban space for events, and demands that uses and global functions are sufficiently sustainable in territoriality, and this is another example of the many unforeseen past 20 years, as in the event RIO - ECO 92 .

The event RIO - ECO 92, of world importance, brought discussions of environmental problems, consequence of urban growth on the planet, made a significant change in the planning of cities thinking about the degrading performance in the natural environment. So Rio de Janeiro, temporarily, was the capital of Brazil, declared the President Mr. Fernando Collor de Melo, and attracted representatives from 180 countries of the world to decide what steps to take to reduce environmental degradation and ensure the life of the human and other living beings. The central idea, left the meeting was to provide sustainable economic development with the consumerism of moderation to better ecological balance through preservation plans and environmental conservation. So, important documents were created as the Earth Charter, Biodiversity Convention, Desertification and Climate Change, the beginning of Forests, Environment and Development and Agenda 21. Agenda 21 has become the most important instrument to be followed for each country, each region and each city representing urban areas, and which produces the livelihood and are concentrated forms of growth and economic development of societies and peoples of the planet.

The City of Rio de Janeiro has a natural landscape with medium mountain ridges and are interspersed with its various neighborhoods and the limited road system and the sea. However the challenge is to get world events, resolving review their sustainable intentions revealed at the

time as a condition to grow the economy and the population of the city, and the natural environment as its main axis. With concepts of Agenda 21, the Rio Declaration (Earth Charter) and the Conventions signed in the RIO-92, the city administration moves efforts to create actions and targets the improvement of urban conditions for sustainable development and that the main focus are: Social and Economic Dimensions, Conservation and Management of Resources for Development, Strengthening the role of the main social groups and Means of Implementation.

Then, with bases in this brief exposure, this research is to know the "State of the Art" and the reflections on the issues that are compelling and disturbing to shape the urban form of the city that, after more than 20 years, is again interrupted in your routine and submit to the urban trials, which makes seeing possible horizons in the common future of cities elected to major world events.

Aspects and impacts in the urban landscape

Middle age studies speak of deforestation, since man understood the forest as barbarism, and reduced as a benefit to civilization for crops and cattle breeding (Dorst, 1973). But, also, there is evidence of respect and admiration for nature in various forms of buildings, urban landscape, vegetation and agricultural production in other cultures, as in the Incas. (Bingham, 1911). History shows the different paradigms, who built the various stages of human civilizations and explain the current situation that influences many urban centers to a significant deficit of environmental sustainability, a lack of resources and planning to reshape the urban landscape. In the collective perception urban landscape expresses how the individual must read and understand the city and it can move to the most possible activities related to who elect the urban site as the ground of its existence.

In the years 50, 60 and 70 the Town Planning intensifies and is providing sustained man in his habitat built with environmental comfort and infrastructure for water supply, food, shelter, heat and light. This proves that man is capable of transforming the natural environment without destroying its condition of living, because the planned space is the best solution in the growing demand for food, housing, jobs and mobility of families, congregations, markets and armies. As a result, governments around the world create steps to ensure sustainable human life on the planet, with the maintenance of corporations and lucrative markets in the global system. But one notes the vulnerability in several ways, such as natural phenomena and accidents in built space with large numbers of human casualties and loss of economic output. Experts say that the planet is finite, and does not support artificial changes to an infinite lifetime warranty and for sustainable urban production on Earth.

The United Nations Conference held in Stockholm in 1972 happens with the purpose of reviewing the synergies between the Environment and Urban Development, establishing new visions and urgent procedures for the greatest possible viability to sustain the future of cities across the world. So are magnified concerns, reviews, commitments and measures to create new uses and functions to the best of urban city and rural areas. The situation called for attention in all the processes governing the productions which support the cities, as the latest models of social and productive organizations are established in urban city to keep workers in at least 50% of the world's population, but 1/3 that live in sub-human conditions known as favelas.

In Rio de Janeiro City this proportion is confirmed and becomes the most difficult task to compose the form of the urban landscape associated with a sustainable condition for economic production and environmental preservation of the city's future. This view is undeniable to common eyes, it creates an impossible density to be recorded in real time, and does not allow the actual location of shifts that move the socio-economic production, which is the thermometer to provide the conditions for development with urban sustainability and environmental.

Other aspects are shown in the city of Rio de Janeiro as relevant which are the administrative expenditures with urban violence and the production of solid waste, which saturate the existing

sectoral structures in the Municipal Administration, creating impacts of disproportionate dimensions on the challenges signed with the remainder the planet, and being in sight the approach of the 2014 and 2016 world events for the World Football Cup and the Olympic World Games.

About the spaces devoted to the world events, there is nothing to disagree about their real possibilities of being available. However, the same result does not occur on the perception on urban routines that promote socio-economic production of day-to-day city, and they need that their movements are carried out on roads and land transportation systems, today already seriously committed to the fluidity by several reasons the urban phenomenon.

The municipal administration made a bold plan born in 2010, which provides a radical urban operation that transforms urban axes, transport types, routes and systems that served the city for over 40 years. See what happened with the complete demolition of the high Perimeter, which bordered the entire port area of the city, which created a ring road to meet the arterial routes of inputs and outputs regional and international airport of the city.

Many impacts already become visible at a future understanding of the shape of the city, when it has the waterproofing without provision of intense forestation and landscaping in new urban axes, in addition to condition the intensive use of public transport systems of long distances (BRT and BRS), which were preferred to place surface or underground rails, and the creation of new shopping centers, technological and industrial poles, and as creators of intense shifts the provision of services, labor, work and jobs, mainly by harmful production of polluting waste.

Although not seem unheard and not disturbing, but these mentioned factors indicate the extensive spreading condition of the city, as the transfer and upgrading of subnormal agglomerates or slums are located mainly in the central areas of large real estate appreciation of the city, gathering around the least 2 million people a housing shortage in the city of 200,000 units, and only 60,000 units were contracted to build the last 2 years. The transfer and the readjustment of each cluster means a problem for many residents, which represents the change in the commitment of families with their urban living needs with their attributes related to labor, employment, health, education, transport and leisure. And change often cannot be gradual, given the condition of tight deadlines to have the new morphology imposed in the city that will receive two world events in a short time of two years.

The spreading of the carioca metropolis promotes many social, economic and environmental delays, since the productive urban axes of significant scale will be transferred, considering the limited road and inefficient road transport systems, sanitary and storm sewer system inadequate and outdated and the constraints physical-geographic of a city choked between the sea and the mountain ridges. The city of Rio de Janeiro today, still sheltered themselves from the omens that threaten their preservation and conservation signed in commitment to the Earth Charter and Agenda 21 for the global environmental event RIO-92. Therefore it is visible from the appearance and impact refers to the new solid waste, where landfill space no longer meet the demand, as well as new areas for this purpose, since they do not become possible to offer the metropolitan area of the city thus saturating the security of the neighboring municipalities, still very poor and latent in his urban and socio-productive structures.

Given the above, the City's commitment to the Rio de Janeiro, to meet the requirements of providing world events, has become a task of great responsibility in the present and in the future in order to get the city morphology with guarantee of intelligent conditions for effective and sustainable metropolis over the next 30 years. This time leading up to the global meltdown which provides urban life occupy 70% of the environmental resources of the planet. That future should ensure the promise that the Urban Contemporary 50s did, after Chicago and Bauhaus School, when allowed ratify on ensuring the comfort in the urban condition at the expense of rural condition, the full and stable permanence of man due the relationship of economic output with the accumulation and capital surpluses.

The morphology of unsustainable empty

Although the experience of Rio de Janeiro City is not as exceptional as the transfer or displacement of socio-productive routes, this comes at a time of various changes imposed by both an internal and external demand, promoting conflicts and even aggravating that can make it impossible many plans and projects still under development and already running. In theory, the change shaft through urban operations produces significant results, often unforeseen or foreseen, it may be aborted by an external demand, creating action of irreversible stages, for example, the formation of voids that may become urban areas unsustainable, both the social focus as economic and environmental.

But what can be said of unsustainable empty? Well, then, urban voids are disturbing themes and replicating over the past 50 years in almost every city in the world. The Modern Urbanism developed solutions and also problems throughout his 60 years in office, and inspired controversial authors like: Ebenezer Howard as the defender of the garden city with 30.000 inhabitants surrounded with green belt; Le Corbusier as a defender of super vertical city hostels towers on stilts holding free and green land for the passage of people and vehicles; Daniel Burnham as a defender of the city as the backdrop for artistic monuments in green parks. And otherwise, the Jane Jacobs author, questioned these monotonous approaches of Modern Urbanism, accusing the main reason of abandonment and death of cities.

But today, the theme of the life and death of cities (Jacobs, 1961) could not be supported on this issue, given the new grounds of the city that need to raise over environmental preservation and the restructuring of production, with the focus of globalization world economy. In this vision, new paradigms and institutionalities are thought to promote change with adjustments or changes, on expected the supposed urban voids, such as remnants of the spaces of the large factories, and other models of urban occupation.

In the city of Rio de Janeiro Urban Plan, with some delay this temporality, preferred the view of environmental reserves as the Barra da Tijuca Pilot Plan and Baixadas of Jacarepagua, Sepetiba and Guaratiba, including Vargens, beyond the Fundão Island - City university, and other districts of the Baixada Fluminense. These spaces, today, are seen as non-functional urban voids for socio-economic production of the city. Then the thought and Janes Jacobs vision are present, and follow fostering municipal administrations, on the emergence of creating strategies to move new "inputs" in the city of global dream. And so perhaps the managers of Rio de Janeiro City chose to get involved, based on the question indicated by Jacobs, leading the city to apply to world events, with the intention of renewal and recovery of empty spaces, considered lacking in production and inhabitants.

But even on the basis of thought and Jacobs's view, the City of Rio de Janeiro develops practices that have not and are not educated on the issue raised by the author. Curious fact about the inclusion of consortium operations in the area of Porto Wonder, the new urban function of Fundão Island and the other inserts of road systems and transportation, that enter areas previously considered of environmental reserves of the city, as the Vargens, Baixada de Jacarepagua, Baixada Fluminense, and Restingas Guaratiba and Sepetiba. Thus, the city will be relocating and moving away from the urban area of the city, without the minimum infrastructure such as sanitation, sewage collection and disposal of solid waste and other urban facilities such as health centers and schools. The order is now being functional, no longer be the condition of conservation areas of environmental reserves, which once served the new world order from the RIO-92.

From then on, it creates a paradox that affects the urban organism, functioning as a city, as it is exposed to surgery with urban operations that break and exclude old urban infrastructure such as bridges, overpasses and elevated. Now, since no real vision of its derivatives, and through their elimination or substitution by other equipment, considering many have not yet effective and sufficient for the flow and maintenance of various urban routines being productive or not, but routines that emerge from a city that even with empty, still remain with "green lungs".

In Modern Urbanism scheduled to be compartmentalized city plan with its uses and functions, and empty were filled with green parks and squares that served the leisure of residents. But Jacobs housed the concept that these green areas were empty, they were only accessible to residents, while on the rest of the residents moved to produce other extreme of the industrial city. Anyway, do not explain the green areas as environmental and ecosystem areas, and the time was trying to degrade them here in Rio de Janeiro, including the Tijuca Forest Park, Quinta da Boa Vista and now at the end and unfortunately, the Flamengo also already suffering from neglect and improper maintenance.

Green and environmental reserves - potential empty

In Rio de Janeiro City is confirmed, then a functional use of vision in areas of green reservation? This is only for fear the thought and vision of the death of the city? Or is it just a new urban-environmental vision? As support and how to present to the world a city of so many natural environments interspersed between seas and mountains, now, a vertical city in the entire region "Marvelous Port" and sprawling to the region of Vargens, the Baixada Fluminense and Jacarepaguá and, the Restingas Guaratiba and Sepetiba? What new urban concept can be allowed to present to the world the new candidate city to be global?

From this observation, this research work brings to the analysis, the effects that are repeated in the municipal administrations that follow in the city of Rio de Janeiro, primarily on the improper and inadequate practice of Landscape discipline with the lack of trees in compensation environmental urban zone. In theory, the urban landscape expresses how the individual must read and understand the city and it can move with comfort, for the most possible activities related to who elect the urban site as the ground of its existence.

But it is important to accept that arises every minute, and uncontrolled speed, new human needs that need immediate solutions, in order to give all humans on the planet, and in order to ensure the economic and financial corporations met their productions and of their profits. This turbulence produced in the last 60 years, excellent solutions and also created in the wrong lane, little effects or never perceived, that are present in incommensurable scales, such as the reactions of the atomic world and the bacteriological abysses, formed from effects of molecular transgeniases.

The human being is faced with today, with something almost unrecognizable to himself, or something that inspires you to go further, and provide himself with a sensitive intelligence and great wisdom. So, putting it to the service itself, putting to the service of all who provided an entity transformer, and the entire environment that surrounds it, observing and following the signs, which should guarantee the required compensation for sustainability the interactions of the natural environment to the built environment.

Research on the best actions to be recommended and implemented in future urban administrations, and these can develop the best return for the sustainable use of the city and can restore the gaps that form the voids in these landscapes. Instead, these can work plans and pilot projects for the restructuring of green empty and recovery sites containing species which may have been extinct from the original habitat, transforming them into areas of Urban Tourism and Environmental Alternative or Urban Development Centers as occurs in the incipient Vilas Green being tested in mountainous regions of neighboring towns.

Therefore, the recommendations and guidelines developed in other urban centers outside of Rio de Janeiro, and foreign cities recommend that urban spaces are inventoried in order to make qualitative and quantitative data of vegetation to provide its Environmental Landscape Plan. This, so that the city can have real and substantiated data, in order to review problems and solutions for environmental sustainability. This is reasonable as it has knowledge that the Landscaping is a reason practiced since the Middle Ages, and in Europe the initial movements of the urban landscape planning occur in half of the fifteenth century and the appearance of landscaped public spaces occurred in the century XVII. (Segawa, 1996)

The spaces of landscaping and urban forestry

The practice of Landscape contributes a lot to keep the moisture in the air and to the permeability of soils, which softens in the flooding of large cities. This interferes with quality of life by visual benefits, and behavioral, in addition to landscaping come to enhance the preservation instinct that arises in the consciousness of people who want to have more green space from the streets, sidewalks even in their own homes and workplaces (Bernatziky, 1980).

The fact is that the landscaping adds the development of a variety of species of plants native or not, and that with this development allows other living beings such as insects, birds and many other animals can stay longer present. Thus, get your food next to residential gardens, green parks, malls and other habitats that may encourage the approach of flora and fauna biodiversity, which are by nature an intelligent, self-regulating environments and therefore sustainable. For example, we have bees that feed on nectar from flowers, birds also carry seeds and other ecosystem interactions that come together for an infinite improvement of biodiversity. (Chacel, 2000).

Urban centers, according to international survey conducted in 1988, already home to more than 40% of the population tends to increase observing comfort of life proven in more developed countries. So being generated environmental impact by expanding cities, is studied and applied in various locations in the world plans to landscaping and urban forestry. Different authors have already advocate the practice and highlight importance of their implementation and maintenance, such as comfort for the city, air purification, thermal balance, noise reduction, financial and landscape qualification of a property, attraction of wild fauna and flora, options leisure and rest for the population and development of the historical-cultural and environmental tourism (Ruschel and Carvalho Leite, 2002).

In Brazil, influenced by Europe, cultivated public gardens arise only in the late eighteenth century, with the aim of preservation, sanitation and maintenance of species. D. Pedro II valued by a preservation order of the natural environment, which promotes our first environmental legislation. However, the periods governed by regimes of the Empire and the Colony in Brazil have important records in relation to the environment (Earth, 2000). But the treatment given to the elements was mercantile character. That is, nature was seen as a commodity, under the influence of anthropocentric doctrine - in which man is seen as the center of all things. (Abreu, 1997). But, there is also the strong influence of landscaping on urban design, which elucidates the time the trees and plant elements are to be understood as structuring elements of urban space, and have the force of such acquired form, which shall be define new types and styles of landscape and urban design. (Farah, 1999).

However, professional landscaping in southern Brazil, city dwellers as Maringa, Piracicaba and Ribeirão Preto have published many articles and symposia to promote the best possible dissemination of the importance of the exercise of discipline applied to the infrastructure of cities and state capitals, with the rational use of urban forestry. Explain that part of the ecosystem of trees plays a big role, influencing the weather conditions, air quality, soil fertility, in the life of animals and plants. In the big cities, which are the most responsible for CO2 emissions, planting trees comes assist in the purification of the whole environmental system.

Studies indicate that some species should be preferred as the Jatoba, Rosewood, guapuruvu among others, which are species of great absorption of carbon dioxide, which both overloads global warming. Simply not only that but also explained that a single change adult has the ability to spray around it about 500 liters of water / day, which makes the air and much more fresh and pleasant environments. For this reason, a woody place comes to have a difference of 10 degrees less than the temperature measured in areas without vegetation (Chacel, 2000).

Topics for this analytical study are being conducted primarily in smaller cities or prefectures in growth, as those located in the southern and midwestern Brazil, and these working groups estimate that the landscape study and practice acts as update tool of urban functions, as well as a

new condition to effect the purposes of socioeconomic and environmental sustainability in urban centers.

The experience of the city of Ribeirão Preto - SP

Former Superintendent of Landscape and Environment of Ribeirão Preto City Hall - SP was responsible for the implementation of a program which is shown below with the title *Landscape and Urban Centralities* by Sergio Marin de Oliveira" between the years 2001 and 2004. "Program Objectives: i) signic relevance; ii) expansion draining areas; iii) reduction of heat islands; iv) biodiversity enrichment. We believe that today's cities, with their enormous needs of all types (health, education, transport) can't, in spite of these, and do without neglecting, as a paradigm of systematic reconstruction, for environmental and landscape issue. The landscape design in its range of intervention, should not be a possibility (the result of indifference, ignorance or weakness of funds), but a vital necessity for the future of cities, as worthy of living place, living and working as a place of citizenship, democratized and qualified public spaces. "



Figure 1. Greater safety for pedestrians. Sidewalks away from the guide tours. Av. Armando de Arruda Pereira.



Figure 2. Public facilities - BMX track. Praça da EMEF Remo.



Figure 3. Greater thermal comfort. Largo Arariba.



Figure 4. Praça do Encontro Jabaquara (after).



Figure 5. Landscaping. Landscaped paths. Av. Lagos x Ipanema. Capela do Socorro.



Figure 6. Praça Sampaio Vidal – Aricanduva (after).



Figure 7. Greater thermal comfort. Residential project Faria Lima.

The own spaces for urban vegetation

Similar afforestation view in public and private open spaces, trees accompanying the road system exert ecological function, in order to improve the urban environment, and aesthetics, in the sense of public roads beautification and consequently the city. And as afforestation accompanying the road system is its subservience as an ecological way, linking the free vegetated areas of the city, such as squares and parks. In addition, on many occasions, the tree in front of the house gives this a particular identity and provides direct contact of residents with significant natural element, considering all its benefits. (Concise Oxford, 1988)

However, many problems are caused in the confrontation of unsuitable trees, on the urban equipment such as electrical wiring, pipes, gutters, sidewalks, walls, lampposts, etc. These problems are very common viewing and cause, in most cases, inadequate management and damaging the trees. (Velasco, 2003). It is common to see trees pruned drastically and many phytosanitary problems such as the presence of termites, drills, other types of pathogens, physical injuries as barking, hollow and rotten stems, chipped branches, etc. (Velasco, 2003)

Noting this common situation in Brazilian cities, adds to the fact that the shortage of trees along the streets and avenues. In this sense, it is essential we consider the need for constant and proper management aimed specifically at the urban trees. This management involves concurrent phases of planting, driving the seedlings, pruning and necessary extractions.

To implement a municipal system that accounts for all this demand services, it is necessary to consider the need for a specific municipal laws, administrative measures aimed to structure the relevant sector to perform the work, considering fundamentally skilled labor and appropriate equipment, as well as involvement with companies to help financially support projects and idealized actions, and with the general population. The latter may happen, preferably through environmental education programs for the theme, seeking to involve in fact the residents in afforestation or reforestation process of the city. (Houass, 1988)

Importance of creating green space in urban reserves

As for the microclimate

In the case of the urban environment, it appears that the rapid population growth in conjunction with other variables of the urban space, contribute significantly on changes in climatic elements. The city causes changes in the surface parameters and the atmosphere, which in turn lead to a change in energy balance (Lombardo, 1990).

According to Furtado and Melo Filho (1999), all landscape elements must be carefully handled in order to bring benefits that will interfere in the integrated project, aimed at improving air quality, the shading of the building and surrounding areas, the ventilation control and moisture. Most of the heat load of a building comes from solar radiation and the outside air temperature, a strict control of the microclimate elements being necessary to remove an excess of energy that would make the built environment inhospitable.

According to Lima (1993), urban areas constitute an artificial environment, since they have high concentrations of paved area constructed and favoring the absorption of solar radiation during the day and the night reflection. Called heat island, this phenomenon can have a very significant thermal differential to more vegetated sites. The trees intersect, reflect, absorb and transmit solar radiation. Proper tree planting and good ventilation are two key elements for obtaining the thermal comfort for the humid tropical climate. The tree set placed at a more appropriate distance possible from the building provide a good shading in the risers of buildings, composing a more favorable environment (Furtado and Melo Filho, 1999).

As for health

The green area serves to constitute an area of "social and collective", is important for maintaining quality of life. For ease of access for all, regardless of social class, promotes integration among men (Martins Júnior, 1996). The OMS recommends that cities have at least 12 square meters of green area per inhabitant (Lang, 2000).

Trees can be considered antimicrobial agents. The trees still act against atmospheric pollution, noise and visual (Pedrosa, 1983).

In the urban environment, have considerable potential for removing particles and atmospheric greenhouse gases. Curtains experimental plants were able to decrease by 10% the dust content of the air (Pedrosa, 1983). Excessive urban sound from traffic, equipment, and construction industries interfere with communication, leisure and people can rest psychologically affect them or physiologically. You can make use of trees as a complement to the alleviation of the noise, since the vegetables reduce the reverberation of sound. It is necessary to emphasize that the protective effect varies with the frequency of sounds, with the position of the trees in relation to the emission source and the structure and planting composition (Milano, 1987).

According to Bianchi (1989), the trees also helps to mitigate the visual pollution, because the trees are components that give shape to urban environments and playing a major role, defining spaces, featuring landscapes, visually guiding and enhancing properties, in addition to integrating various components system.

As for urban ecosystems

The standardization of vegetation in urban centers is one of the greatest dangers to the earth's ecological balance and should be avoided. The diversity of plant species is a basic condition for the survival of animals and the ecological balance.

Cities that do not diversify its vegetation may turn into green deserts. Each city should give higher priority on native species. When this happens, the tourists will be happy to visit them, as they present distinct and typical aspects of its vegetation.

The current legislation

According to the Federal Constitution, every city with more than 20,000 inhabitants must necessarily have a master plan approved by the City Council. So, will the existence of urban zoning identifying sectors with vocations, destinations and specific occupation rules. The zoning determine the specific occupation rules which, in turn, generate facilities and / or difficulties for the existence of urban forestry.

The creation of public squares and parks requires for its effectiveness, and legal foundation and economic resources, the availability of physical spaces. The zoning laws and subdivisions to define rules and installment conditions, destination and urban land occupation can guarantee these spaces, forming highly effective instruments for the realization of a suitable tree planting system.

The laws that determine and govern the areas of permanent preservation and immune native tree species are cut to Federal Law No. 4771 of September 15, 1965 - Forest Code and the State Law No. 8518 of January 21, 1992 - State Forest Code.

In this set, the municipality must have a specific legislation. In order to help municipalities, as the example of RGE - Rio Grande Energia, responsible for distribution of electricity in the southern region of Brazil, who made a collection of laws and environmental projects that can guide in defining the best legal guidelines for implementation of an environmental management policy.

Conclusion

The knowledge and scientific research as the basis for the management of green areas would be the foundation that would support the control and management of these areas. According to chapter 35 of Agenda 21, it is emphasized the role of science for sustainable development where scientific knowledge provides support for the prudent management of the environment, ensuring the daily survival and future development of humanity. You can't control or manage the plants and animals of urban green areas without knowing the biology of the species, the relationship between them and the relationship with the other components of ecosystems.

In the face of threats of irreversible environmental damage, lack of scientific knowledge can't be an excuse for postponing measures to protect the environment. In a broader and more general analysis it appears that the lack of knowledge often is usual to assume that protecting the vegetation is protecting all living beings who live there all your life or at least part of it. This is the possible position with the available knowledge, but it does not guarantee the success of the control and management of green areas. With the evolution of knowledge will be allowed a more secure control with scientific bases and more adequate monitoring.

In this new section appears on the priority guided models of cities that make studies, projects and the implementation of programs, they always monitored and rectified by Technical and Scientific Committees designed by international rites of ideal functionality that will promote the city that reacts technically front of own adversity. So it's definitely inserted in this context, the construction of a vision with mature approach for providing scientific disciplines multidisciplinary tone in order to create new demands on organizational chains of public and private companies, but also creating necessarily the true condition of participation public and citizen in the various aspects of sustainable development of urban life in cities. Thus arises the strong condition of raising cultural efforts in order to create the new 21st century citizen profile, providing for the training from basic school cycle in the course in Environmental Education for Citizenship.

The matters set of Urban Environmental Planning intended to show how isolated and fragmented attitudes of the government, whether in the physical space, either from a legal point of view, is a vision of unilateral interests, are able to create situations of economic and social spending, generating conflicts and social dispersion. Should be alert authorities that the occupation, both spontaneous and formal, reserve areas has caused many environmental damage from landfills, stream channeling, street opening and construction of condominiums in permanent preservation area.

This research has also demonstrate the impertinence of expropriation made by the Government of private reserve areas, whether in environmental issues presented, either because the installment law of urban land make possible an active joint government with the landowners, provided they are used democratic actions and the government there is indeed in the interest of minimizing costs and build consensus. You can still submit proposals open to resolve the impasse caused by the expropriation and for a possible discussion of an Urban Design for Environmental Parks and corrective measures in the medium and long term so that the competent authorities pay attention for environmental issues.

Thus, there is sure to have achieved contribute to the deepening of issues relevant to the understanding of the issues presented and that this work can indeed be a tool to elucidate polemics, enable the defense of the collective interest. With the facts and analysis presented here, there is sure to have fulfilled the duty of citizens and technical research, understanding that failure to not investigate and denounce means complicity.

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Interactions between agricultural-systems and urban forms in Sardinian villages

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Abstract. *The rural landscape is historically based on mutual interaction between the *bid̃da* and *sartu*, the village (*villa*) and the countryside (*saltus*). The forms of the Sardinian countryside, the openfield in the plains and hills with cereal crops, the closures in the inland basalt slopes and highlands used for sheep grazing, are deeply connected with the form and structure of minor towns. The contribution focuses on the historical reasons and the contemporary developments of three specific relationships between Sardinian villages and their agricultural systems: (i) Villages situated in the plains are placed in a central position in relation to the openfield and they are characterized by strictly closed blocks which have large interstitial inner spaces between them, that constitute the sites of accumulation and primary processing of cereal resources; (ii) "Margin" villages between environmental and agricultural specialized systems, or between different agricultural systems, show mixed structures and forms that are generally compact and adherent to the topography. The fringes of these centres are highly dependent on soil conditions, on crop specializations and different topographical forms. The porous space of the block gives greater precedence to the peri-urban *hortus conclusus*; (iii) The pastoral villages of the great *tancas* (enclosures) are composed of narrow elongated "spindle" blocks located on the terraces of the inland hills. The adjacent agricultural systems are a few kilometres away, in a pattern of total autonomy and division among the cultivated fields and urban forms. The contribution aims to focus on the effects that these historical relations have today on the creation of new forms of contemporary habitat.*

Key Words: rural landscape, villages, urban forms, agricultural systems, enclosures

The exceptional poverty of the soil combined with his incredible fragmentation of ownership and with an economy fundamentally based on sheep farming, paradoxically, have given an exceptional diversity of forms to the Sardinian landscape: we can find in just over 20000 km² many of the structures that characterize the rural 'ancient continent from the closed pastoral of the most distant parts of Wales to the openfield landscape of Lanières in Alsace, peri-urban regions of orchards of Andalusia on the Iberian Peninsula.

This extraordinary material and cultural palimpsest, consisting of the rhythmic succession of the *bid̃da-sartu* binomial, villages and agricultural systems domain, or consisting of the different agro systems, is the ability of the Sardinian landscape to change "in short," and to conform and adapt human habitat to a severe and arid soil and also be structured around complex social rules, extreme collectivization of resources or drastic ownership manifestation, in a continuum made up of rural fragments of floating islands, of landscape "plaques".

The research interest on the landscape, or rather, on the rural landscapes in Sardinia, then, is based on this ability to be revealing of urban forms that for a long time, it represented a direct extension or densification of them, in this so interpenetrating and structured two-way relationship, that we can consider agro systems and villages as a supportive and cooperative aggregation, two entirely consistent expressions of architecture of soil. The origin of the Sardinian village, despite the numerous classifications and structural analysis, it is nevertheless difficult to understand, and indeed, for a long time, it had "the disconcerting habit of disappearing, reappearing, disintegrating, fractionating, recomposing in compact clusters, even the habit of changing location (...)."¹⁸²

¹⁸² John Day, *Villaggi abbandonati in Sardegna dal trecento al settecento*, ed. CNRS, Paris, 1973.

And however, a constant in its geographical location is precisely this founding relationship with its more closely agricultural domains, which only for convenience of description, can be described as anything else from the same village, even when there is no physical continuity between the two systems. The house and the field, in fact, can be defined as two complementary devices of production and organization of agricultural resources and, in accordance to this, conform the soil and are in turn modeled.

It exists in Sardinia, and then remains very strong, that extraordinary identification between urban and territorial "individual", based on their agro-pastoral culture and the everyday construction of rural landscape that even in inevitable contemporary transformations, it is still rooted and often contrasts the inappropriate use of territory.

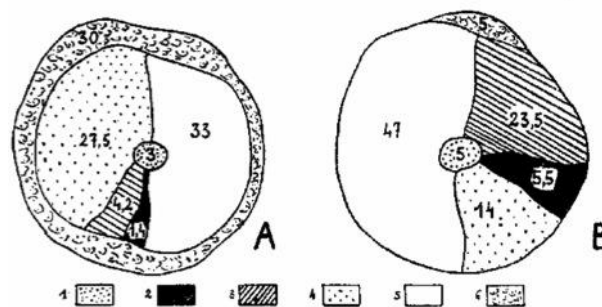


Figure 1. Ground uses and organization of the village territory.

The Mediterranean landscape: a history of agro-urban relationship

The rural history of Sardinia is not very different from that which characterizes the Mediterranean landscape: the continuous layering of cultures, diversity of land uses, the different urban morphologies, make the island one of the places in which the continental rural forms have specific configurations. In particular, the structural and perceptual contrast between the specialized cultivation encloses and of pastures and upland expanses of open fields of cereal crops or extensive contemporary, the Sardinian landscape enroll in the formal evolution of rural Mediterranean and therefore also in its constant mutation processes.

However Sardinia still shows those "figures" and "geometries" imprinted by strong colonizing cultures, such as the Roman one (for example, is still significantly visible in the so-called "valley of Quartu", the hilly hinterland of Cagliari) or the Arabic one, especially in the management of water systems and peri-urban agriculture of small villages. The same "*domus-structure*" of the agricultural villages of Sardinia, it appears that expression of Roman *rus in urbe* which sees in the rural landscape the exact morphological and economic origin of the more rooted urban fabrics.

In the whole area of influence of Andalusia, the Iberian peninsula and Mediterranean France, the *huertas* accompanied and structured the development of the cities which, albeit with a progressive consumption of soil, embraced them within their confines and guaranteed their historic function. In fact, these spaces, as well as influencing urban growth, were considered valuable for the complex infrastructure of the cities themselves, especially in relation to the articulation and distribution of water resources, whose network often designed and organized - as happened with the Romans - the urban fabric, making it morphologically continuous and unified with the countryside.

The minimum, suburban rural lots, in such contexts, gradually merged with the large residential blocks of the city, describing them as large open interior space, or large, productive estate farms.

Rus in urbe - the countryside into the city, but also the city into the countryside - is the first real expression of that structural union between urban and rural that makes Roman society the first real landscaping society in history: "within the peaceful and lasting context of the Roman Empire, rational design flows back from the cities to the territory, and puts into the landscape the regular forms of agricultural subdivisions, roads, bridges, aqueducts, border lines, canals and ports: a functional support and omnipresent image of a homogeneous civilization spread over a very large geographical area."¹⁸³

For a long time, even after the end of Rome, the strength of that urban and territorial settlement model was able to continue as an ordering platform and was effectively the landscape approval system on the continent, although in its various forms. A real "ground-city", a real "continuous monument" which, in many ways and in many cases, formed the solid basis even for the construction of contemporary landscapes.

The Mediterranean countryside, even subsequently, especially in its more urban spatial forms, the *enclosed garden*, the rural court, the suburban garden, was for a long time the area of man's production and socialization and made up for the well-known poverty of strictly urban public space. In the whole Mediterranean area, the historic links between the city and forms of agriculture that surround them and provide them with supplies, for a long time, represented a necessity and subsistence, but were also generators of alternative spaces to those *intra muros*.



Figure 2. The Ghardaia "cultivated fabric".

In the Arabic settlement fabric, the countryside was a source of income for the city (medina) in which the vegetable-garden spaces were already used for relaxation and leisure. In the coastal cities (Beirut, Tripoli) they were located within the walls and maintained through collective irrigation systems (dams or large tanks) or individual systems (wells, boreholes) and were located in the vicinity of the ports for marketing the produce. In Istanbul, the horticultural gardens are the Bostan, which face each side of the Bosphorus, whereas to the north of Tunis large orange groves (jnina) and olive groves have been preserved in the peripheral residential areas.

In the countryside of Tunisia (the rif), the well-off people stay in Swani, properties and rural homes; urban oases in Damascus (Waha) represented a gradual and hierarchical landscape that allowed the passage from city to horticultural gardens and orchards, to grasslands and cornfields, before finally reaching the wilderness. "

In the whole area of influence of Andalusia, the Iberian peninsula and Mediterranean France, the *huertas* accompanied and structured the development of the cities which, albeit with a progressive consumption of soil, embraced them within their confines and guaranteed their historic function. In fact, these spaces, as well as influencing urban growth, were considered valuable for the complex infrastructure of the cities themselves, especially in relation to the

¹⁸³ Vitta, M., *Il paesaggio, una storia tra natura e architettura*, Einaudi, 2005, Torino.

articulation and distribution of water resources, whose network often designed and organized - as happened with the Romans - the urban fabric, making it morphologically continuous and unified with the countryside. The minimum, suburban rural lots, in such contexts, gradually merged with the large residential blocks of the city, describing them as large open interior space, or large, productive estate farms. It is also the historical continuity between urban and rural areas that can be traced back to the ecological porosity and permeability of the Mediterranean urban fabrics. In fact, there exists a close relationship between the private and protected open space, whether it is urban space or cultivated fields, or also intimate space of domestic life and the closed structures of the Mediterranean peri-urban rural landscape.

It is no coincidence that the greek word *kepos* (the garden) and the Latin *Hortus*, in the *Middle Ages* have been treated with the Indo-Germanic word *ghordho*, which also indicated the court and the fence, reaffirming the closed, protected and circumscribed nature of the space, typical of a *hortus conclusus*. In addition to protection and control the enclosure guaranteed, biotopical balance and diversity of crops, but also spaces for socializing away from the hottest conditions. Even when in the post-medieval age -exactly as happened to the urban processes - the need to subdivide the lots according to the property divisions and the farming types and techniques led to a gradual densification of divisions and lots near the cities, re-proposing organizations, paths and structures quite similar to the urban ones, the autonomy of the two systems and the formal and functional integration between the city and the countryside were not lost. The outcome of this process in large parts of rural mainland, is therefore that of a subdivision in *Lanières* - long and narrow lots - a direct expression of this primordial urban occupation of the countryside.

The agrosystem-village relationship in different forms of rural landscape in Sardinia

Due to this strong link, the village and the agrosystem are arranged in the territory according to different and changing social, economic and nature of the land conditions.

However, the persistence of a dominant economy allows us to identify some repeated ways to organize the rural space and then to "give form" to a landscape so recognizable and prevalent. The fundamental relationship between agriculture and shepherding for centuries has affected the habitat of Sardinia. It is in this way that discriminates against some forms of housing permanent and immanent, from the most nomadic and ephemeral. In fact, it could be more synthetic if we say that the behavior and the work in the pastures determines the position, shape and durability of the Sardinian settlement. In Sardinia the transhumance, for example, is responsible not only more compact and fortified forms of mountain villages, but also more fluid and dynamic configurations of spread habitats in peripheral regions, of which it is the main and the relatively recent colonization reason.

The permeability of rural areas within the urban fabric of the village is measured in multiple scales. However, it is the nature and size of the public space that we have confirmation of this deep interaction. The dynamic and fluid pastoral habitat produces villages without real squares, and public spaces are made simply where, for morphological reasons, the road widens considerably its section or converges with another territorial path also originally a flocks passage.

In short, we are allowed to identify three main modes of behavior of the ratio village / agro system within the complex and diversified Sardinian rural landscapes.

The “center – center” form

Within the cereal open-field, inside the common management system of soil resources (called *Viddazzone*, deriving from the Sardinian word “Bidda”, specifically, the *village*), in the regions of hills and plains, the urban position is available in the most convenient way to support this

system, at the center. Beyond specific situations of institutional or religious nature, which could substantially affect on the definition of landscape boundaries, simultaneous and cyclical use of land in this agro-pastoral sense not only creates an equable sharing of village territory in pasture and arable land but also determines a certain equidistance between the centers, proportionally according to their size. These open landscapes are characterized by little point features of micro-urbanity (rural villages) that underlie a territory proportional to their specific needs.

The characteristic of the compact village of plain or hill is that it is also surrounded by another dense habitat form, the specialized crops one, a kind of food system made of interlocking orchards and of enclosed gardens (*lottus*, *cussorgias*, *binjas*), impermeable to pastures and in clear continuity with the urban tissue.

This belt manifests urban features: in particular, the settlement culture of the enclosure and *hortus conclusus* makes urban blocks and enclosed gardens two events entirely consistent habitat made in a different way. The continuity of the road network, the horizontality of built profiles, the enclosing public space, make the binomial village / agro system an integral and autonomous element with morphology clearly recognizable.

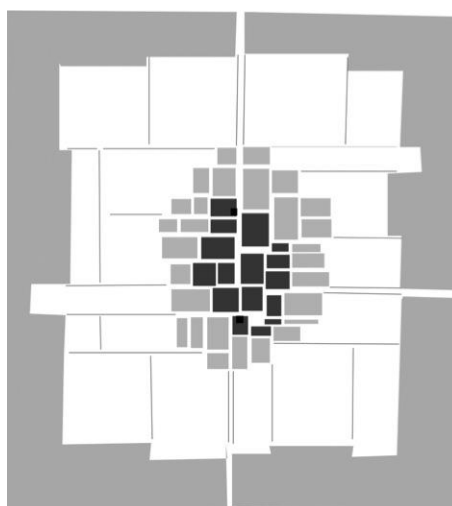


Figure 3. The centered village in countryside.

The “Center-edge” form

It is frequent in Sardinia that the village places itself in a strategic edge site between two major agro systems or between the dominant agro systems and grazing; in this territorial configuration, we're allowed to consider the urban center itself an edge that controls both production systems. This is done in the frequency halfway fluvial systems, in which the space between the river and the town consists of the most fertile land is occupied by peri-urban specialized crops (citrus groves , vineyards , orchards), while the space upstream of the urban pastures or extensive olive groves. In these cases, the landscape is not structured on more centers that colonize isotropically in the territory, but on centers arranged linearly and with an almost symmetrical between land use systems or agro gardens and saltus. This operating center / edge also makes two different types of configurations of urban edges: those upstream definitely closed and protected, sometimes in continuity with fences, pastures, and downstream of high permeability and dense and capillary branching paths to the river. Many of these situations are often near the mouths of rivers, inland, or in the narrow terraced valleys of the interior, in which the cultivated terraces show morphologies and sizes absolutely comparable to urban terraces.



Figure 4. The village between specialized crops and saltus.

The “Center-Saltus” relationship form

In this case, especially prevalent among mountain or hill pastoral habitats, as opposed to the main agro system and inhabited reality are two totally different and distant but closely related. The area of the gardens, occurs therefore also a few kilometers from the center that controls it, very often placed in a dry and arid soils, not very suitable to crops, much more connected to the main paths of the pastures. These villages, in contrast with the village of the cereal open-field of the plains, present themselves as centers with a strong vertical development, with a significant urban projection and a very limited internal porosity.

The pastoral relationship with the large enclosures (*tancas*) dominates the physical configurations of the relationship with the countryside, and as these are very wide, often dramatic antinomy between full and empty spaces. The specialized crops agro system domains, very often arise in the highlands and valleys that characterize the draining themselves are enclosed by dry fences arising from the works of stone clearance of rocky soils that characterize these areas.

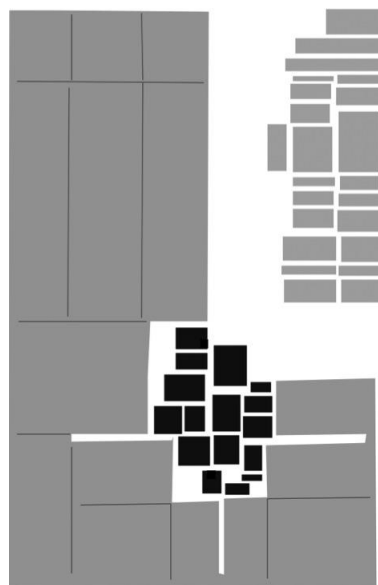


Figure 5. The village away from its agricultural domains.

This concise classification of rural Sardinian villages on the ground of relationship with its closer agricultural domains, shows how this extraordinary continuity of rural landscape, continuity of space and time, permeates all the scales, the one of big territorial organization forms (the hill openfield “puzzle”, the flock passages (*camineras*) net, the *bocage* of agricultural enclosures, the twentieth-century modern reclamations chess-board, the fieldworking strips of Southside urban fringes), the one of urban blocks and of housing dimension, the great agricultural *domus* dominant figure or the mountain simple house “*en band*“, or again the diffuse pastoral farm-houses of island peripheral regions (called *furriadroxius* on Sulcis – in southwest side, *cuiles* on Nurra – in northwest plain and *stazzos* on Gallura, in northeast side).



Figure 6. San Vero Milis. The village and its enclosed domains.

The new ecologies of fringes. Hybridizations urban / rural

It is no coincidence, in fact, that in the smaller towns of Sardinia, which have never completely supplanted the activities related to agriculture and farming, which occurs today this slow and difficult re-appropriation of an unproductive and piecemeal countryside, through a mixture of housing configurations, where the fringe of the original nucleus fabric of *domus*, dissolves into a singular and picturesque morphogenesis of “building-annexed”, into the carpet of polychrome surfaces between urban and rural areas. This form of “landscape of fringes” is a result of stratified processes, the dynamics of which diachronically occurred, uncoordinated and inconsistent, and in which the very presence of the green has more a residuality and isolation character than connection, contributing to diffuse image of patchwork landscape. Within this mosaic of full and empty spaces, buildings and agricultural interstitial, where persists deregulation and the need to take up space for the production and housing, there is an evident concern to organize and live the suburban areas through new rationalities. In contexts such as Sardinia, where rural activities held decisive roles in the landscapes formation as an expression of a specific social economic fabric, this hybridization with typically urban settings, generates discontinuity and inconsistency factors which necessarily reflected in the new rural habitat

types. This, in indirect farming system, in part derives from the incompatibility between a 'building that is substantially related to the sharecropping activity generated by social and economic needs and the current one oriented towards only to economic development. Also in the rural systems in which dominates the ownership and direct agricultural management, as we have seen, we are witnessing a shift in housing and in other urban functions to holdings, especially situated in peri-urban areas, thus altering their historical relationship with the landscape. This process therefore occurs not only in territorial scale, in which the historical structures gradually change or they are subject to a new logic of settlement, «but also involves the domestic space, which - split the original unity between living and produce spaces of the farm - it becomes the space devoted to services and business»¹⁸⁴

This change in the singular unity of this "rurban" settlement then generates rationalities that are moving more in the direction of a multi-functionality¹⁸⁵ that radically changes the historical concept of rural and urban space. As a result of these processes, these rationalities seem to be made of combinations, unusual juxtapositions between spaces for housing, manufacturing, marketing, in which the domestic space and the public one are often not identifiable and even not physically divided.

The combinations "house-greenhouse", "house-shed", "house-warehouse", rather than the large remittances, livestock farms residential or residences complexes attached to the company craft, witness a sharp re-appropriation of the countryside by the production activities although never related to the traditional concept of the rural space of agricultural production. And yet the direct management of rural areas, since the beginning of the new millennium that had accentuated the possible distance between the places of production and administration and especially the residence, in the opposite direction, seems to be peremptorily returned as a practice of a new extra-urban living¹⁸⁶, a new ecology that distinguishes the nowadays great spread housing crown of main conurbations.

The "urban" multifunctional potential of specialized crop areas.

In this "puzzled" belt of specialized crops that densely surrounds the village, strategically displaced in urban fringes areas and which is deeply rooted in the very nature of the village, are occurring the main mutations in "rurban" sense of the historical landscape, the deeper hybridization between *bidda* and *sartu* (the village and the countryside), historically distinct but highly related. This bond is in crisis today, paradoxically for a new rapprochement of agricultural, livestock farm and handicrafts and housing. And yet, in the current "rurban" configurations of fringe areas, specialized crops participate in multifunctional sense evolution of the countryside and are just essential into the new processes of progressive urban colonization. If we consider that our rural areas, as stated by Bernardo Secchi, as invaded by urban tensions, react and are yet structured for "micro-rationalities" of production, often still closely tied to the fabric of rural society that generated them, we are allowed to consider the specialized peripheral crops as a specific dimension and completely integrated with all these rationalities, or are themselves rationalities, through which the farm or another small generic production unit reached the direct and continuous use of the land.

¹⁸⁴ Durbiano, G., Robiglio, M., from "la nuova dimensione del territorio", in *Paesaggio e architettura nell'Italia Contemporanea*, Donzelli editore, Milan, 2003, p. 40.

¹⁸⁵ These features are described very well by the addresses of the PAC (Politiche Agrarie Comunitarie) in which "multifunctionality" of agriculture activities is a fundamental issue. About this topic cfr. AA.VV., *La riforma della Pac in Agenda 2000. Dalle proposte alle decisioni finali*, Osservatorio sulle Politiche Agricole dell'UE, Inea, Roma, 1999.

¹⁸⁶ Cfr. Pierre Donadieu, *Campagne Urbane*, (trad. eng. *Urban Countryside*), Donzelli editore, Roma, 2006.

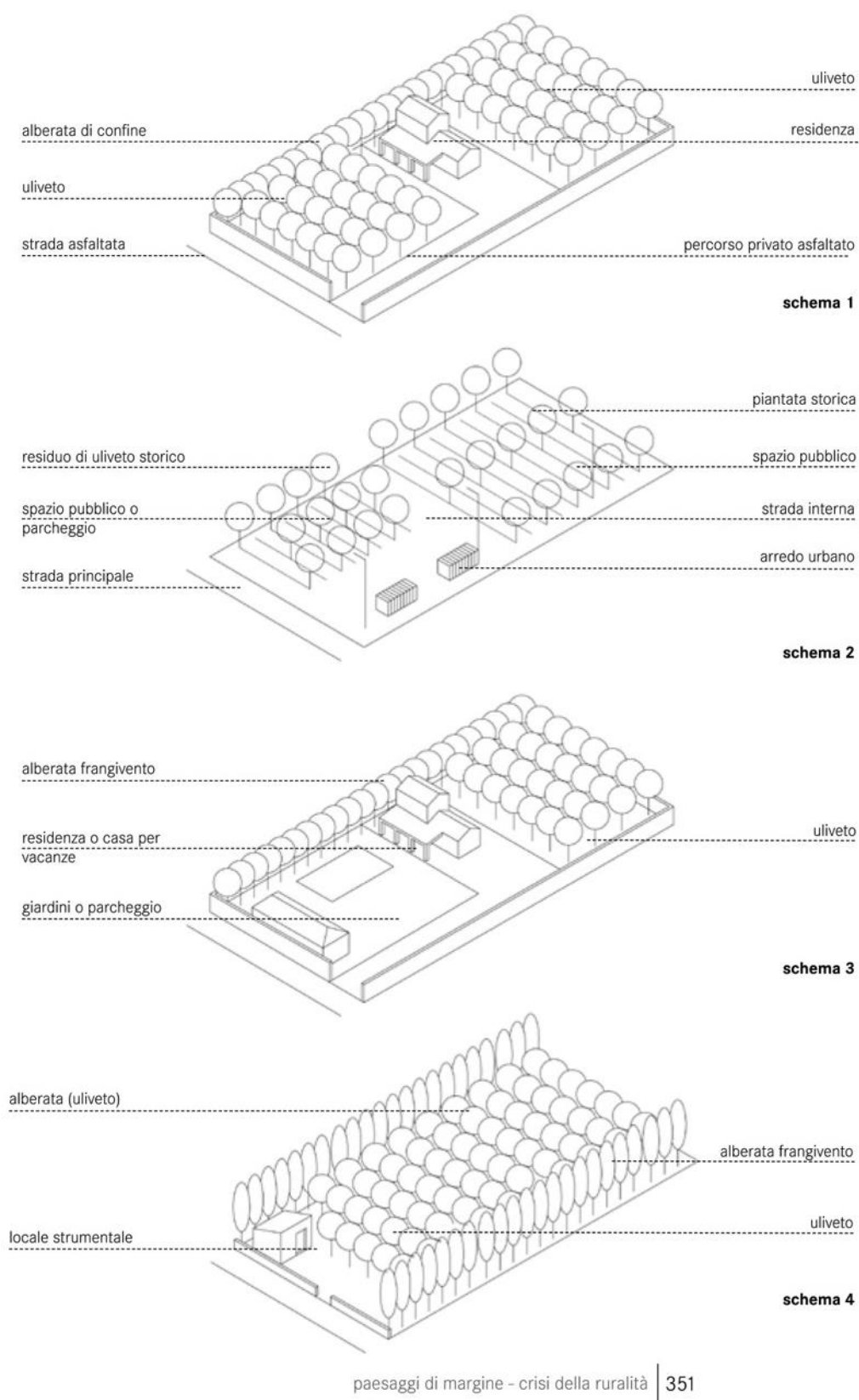


Figure 7. Schemes of contemporary rurban house/garden aggregations.

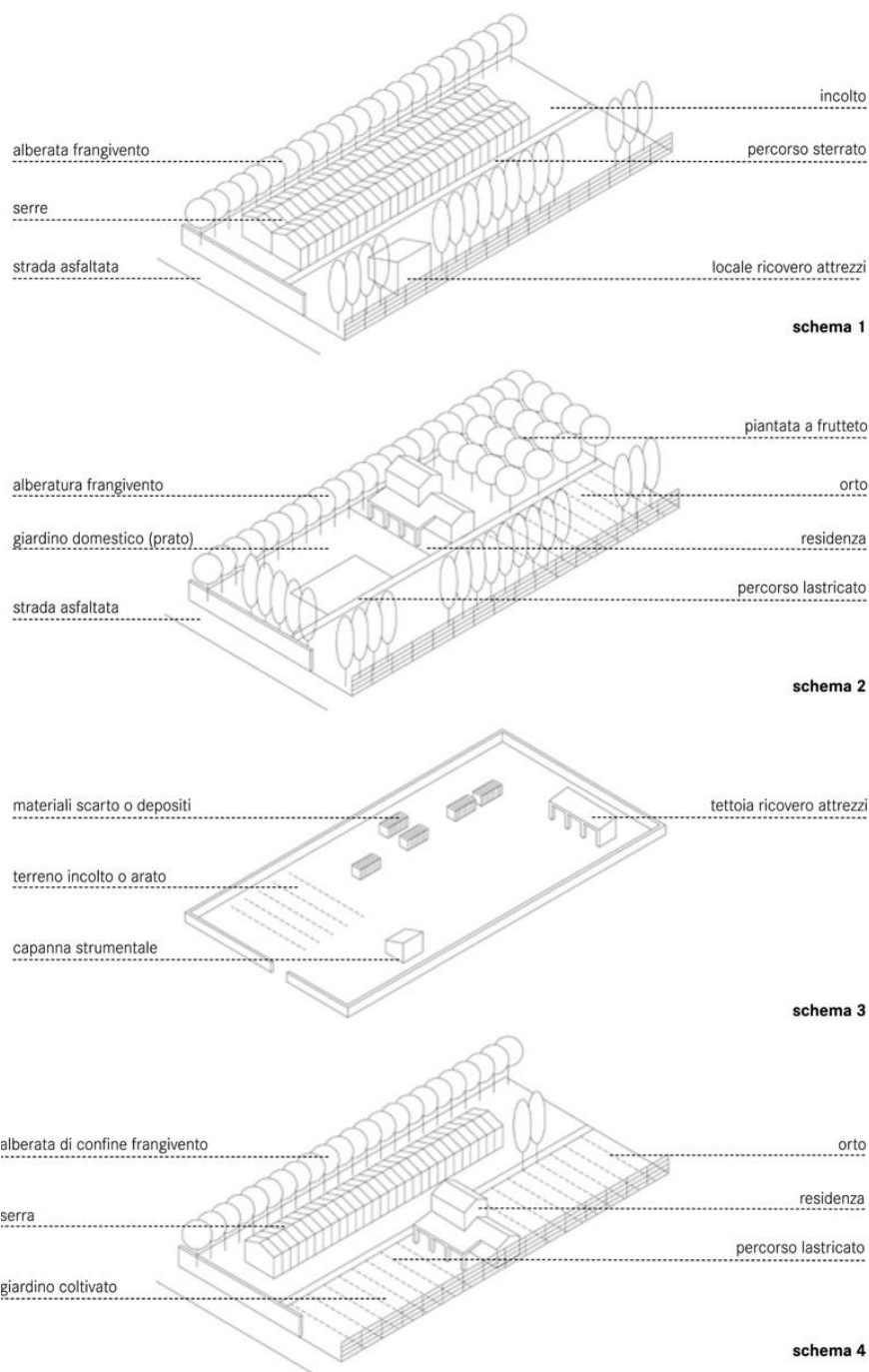


Figure 8. Schemes of contemporary rural house/garden aggregations.

The specialized crops such as residential gardens

It is undeniably the most diffuse issue of rural landscape. Increasingly the suburban specialized crops, especially in the Mediterranean area, are incorporated inside the residence domain at the time when the ancient rural lot, originally productive, it becomes tight housing.

This phenomenon is due to landlocked agricultural parts into the more and more closed net of the city, those rural "vacuoles" mentioned by Gilles Clement in the *Third Landscape Manifesto* in 2006, they become more and more places of the garden or the urban individual tree-private, which represents the new garden of the house. The myth of ornamental plants, the ancient lemon pergola of Mediterranean terraces, the classic bourgeois garden, is increasingly taken up in making suburban neighborhoods into residual peripheral crops and becomes one of the essential factors of the binomial "garden-with-house" of large mesh of *pavillonniers* fabric, within the housing sectors between suburban nucleus.

In Sardinia, for example, the two most important urban areas, that of Cagliari and Sassari, evolved than their suburban crops in different ways: in Cagliari, the ancient crops of olive groves and vines, now on a residual basis, remain as trim farm into long and narrow lots (*Corrias*) and define the main slope of spontaneous settlements in urban fringes that have no more agricultural vocation; in Sassari, a robust and ancient crown of olive plantations is underpinned by the residential expansion, however, that not substitute, rather incorporates it as an internal garden of second homes, or operates a network of suburban micro-accommodations.

The specialized crops as work and play clusters

In many circumstances the tree-crops, such as olive groves and citrus groves, constitute a sort of buffer to protect new residential-productive mix cluster -which tend to operate independently within the non-urban territory. In this case also, the functional shift between a productive and ornamental green and another one for loisir is decisive. In fact, the tree-lined field becomes ornamental windbreak tree-lined for sports areas or a traffic noise barrier for productive and residential enclaves. The residual of ancient belt of orchards and olive groves surrounding these villages, often built over ancient poles of rural production, restores the idea of great productive farming within a complex landscape of encloses: the evergreen leaves of tree-lined or the *Boccage* made of Mediterranean shrub and bush arrangement species contribute to "making-of-privacy" of peri-urban multifunctional farm. This new suburban landscape multiplies the crossing and colonization devices of the soil: alleys, yards, sheds, parking lots, dirt roads, open spaces are entered in the residual cultivated network that mediated the capillary relationship between the ancient village and the pasture territory.

The specialized crops such as peri-urban centers connectors

In no different way, the old and new origin main urban nuclei, belonging to the suburban crowns of the main conurbations, whose growth in the last twenty-five years, often proportionally higher than that of the core, they often occupy large areas of the fringes engaged in special cultivation. The interesting combination between settlements and cultivated crown has generated ever-changing and evolving landscapes, where territorial connections and crossings are developed in a "non-stop" urban-rural and in which the walls of the cultivated fields, orchards and of peri-urban vegetable gardens, are often in substantially line with those of the houses, restoring the close landscaping relationship between the house and the field, the arcades and the rural court, between the market open space and the alley. This continuing situation of dispute for the use of the ground in more fertile areas between the city and the agriculture activities, produces interlayered configurations between urban and rural, in which typological hybridization of different nature buildings is the most common and the most "natural" in the management process of a difficult balance between built-up areas, empty spaces and green spaces. In these rurban areas, the logic of the *interstitium* takes precedence over the traditional one *vacuum*, the ecological corridor than the urban block, the residue compared to the unitary effect.

The specialized crops as new poles of multifunctional agricultural production and tourism

The latest Community Agricultural policies encourage the so-called principle of “conditionality” of the agricultural farming, which as well as ensures the efficiency and quality of the product, it must be as multi-functional core and consumption within the peri-urban rural areas. This fact, from the typological point of view, constituted an important innovation but has made even more complex the definitive shift from monofunctional traditional rural building, on the model of “farm-house”, to aggregates volumes for different functions, more and more specialized. To the original productive nucleus should be added the store, the local dining and consumption, marketing, workshops and warehouses. So, within this multifunctional nature of the contemporary farm, in many cases, the specialized crops dominate the agricultural sectors here although short-distance and absolutely necessary to the survival of the same company. The configurations that can take this relationship is variable: you can think of a real agro-urban village in contexts of intensive agriculture and diversified from multifamily management, small farm-houses into agri-tourism houses.



Figure 9. The Sassari olive grove crown. A new “rurban”habitat.

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Study on the sustainable development of urban fringe at the background of urban and rural co-ordination in China

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Abstract. *Since last century of the 90's, with the continuously expanding scales of modernization and the high-speed development of urbanization, as well as a long-term practising on the structure of urban-rural binary economy, urban fringe, as a transitional area derives on the urban-rural region system, is facing great challenges of sustainable development, and a series of contradiction of expansion and protection is becoming more and more obvious. At the background of the urban and rural co-ordination, urban fringe has become a critical point of sustainable development realization in integrating urban and rural areas, on the basis of whole above, this paper selects three different urban fringe of Hangzhou in Zhejiang Province as case study areas, by analysing the non-single factors influencing on the mainly subject, and focusing on the development process of urban fringe and its evolution mechanism, attempting to find an effective approaches on optimizing the distribution of land resources in urban fringe, and establishing a development strategy evaluation system, to promote relevant measures and recommendations for the future development of urban fringe areas.*

Key Words: *urban and rural co-ordination, urban fringe, smart growth, spatial conformity, strategy guidance*

Introduction

Background

Since the 1990s, with the rapid development of urbanization in China, the urbanization has reached to 30.8% by the end of 1998. In 2011, the urbanization has exceeded 50% for the first time. The State of Chinese Cities 2012 / 2013 points out that China's urbanization will reach to 70 % -75 %, by 2050.

Around metropolitan area, as the continuously developing of modernizing construction and promoting urbanization, urban and rural area have shown a mounting blurry boundary between each other, and the traditional urban-rural dichotomy is gradually replaced by the new urban-rural relationship, which is mutually infiltrated and relied on each other. In the spatial structure aspect, there has been a sensitive, rapidly changing area of relatively independent regional unit named Urban Fringe, which is a new transitional area derived from the foundation of urban-rural regional system, and it has been the first choice of urban sprawl. Urban fringe, as the frontier region of non-agricultural constructive land sprawl, and the marginal area of agricultural land protection as well, is the key to controlling the urban scale and guaranteeing the agro-ecosystem. Various forces from urban and rural area are gathering there, inspiring and exposing the contradiction between the urban fringe development and protection apparently. Whether it is from the view of long-term goals or short-term benefit, a systematic study on the land-use of urban fringe, spatial distribution and sustainable development research, has become an urgent task for China's urban construction.

Interpretation of the Urban and Rural Co-ordination

The urban and rural co-ordination, proposing as the economy development strategy, is based on the contradiction of urban-rural social economic structure dichotomy, aiming at establishing a

symbiotic circular economy system of functional complementary and organic in urban and rural area. By changing the imbalance of policy and resource allocation that implemented under the social economic structure dichotomy in the past, with the way of developing urban area to promote the rural growth, transforming the rural feature of poverty and fall behind, improving farmers' production and living conditions, ultimately, achieving an integrated development pattern of suitable level in urban-rural productive development, relatively associated urban-rural industrial development, relatively unified urban-rural policy institution, relatively equal urban-rural dominant position and frequently urban-rural interaction.

In the spatial aspect, it is considered to co-ordinate urban area and rural area, combine the characteristics of urban and rural to make each other mutual penetration.

Urban fringe spatial development status

The case of Hangzhou expansion

Hangzhou's development is a process of rapid expansion. The early days of the foundation, under the guiding principles of vigorously developing in the industry, Hangzhou suburban district has formed a large-scale industrial area, the urbanization begins to sprawl to the urban fringe for the initial expansion. By the early 1990s, with the rapid development of market economy, Hangzhou's construction has dramatically speeded up and sprawled along the urban periphery. The rapid expansion of urban space leads to structural imbalance, shortage of land and other issues, we must take measures to guide urban function. In the year of 2001, the adjustment of administrative districts eased tensions of land conflicts and urban spatial morphology got changed from the original single-center to multi-center.

Land utilizing scale, expansion rate and intensity

The land scale of Hangzhou is 3068 square kilometers and the population is of 409.54 million, the metropolitan spatial pattern has begun to appear. By using remote-sensing image technology, we count the urban construction land area of different period in Hangzhou, and calculate the average expansion rate and intensity. (Table 1, Table 2)

Table 1. Land utilizing scale of Hangzhou (Urban Master Plan of Hangzhou, 2001-2020)

Year	City Area			Downtown		
	Land scale (Square kilometer)	Population (million)	Average (Square meter per)	Land scale (Square kilometer)	Population (million)	Average (Square meter per)
2000	229.01	253.72	90.26	204.75	238.26	85.93
2005	290.39	313	92.77	256.53	284	90.33
2010	354.76	362	98.00	304.70	319	95.52
2015	399.96	404	99.00	334.65	345	97.00
2020	453.00	445	101.80	369.92	370	99.98

From the expansion area in different district, the rapid expansion of urban land-use in Hangzhou has an increasing impact on urban fringe. The sustainable development of urban fringe should be studied on the basis of this background that fully understanding the economy development and rapid urbanization.

Table 2. 1991-1999,1999-2008 Different districts expansion speed and intensity in Hangzhou (Urban Master Plan of Hangzhou, 2001-2020)

Location	Constructive Land (Square kilometer)			Area Expansion (Square kilometer)		Expansion Speed		Expansion Intensity (%)	
	1991	1999	2008	91-99	99-2008	91-99	99-2008	91-99	99-2008
YuHang	76.87	107.92	166.57	31.05	58.85	3.88	6.54	5.05	6.06
XiaoShan	117.37	166.36	389.96	48.99	223.91	6.12	24.88	5.22	14.95
GongShu	21.24	31.65	43.81	10.41	12.21	1.3	1.36	6.13	4.29
XiaCheng	17.33	25.53	33.77	8.2	8.29	1.03	0.92	5.91	3.61
ShangCheng	14.22	17.28	16.29	3.06	-0.96	0.38	-0.11	2.69	-0.62
JiangGan	32.02	53.9	108.4	21.88	54.59	2.74	6.07	8.54	11.25
BinJiang	9.68	16.12	37.56	6.44	21.47	0.81	2.39	8.32	14.80
XiHu	38.69	53.69	71.58	15	17.99	1.88	2.00	4.85	3.72
Total	326.67	471.58	867.95	145.03	396.37	18.11	44.04	5.54	9.34

Land-use changes in urban fringe

According to the changing situation of urban space in Hangzhou (Figure 1. and Table 3.), from 1988 to 2004, the central area of Hangzhou has expanded by nearly six times, and the urban fringe area expanded by 3.5 times as well, while, the rural area has reduced by nearly 20 %. Hangzhou is still in the process of expanding rapidly, and the urban fringe expansion is the most furious.

Land-use and urban fringe spatial morphology features

By the Hangzhou urban fringe range chart in three periods of 1988, 1998 and 2004, we can get the general expansion trend of urban fringe area and built-up area.(Figure 2.)

A. Concentric expansion trend

Part of the main city urban fringe, whether it is inside or outside, the boundaries of the border are in the form of concentric ring that constantly pushing and outward, showing the evolution tendency of developing from the center to the edge.

B. Road - river trend

Through the investigation of external edge, we can see the urban fringe belt's extension characteristics of plan morphology. Urban fringe belt and its built-up area are presented with the shape of rhomboid, reflecting the evolution trend changed from the concentric mode to the finger expansion mode.

C. Trend of satellite towns

There is convincing evidence of frequently contact with the Hangzhou central area, administrative district and satellite towns. On the one hand, the urban fringe expansion was driven forced by built-up area, on the other hand, was affected by the satellite town's geographical tension. All of these, highlighting the stretching of urban fringe belt and built-up area's plan morphology in East-West axis .

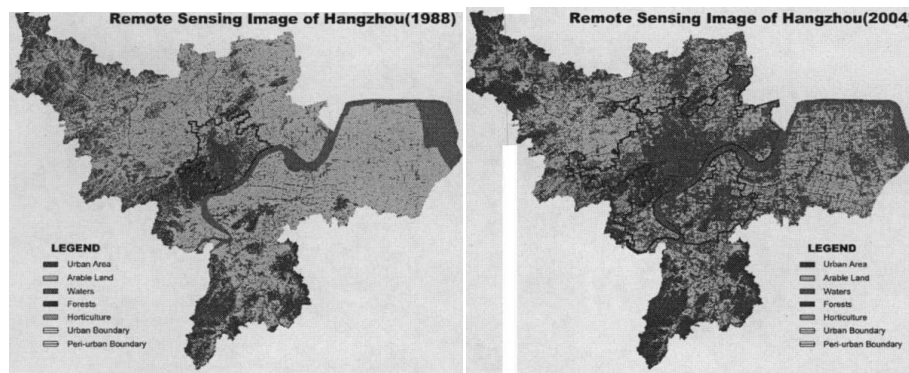


Figure 1. Urban land-use classification by remote-sensing analysis.

Table 3. Analysis of urban space land uses

Year	Urban Area			Urban Fringe		Rural Area	
		Area (Km ²)	Proportion (%)	Area (Km ²)	Proportion (%)	Area (Km ²)	Proportion (%)
1988	Total Area	30.9	0.93	145	4.36	3151	94.7
	Construction Scale	22.3	0.67	66.9	2.01	400	12.02
	Agricultural Area	1.96	0.06	53.25	1.60	1956	58.79
	Forest Area	0.96	0.03	8.61	0.26	499	15.00
	Water Area	5.7	0.17	16.15	0.49	298	8.96
2004	Total area	210	6.3	652.4	19.6	2464	74.1
	Construction Scale	176.7	5.31	290.37	8.73	485	14.58
	Agricultural Area	16.75	0.50	237.05	7.13	1003	30.15
	Forest Area	10.28	0.31	56.64	1.70	619	18.61
	Water Area	6.63	0.20	68.26	2.05	357	10.73

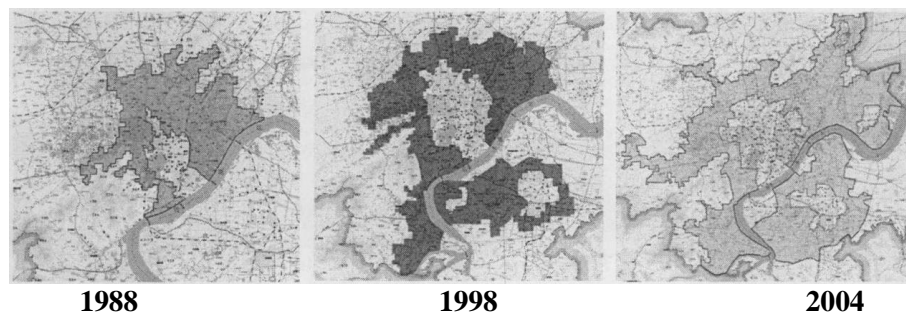


Figure 2. Each period of Hangzhou urban fringe range.

Relationships between the population and urban fringe development

The characteristics of urban population spatial agglomeration and diffusion are extremely significant aspect to interpret the urban internal spatial structure model. Studying on the demographic changing charts in three stages various form 1964-1982, 1982 - 1990 to 1990-2000, we can obviously see that during the period of 1964 to 1982, changes of Hangzhou urban population is relatively small, and the central area population has emerged signs of decentralization, however, the population decrease was minimal (Figure3.). In 1982-1990, the urban center's absolute quantity of population is reduced by 11.86%, which indicates that the

central area has such suitable scale of diffusant source. The distant suburban population declines, and the suburban population growth rises, showing that the suburban area has been the main part of attracting urban population (Figure4.). In 1992-2000, the entire central area of negative population growth rate increases, and the distant suburban population growth rate decreases, meanwhile, the suburban population growth is considerably highly improved. (Figure5)

Development types of urban fringe in Hangzhou

Hangzhou urban expansion is affected by multiple factors, such as, population urbanization, economy agglomeration, industry suburbanization, development of science and technology park, and construction of intercity transportation infrastructure. Through the integration of research and summary, Hangzhou urban fringe development types are mainly in these following categories:

A. Type of mainly based on the recovery of culture and landscape, and the development of tourism and residence. For example, XiXi Wetland and Jiang Village, which are characterized by estate agent as the vanguard of spontaneous market force.

B. Type of ecology protection and control of urban development. For example, Zhuantang district, which is characterized by achieving the coordination of overall urban and local benefit of urban fringe development under the way of urbanization.

C. Type of the construction of high technology park. Such as Binjiang district, which is completely developed under the leadership of local government.

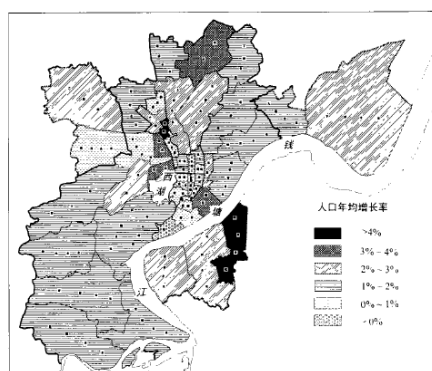


Figure 3. 1964-1982, Spatial types of population changing in different blocks of Hangzhou.

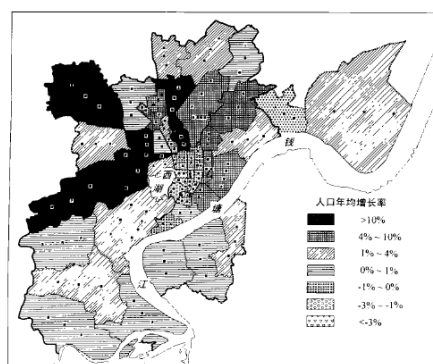


Figure 4. 1982-1990 , Spatial types of population changing in different blocks of Hangzhou.

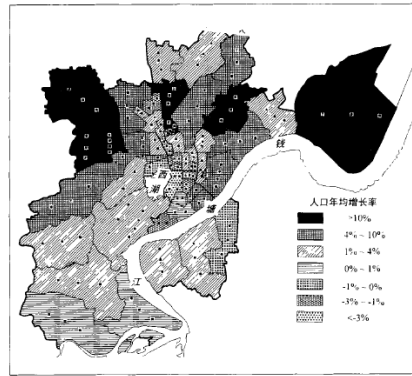


Figure 5. 1990-2000, Spatial types of population changing in different blocks of Hangzhou.

Explore the evolution mechanism of urban fringe development

The evolution mechanism of urban fringe

Urban Fringe is a unique human environment system, which should be due to the interaction of various factors and powers including urban nature, economy and cultural environment system. Each aspect of the urban fringe developing changes is related to the different element of the whole urban environment system, and has maintained a close spatial relationship with urban area, relying on each other. Among the all factors, urban economy activity is the determining factor of the urban fringe development, industrial activity is the direct motivity of the urban fringe development, furthermore, the content and pattern of industrial activity determines the urban fringe spatial structure and land-use morphology characteristics.

Urban fringe internal evolution mechanisms, essentially is the result of joint action that the urban internal development pressures working on the suburban area and the needs of urbanization of suburb. The existence and development of urban fringe entirely rely on the pressures of urban development, the imbalance of all these pressures in different directions, is the direct cause leading to imbalanced changes in urban fringe. The factors, affecting urban fringe spatial development can be summarized in three aspects: promotion mechanism, basic mechanism and support mechanism. (Figure 6)

Promote mechanism: The spatial requirement that urban economy development has to be faced with, is the motivity resource of urban fringe spatial expansion. Urban continuous development, on the one hand, is to make the urban function and structure complication and diversification, upgrade traditional industry, rise the related peripheral industry, and increase the spatial resource demands of urban, on the other hand, economy development has attracted a large number of non-agricultural population congregated, which stimulates the urgent spatial resource needs of urban. Industrial development and population congregation makes the urban create a strong model of developing from the internal to external, which is a spur to seek ways to the external expansion.

Basic mechanism: Transportation system construction, transformation of lifestyle of production and living that promoted by technological development, and the influence of the natural conditions, all these above have become the basis of the spatial evolution mechanisms of urban fringe, which is the main support to realize the possibility of spatial evolution. Building a modernized transportation system has greatly increased the individual action distance, at the same time, the construction of modern logistics system in the internet age, reduces the individual spatial distance of seeking service and information. Traditional urban structure has got shocks by the reciprocal relationship in distance. The superiority of central area information has gradually weakened, a real external expansion has achieved to form a various group pattern.

Support mechanism: Urban planning and policy regulation is the coordination mechanisms

of urban fringe spatial evolution. As a subjective form of coordination, the establishment of policy regulation and the formulation of urban planning play a role in promoting or limiting the urban expansion. Among these, the whole urban planning policy, urban development policy, related land-use space and industry development, which are all formulated under the guidance of national macropolicy, have a direct impact on the development of urban fringe spatial morphology, as well as the provisions of the regulations and macroeconomic policy form an indirect impact

Form the structure diagram of governance evolution mechanism

The phenomenon of urban sprawl development is a consequence of various factors, we should consider the governance measures in a systematic standpoint instead of a single aspect, and on the basis of the conclusion of western countries' management experience, combining with the current reality as well.(Figure 7.)

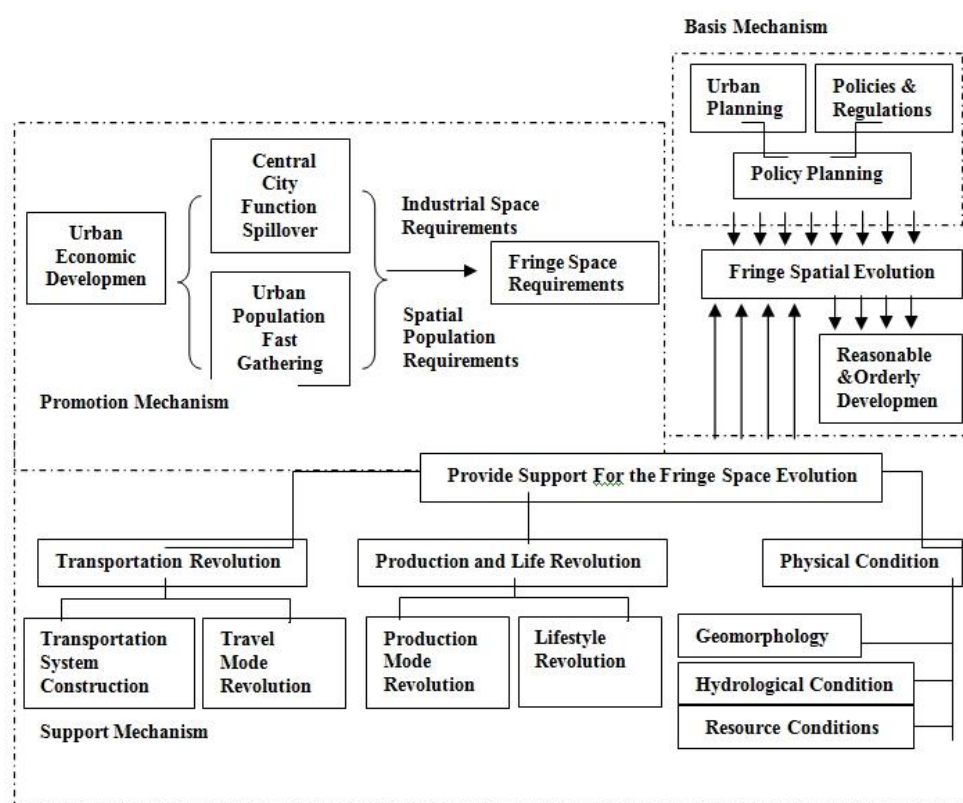


Figure 6. Analysis of the evolution of urban fringe.

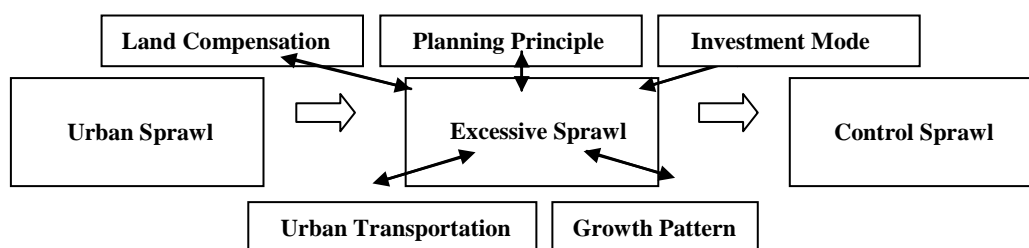


Figure 7. Governance mechanism of urban sprawl.

Select the case of urban fringe

XiXi wetland: recover culture and landscape, develop tourism and residence.

XiXi district is located in the westnorth part of Xihu district in Hangzhou with the total area of 23.06 square kilometers. In the process of XiXi district development, the government of Hangzhou has formulated a series of related planning and made decisions to consciously guide the recovery of culture and landscape, and achieving the sustainable goals of the development of the tourism and residency, which mainly including:

- A. 'Jiang Village phenomenon' and improvement of the basic infrastructure
- B. The construction of XiXi Wetland Park and cultural tourism
- C. Provide employment chance for the farmers and other related security

Zhuantang district: ecology protection and urban development controlling.

Zhuantang district is located on the southwest part of urban fringe with the total area of 156.32 square kilometers, which is an essential place of the golden tourism line. In quite a long period of time, Zhuantang district has been incorporated into Hangzhou scenic tourism and urban water conservation district, and takes the function as the industry base of agricultural production. Since 1990s, the whole Zhuantang district developed slowly and had a poor economy foundation, which become the 'lagging region' of Hangzhou's economic and social development. In 2006, the government proposed to develop economy to achieve the goal of controlling the urban development under the protection of ecology. The planning decision including:

- A. Tourism scenic spots protection and tourist facilities development
- B. Ecological belt protection and developing planning
- C. Education facilities construction
- D. Pollution prevention measures
- E. The agriculture support for the valuable culture
- F. Financial compensation

Binjiang district: develop high-tech skill and construct eco-creativity park.

Binjiang district is located on the South Bank of Qian Tang River with the total area of 73.33 square kilometers. At the beginning, in the face of 'agriculture, rural, farmers' and the blank situation of urban infrastructure, the government put forward the main objective that combines the high-tech skills development and economy promotion. The developing orientation of Binjiang district ranges from a single high-tech industry development district at first to a combinational functions of education, business and dwelling, which moves towards from the 'West Lake Times' to the 'QianTang River Times'. The planning decisions including:

- A. Building technology innovation base, high-tech industry base and the most dynamic economy growth district
- B. Set up the 'White Horse Lake' creative park as the foundation of the urban organic renewal, ecological environment protection and creative industry .
- C. The improvement of living development and basic facilities
- D. The favourable tax policy and independent budget system
- E. Re-employment training for the land-lost farmers

Summary and reference

Through the spatial development strategy analysis on the three cases above, the advantages and disadvantages of sustainability of content, implementation results and decision-making process

can be easily found out. The existed problems on sustainability of content can be summarized as paying not so much attention to the guidance of land layout in the future, compactly efficient land developing, effective usage of resources, reduction of the social differences in groups and achieving the social equality. In the aspects of implementation results and sustainability of decision-making process, there are issues that the insufficiency of public participation, and lack of the effect evaluation after the formulation and the feedback correction system. Of course, the spatial development strategy of three regions also play an effective role in promoting the sustainable development of the whole urban fringe in Hangzhou and provide some experience.

A. The reference of 'XiXi mode'

During the process of urban sprawl, natural resources are often difficult to be got effective protection. As the accelerating pace of development, natural environment and historic relics are the common phenomenon of a significant recession. Some local governments in order to pursue the economy benefit, fail to attend to the protection of natural space. The protection of Xixi wetland displaying the importance of natural ecosystem protection that government attaches to, is an innovative meaning practice of urban management, which tells us how to protect valuable nature resources in the process of urban sprawl with sustainable development based on the fundamental concept, how to find ways of ecology protection among the battle of the benefit of economy, society and environment, and how to explore a new style of protection and utilization in the urbanization.

B. The innovation of 'White Horse Lake' style

Binjiang southern district construction tasks are identified from four fields, such as economy, culture, spatial quality and development model that are the most basic elements of urban city.

Economic 'transmission mode', which actively cultivates new leading industries, stresses the mutual supporting relationship between the new - old industry and the new - new one, emphasizes the positive interaction between the industry and environment on the original industrial basis. Culture's 'growth mode', which focus on the heritage of urban tradition protection and the cultivation of mechanism's sustainability. Living space's 'quality mode', which is unified with the goal of the whole urban construction and is raised to the height of a kind of productivity.

C. Thinking about the 'Jiang village phenomenon'

In the process of urban fringe development, the market force tends to be a effect can't be ignored. Developers can often lead to drive the region's initial development because of the market sensitivity and profit-driven, however, as the approach of 'isolation', which leaves a lot of problems in the west part of the city during the early days. Although, there are improved facilities in each neighbourhoods, the whole basic infrastructure is still in absence. During the development, because the lack of necessary preparation of the uncertainty about the future, planning following with the developers leads to a state of disorder and confusion about the urban development space. Developing the urban fringe, we must strictly implement the principle of 'planning in advance' to continue the sequence of the holistic urban city and achieve the sustainable development.

D. The advantages and disadvantages of urban space development mode under the leadership of government

The development of Binjiang district is an entirely typical case of urban fringe development under the leadership of government. Some scholars have pointed out that the evolution of urban development and spatial structure in China is largely depended on the result of institution changes. The local government can directly intervene the urban space resource by the executive power, which shows a strong state of government leading.

When in the face of the fierce competition of external environment, the executive power can often produce a strong priming effect quickly, and thus the development of urban space that is implemented under the guidance of the local government, has a significant positive influence on the rapidly gathering superiority resources, promoting the urban structure adjustment, improving the appearance of urban landscape and enhancing the urban competitiveness. What's more, we should notice that the transformed local government, market and public has produce a

profit misalignment.

Propose the sustainable space development strategy of urban fringe

The concept of sustainable development in urban fringe is an important part of the overall urban sustainable development. The power of sustainable development is consist of economy development ability, social development and stability ability, resource environment ability and management coordination. This kind of sustainable development pursue to reach a state that the common development of urban and rural area, and the coordinating construction of economy and environment. It promotes social equality and intergenerational fairness in the course of urbanization, and emphasis on meeting the demand of urban population, rural population and foreign population, and rational allocation of existed resource as well, which not only think seriously about the economy development, but also pay more attention to the social progress and environmental ecology protection.

Hangzhou is a city of rapid urbanization. The city, urban fringe and suburban area are all in the fast evolution, at the same time, the economy, society and land-use structure of urban fringe is abrupt changing all the way, which requires effective urban development strategy and spatial planning guidance and regulation. By the sustainability assessment of regional planning strategy in the case of Xixi wetland, Zhuantang district and Binjiang district, we propose some following suggestions for the sustainability of urban fringe spatial development in Hangzhou.

A. At the stage of urban rapid expansion, in order to keep the reasonable orderly development of urban space and coordination of economy growth, social development, and ecological environment protection, we need effective development strategy, spatial planning guidance and regulation. How to maintain the consistency and unified implementation in different strategy and planning, how to keep the coordination of planning in different period, are both the issues we should pay attention to of Hangzhou urban fringe development.

B. For the development of Hangzhou urban fringe, we need to emphasize the relationship with the whole city from the aspects of functional orientation, construction scale and logical urban form. With the space expansion and the aggregation of population and production, we should form the division coordination of urban function, and set up urban traffic system to ensure the sustained performance, also, we need to solve the coordination operation to build a suitable working and living environment.

C. During the process of urban fringe development, there is a most prominent contradiction between the farmland, ecological space protection and the land for construction. On the one hand, it is the requirement of country and urban's long-term benefit that try to protect the farmland, water and other natural space, on the other hand, it is the industrialization and urbanization which need a large quantity of land space. It demands that improving the efficiency of land-use construction by the study on spatial planning and development strategy is an urgent task.

D. During the process of urban fringe development, farmers are always the vulnerable groups, who have lost their production and living land because of urban sprawl. The government should use a variety of policy methods to arrange their residence and ensure their living life. It is a strategic work that will make a close relationship with the stability of society and long-term development.

Conclusion

Urban fringe's sustainable development is inseparable from the basic conditions of urban and rural co-ordination. From the perspectives of urban and rural co-ordination, there is of positive significance to study the structure of urban fringe spatial development, explore the evolution of urban fringe development mechanism, seek the countermeasures for space sustainable

development, play an important role in coordinating urban-rural relationships and promoting region development and so on.

However, urban fringe development is a dynamic changing process throughout, and has its own particularity. This paper is just based on the research data of Hangzhou, and making a preliminary study of the process of urban fringe development evolution and characteristics. There are still many questions to be discussed and solved in the future.

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Contributions to the study of urban morphology: morphological, typological and landscape interrelationships in Brazilian Jesuit architecture

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Abstract. *The hypothesis put forward in this article is based on the possibility of Jesuit architecture, in particular, located in Brazilian territory (16th century), and brokering dialogue built on the same body, and interrelated manner, aspects of urban morphology, typology and landscape. Lamas explains that, as a discipline, urban morphology adds to itself not only the built environment, but the means by which this was built in its interaction with urban form, ie "social phenomena, economic and other engines of urbanization" (LAMAS, 1992). Understanding the urban form is to understand its elements, "both in order to read or space analysis both in order to design or production" (LAMAS, 1992). Studying urban form means understanding where it enters the city and its constituents, its spaces and the interrelation between them and their context in a comprehensive spectrum of what is called the city and urban. The architectural typology and urban morphology are connected at the heart of their analyzes, whereas both, according to Pereira, studying "two orders of homogeneous facts" (PEREIRA, 2012), studying the components of the city - architectural and spatial - that overlap or complement according to the scale of analysis used. The Jesuit colonial architecture models Brazil, in a decisive way, the construction of distinct urban cores originating in the Brazilian coast in the sixteenth century. This by deploying edilicia typology accompanying the Jesuit doctrine of location and site selection for its buildings, recommending security, visibility and ease of access around rivers or the sea. These constructions carried out on elevated areas marked in time and space the landscape of the first Brazilian urban core.*

Key Words: urban morphology, typology, landscape, architecture jesuit; Brazil

Introduction

The city as a center of human culture builds great narratives of architecture and urbanism over the time¹. These narratives are cultural products that communicate and translate to a greater or lesser extent, as time passes, the quality and shape of the space and the landscape is constantly changing and reframing their content, mostly cultural. In this article, the typological analysis reaches its understanding from the articulation with the urban and landscape morphology. So comes the understanding of the transformations of cultural content of a given time and place, or even changes the meanings of such content. Therefore, the inclusion of the landscape as part of the typological study is relevant. Besides the typology and morphology, include the landscape as one of the narratives of architecture and urbanism, which helps in translating the object of analysis on canvas, provided that such narratives are hinged together. As Milk (1991) explains, the landscape changes constantly as the prevailing cultural content. However, when inserted in the urban environment, binds temporally morphology and typology. At the same time, the construction of the connect type urban form, or morphology of the city, also constructs the image of the city in specific time and space. The landscape under the parameter of urban development complete the history of the city, constituting perhaps one of his most compelling narratives.

Therefore, this article proposes to elucidate the connection between three major narratives of architecture and urbanism - the typology, urban morphology and landscape - and as a last level, investigates the role of architecture in the constitution of the city, taking the type as conductor

initial analysis. Assume, therefore specifically, the study of Jesuit architecture implemented in Brazil in the XVI century, the understanding of spatial relationships that surround it. It is about seeking to elucidate the morphological construction of Brazilian colonial city through typological analysis of Jesuit buildings in an attempt to understand how this typology interferes, builds, rebuilds and replaces landscapes, in different times and spaces.

The Jesuit architecture in its European origin, introduces new aspects in the typology of religious architecture, reflecting the *modus operandi* of this order itself. Founded in 1540 by Father Inácio de Loyola¹⁸⁷, the Society of Jesus is characterized as an effective religious arm of the Catholic Church, to act directly on the catechized peoples and for those that will be catechized, imposing and adapting itself to new cultures that are the incursions of Portuguese overseas trips of the XVI century.

Patetta in citing Alois Riegl, explains that the birth of the Society of Jesus himself comes against political Counter-Reformation of the Catholic Church (Patetta 2012), in his political-religious struggle against the advance of Protestantism over the Christian world, and primordially on the new world discovered by the great navigations, initiated in the late fifteenth century. On behalf of the Church of Rome, the first Jesuits arrived in Brazil in 1549 - almost ten years after the creation of the Order - as part of a new crusade (Ribeiro, 2006).

The partnership between the Portuguese Crown and the Church, especially through the Society of Jesus - not forgetting the role of other religious orders - induces the mode of occupation of Brazilian lands. According to Freyre, unlike the occupation of other American colonies for Spanish, English and French, the Portuguese colonization is characterized by being more open to foreigners, importing only the settler who arrived was of "faith and Catholic religion" (Freyre 1999 : 29).

Carvalho says in his work of catechize the "Gentiles" (Carvalho, 1982: 11), the Jesuit Order has in its doctrinal basis fixation on earth through the creation of religious buildings in urban centers have started as villages or seats of captaincy or the creation of new urban centers such settlements and missions. These centers would be the radiators of the Catholic faith in new lands. The Jesuit installations serve to both the Indians as legitimate or interracial children of Portuguese with Indians (Carvalho, 1982).

The first decades of colonization still had in the presence of the Jesuits the power of the first laws, which required control of European culture on the social, economic and spiritual life of the Indians and settlers. Specifically on the Indians, this culturalisation on European molds occurs in Jesuit domains in their properties deployed on Brazilian ground. Freyre discern how the Jesuit European cultural influence was, in his words, "deleterious" to the indigenous culture, to a greater or lesser level. In the Jesuit missions and settlements in accordance Freyre (1999: 153), "the assembled Indians out of their system and integration with nature" are segregated and protected from slavery and European settlers, but are integrated in a artificialized life transformed into men and women "incapable of have independent living and natural development", concludes the author (Freyre, 1999: 153).

Different situation, or more "friendly" as Freyre explains, for those who "enjoy missionary work, not with eyes of devout apologist or sectarian Society" (Freyre, 1999: 152), there is found among Jesuit colleges, where instead of segregation, the children of Indians or already mestiçados are treated as equal to the sons of Portuguese settlers. The central courtyards of the colleges were the meeting place of the two "races" of dominant and dominated, says the same author, "meeting and amalgamation of indigenous traditions with European; trading toys; word formation, games and crossbred superstitions" (Freyre, 1999: 153).

¹⁸⁷ Officially as a religious order linked to the Catholic Church, the creation of the Society of Jesus was given by the Papal Bull *Regimini militantis Ecclesiae*, of September 27, 1540, signed by Pope Paul III. See in particular: Oliveira, Beatriz dos Santos. *Espaço e Estratégia considerações sobre a arquitetura dos jesuítas no Brasil*. Rio de Janeiro: José Olympio / Uberlândia: City Hall, 1988: 17.

Jesuit typological references: hypothesis of its origins

For Costa, the "modern, post-Renaissance and Baroque" jesuit spirit (Costa, 1941: 10) is unmistakable part of the Order, both in their doctrine as in their art and architecture, even if that has passed in the centuries by changes in their aesthetic, technical and formal patterns. Born in the first decades of the century XVI, in the ends of the art and architecture Renaissance (Costa, 1941), their constructions of this first century are characterized by "programs" and "aesthetic guidelines", called by Patetta of "pauperism" (Patetta, 2012: 390). It is the art and architecture as an expression of faith by unassuming, dedication and self-sacrifice, discipline and order of religious life, says the author.

The stylistic flexibility of the Jesuit production determined that its art and architecture were opened to "mannerism experimentalism, until the formal and decorative triumph of Baroque in the century XVI and the Rococo in the next century" (Patetta, 2012: 390). And further, this flexibility has enabled the Jesuit art and architecture to "adapt to historical situations, cultural developments and the conditions of society" (Patetta, 2012: 391), not retaining on styles, but in local and symbolic needs. To Patetta, in fact, this flexibility or adaptation expresses a "typological experimentalism" (Patetta, 2012: 391), characteristic of this religious order, making it impossible to disassociate their architectural production of their typological historical experiments:

(...) It is not possible to talk about of the "jesuit architecture" without discern between a first period, of the century XVI, characterized by typological facilities and very simple, austere and functional decorative apparatus (in which utilitas and firmitas relied more than venustas); a period between the century XVI and XVII which saw the foundation of important head offices and typological pontualização of the great collegiats complex; a third period (the full century XVIII) based more on the decorative finishing of buildings and scenic than the new foundations (Patetta, 2012: 391)

Such adaptation of the arts and Jesuit architecture to "physiological" changes, as Costa (1941) explains, are only enhance the brand or the "cachet" of this intense production that spreads around the world adapting according to the "conveniences and local resources and style characteristics specific to each period" (Costa, 1941: 10). It made that Jesuits would be different from other stricter Orders in their doctrines, and at the same time, established his identity to them.

Typological origins of Jesuit architecture in Brazil date back to the creation of the Order in the European context, its architectural reference, or references, that represent the expression of its doctrine and ideal of evangelization. This article, in front of studies on a variety of sources, pointing assumptions that, if they are not distinct, may in the end, they can be complementary for the recognition of the origins of architectural typology of the Society of Jesus in Brazil.



Figure 1. In the center, the Monastery of Santo António the Elder inserted into the fabric of the city of Lisbon. Source: Google Earth, 2014.

Both for as to Carvalho Gonçalves, for example, the Society of Jesus has in the medieval monastery of Santo Antão the Elder, in Lisbon, his first architectural experience (Figure 1 and Figure 2). The Company was established in 1540 and the monastery was received as donation from the Portuguese Crown in 1542 (Carvalho, 1982; Gonçalves, 2014). King João III, indicated by previous years (Gonçalves, 2014), receives and installs in Portugal two brothers of faith of Inácio de Loyola - Francis Xavier and Simon Roberts - arriving in Portugal in 1540. Two years later, a small group of Jesuits along with Simão Rodrigues, settles in Santo Antão the Elder "in full Moorish lisboeta" (Gonçalves, 2014: 96). Do this, their first home (Carvalho, 1982) and the basis for the Order be established in Portugal. Santo Antão along with the construction of the College in Coimbra (1548), the later works of the College of the Holy Spirit of Évora (1551) and the Professed House of São Roque (1553), became typological references for future religious works of the priests in Brazilian lands¹⁸⁸



Figure 2. Picture in elevation of the Monastery of Santo Antão, the Elder, in Lisbon.
Source: Google Earth, 2014.

Francisco Rodrigues, cited by Carvalho (1982), points out in his report the architectural features of Santo Antão, which define the building typology of another Jesuit buildings since their beginnings¹⁸⁹: from the concierge, can get to a cloister or "square courtyard" (Rodrigues *apud* Carvalho, 1982: 23) made up of pillars supporting a balcony surmounted and skirted around the patio; the central courtyard, a well water for daily services; upstairs, the bedrooms and support rooms that completed with atelier and another rooms from the ground floor. The building is closed on a court with a small church "devout and collected" (Rodrigues *apud* Carvalho, 1982: 23).

For Santos (1966), however, the typological origins of Jesuit architecture found itself in the first churches built by the Society in Portuguese land under foreign influence or not¹⁹⁰,

¹⁸⁸ In the rapid expansion process, the Jesuit buildings spread over several Portuguese cities from the second half of the century. XVI, reasserting itself in Portuguese territory, while they advance on other provinces, in Europe, coming to Africa (Congo, Angola, Mozambique, Ethiopia, Cape Verde and Guinea), Asia (India, China and Japan) and new World of the Americas. See in particular: GONÇALVES, Nuno da Silva. Baltasar Teles, Cronista da Companhia de Jesus.. Available at: <<http://ler.letra.up.pt/uploads/ficheiros/5270.pdf>>. Accessed on 16 Jan. 2014.

¹⁸⁹ Santo Antão overcomes its importance as the original site of the Jesuits. At the end of the sixteenth century the monastery with his high school constitutes an important place for teaching basic fortifications taught by Jesuit priests who combined in their classes, the religious basis with technical education, the training of future military engineers of fortification, "making them respected as intellectuals, writers, professors of mathematics and other activities" (Oliveira Ribeiro in 2013: 54). Inside the Jesuit Order itself existed priests who beyond assume their cassocks and religious functions, were dedicated to studies and craft of military engineering, also acting on Brazilian ground (Ribeiro, 2013; Oliveira, 1999).

¹⁹⁰ See in particular the work of Santos on the "autochthonous" and foreign hypotheses buildings of Portuguese Jesuit architecture, mostly Italian, from the mid-sixteenth century. Santos, Paulo (1966). Contribuição ao estudo da arquitectura da Companhia de Jesus em Portugal e no Brasil. V International Colloquium on Luso- Brazilian Studies Coimbra: 19-30.

especially in works of the College Church of the Holy Spirit of Évora (1551) and Professed House and Church of São Roque in Lisbon (1565) (Figure 3). From the two, according to Santos, the most important for the Brazilian story is that São Roque, in addition to becoming one of typological reference architecture Portuguese Jesuit, had his foreman, the architect Francisco Dias, sent to Brazil¹⁹¹ for the construction work of the colleges of Bahia, Olinda and Rio de Janeiro (Santos, 1966), since the last decades of the sixteenth century.

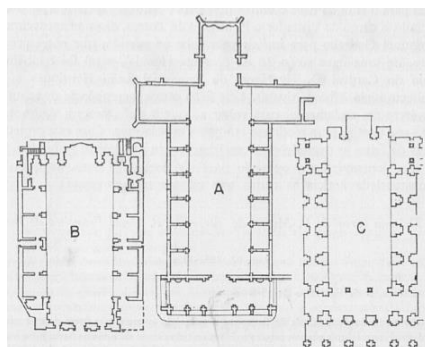


Figure 3. Schematic plans of Churches (A) of San Francisco in Evora; (B) of San Roque in Lisbon (1565) and (C) of the Holy Spirit Church of Évora (1551). Source: Santos, 1966.

Studies indicate, however, that only at the beginning of the construction of the Church of Gesu in 1568, with its professed house in Rome, originally designed by Vignola and completed by Giacomo Della Porta and Girolamo Rinaldi¹⁹² in 1575 (Capitel, 2005), that Society of Jesus has its "mother church", Patetta argues (2012: 391). The Vignola's Gesu is not complete before, however, of two projects with plants attributed, firstly to Nanni di Baccio Biggio in 1550 and subsequently a second project attributed to Michelangelo in 1554 (Santos, 1966). In both projects, the cornerstone of the start of construction is launched, but only the Vignola's project remains as final. In projects of Biggio, Michelangelo and Vignola - three architects of "universal renown" (Santos, 1966: 16), have variations of the same type of cross and longitudinal plan (Figure 4), with her arms a little more or less indented; side chapels along the unique nave and chapels in the background, on the side of the altar and apse closing a greater or lesser proportion the end of nave's perspective, embracing the altar (see Santos, 1966 Tábuas VI).

The construction of Gesu (Figure 5) happens in a singular moment in urban history of Rome, and to the very concept of city and western architecture. To Argan (1999), it is the construction of humanist culture throughout the fifteenth and sixteenth centuries in Europe, which brought a new vision of the city, based on the organization of its urban space, the definition of its functions and the creation of a defining architecture and urban space defined itself¹⁹³. Gesu

¹⁹¹ To Lúcio Costa (1941), the importance of the architect Francisco Dias extrapolates the limits of Jesuit architecture built or helped build in Brazil. As an architect, his performance in Brazilian lands has featured in the spread and development of the architecture of the early colonial Brazil.

¹⁹² According Capitel (2005) is attributed to Rinaldi the charge for completing the Jesuit complex of Gesu, projecting their professed house and closing the occupation of a large block of irregular design of the city of Rome. Della Porta takes and completes the design of Gesu after the death of Vignola (Santos, 1966).

¹⁹³ The humanist city, according Argan is a rational conception, derived from the will of a prince by the hand of an architect, base of humanism to be "lay, bourgeois and urban" (Argan, 1999: 58). These urban changes are part of a complex of social, economic and political changes that redefined the central role of European cities in the known world of that age. Part of this urban transformation focuses on the prominence of the architect as part of the explanation of Argan, the "bourgeois split of the city" (Argan, 1999: 58). The liberal, highbrow arts are distinguished from their mechanical and legwork to be created elites of artists who work directly to meet the artistic and urban demands of this new vision of the city (and its sovereign).

therefore born under the aegis of an architecture focused on practicality and adaptability of architectural compositional possibilities, with the city and its urban fabric as a background.

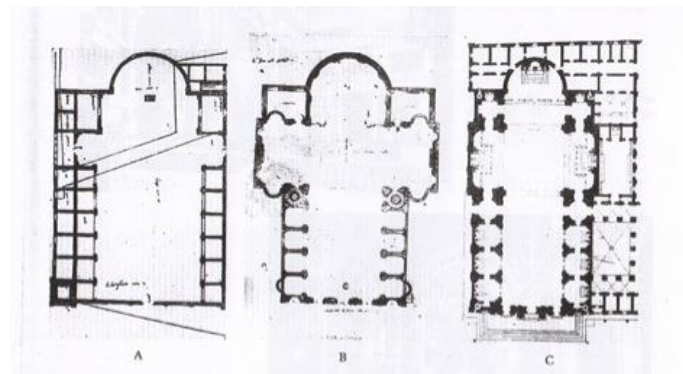


Figure 4. The three plants Gesu of Rome, assigned respectively to the Nanni Baccio Biggio (1550), Michelangelo (1554) and the conclusion in 1575, from the design of Vignola (in the picture the plant appears to work as part of its Professed House). Source: Santos, 1966.



Figure 5. In the center, the Church of Gesu in Rome, with its Professed House shutting in type of court. Source: Google Earth, 2014.

If the Renaissance architecture is governed by a rational ordering of your speech, translating their own faith as part of this new environment, Gesu and later religious architectures, discourse is now clear, second argument of Brandão (1999: 128): an artistic "anti-intellectualism" and "approaches everyday," demonstrating the power of faith over men, having their art as marketing. In fact, the art this time is no longer the middle of the speech, the ideation of the Catholic faith, from itself to be the ultimate representation of the very power of the Church.

This is reflected in the architecture developed by the Jesuits in their expansion across the world. In its origin, is characterized as a mixture of austerity and introspection around a central courtyard, the molds of Santo Antônio, and the Professed House of Gesu. However, while the typology expresses the architectural and urban brand of the Church presence on earth. Initially assuming this austerity, the Brazilian Jesuit architecture accompanying with the passage of time the ideal of aggrandizement of religious space by the art, mainly represented in the work of the panels richly ornamented, represented in the classic text of Lucio Costa, 1941, on the Brazilian Jesuit architecture. In summary, in a range of less than 30 years between the acquisition of the monastery of Santo Antônio and the construction of the Gesu, the architecture of the Society of Jesus establishes the beginnings of its build typology. Based on a flexible and adaptable type,

functionality and meets the symbolism of faith and the power of the Church, while it is ultimately the representation of European culture outside their continent.

Typological origins of Brazilian Jesuit architecture: the church, the fence, the court and the courtyard

As mentioned earlier, the power of the Catholic Church in colonial Brazil was present, primarily through the Jesuit order, one of the first to arrived in Brazil on an unquestionably way. Their religious buildings mark the virgin and untouched kind of the first centuries of Portuguese colonization of Brazilian lands. Deployments of Jesuit buildings, always it can, seek for strategic places on the land to be catechized, regardless of the large availability of land in the early days of Brazilian colonization. According to Carvalho (1982), the Jesuit religious buildings seek a middle ground in the occupied territory, among the first villages of Portuguese colonization and indigenous villages, the latter being his main target for Brazil. Still according to the same author, the proximity of the Jesuit religious complexes with the Portuguese urban cores is providential, because of the eminent growth of the first urban centers in Brazil. Thus, the Jesuit buildings would be in "civil action center to better exercise their religious activity" (Carvalho, 1982: 25).

From there, the places chosen for the construction of their religious complexes are defined primarily by their position in relation to the environment (Figure 6) and, not least important, by the ease of roaming about the territory to be catechized:

Thus, the location of Jesuit buildings in Brazil was almost always on the highs, with beautiful views over the sea and next to a river. The proximity of another building warranty Jesuits easy locomotion: an along the coast, for communication with other centers of catechesis and conversion; and another for the interior in search of Indians and the establishment of new settlements. And the elevation facilitated the defense, and the building itself, by itself, it stood as a fortress (Carvalho, 1982: 25).

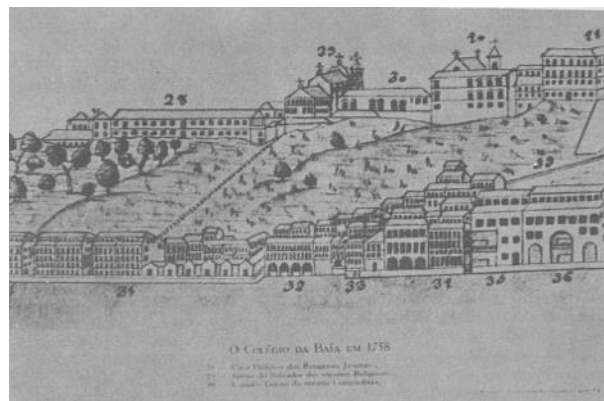


Figure 6. Drawing 1758 the Jesuit college of Bahia (BR) and its prime location relative to the sea. Source: Oliveira, 1988.

Free visual obstacles, these high places - mostly - establishing control and dominion over the lands around them and the landscapes that form from the inevitable framing that the openings of the first religious buildings do to nature around. A form of occupation guided primordially on safety of the clergy and their aggregates, living around religious life of the Order. But at the same time, they reflect the human and foreign occupation in these virgin lands, creating, recreating and continually appropriating the surrounding and abundant nature, as part of daily activities, tasks and moments of seclusion of the Jesuits priests.

In a mix of religious building for teaching and dissemination of the Catholic faith and fortitude - place of safety for the community that there was forming - the Brazilian Jesuit architecture adopts formal and functional types that suit both the missionary purposes of the Order as the casualities those unexplored and wild places. The occupation of the land is done at first by the erection of temporary structures (Figure 7), namely: a rustic shelter, almost a hut without dividing the reference is built for exploring the surrounding territory in search of the ideal and to construct the final religious building, besides the first religious activities of the Jesuits in that ground (Carvalho, 1982).



Figure 7. The construction of the Jesuit temporary shelter. Source: Najjar 2011.

Chosen the place in the premises of service protection, location and presence between Portuguese and Indians, initiated up the works with the availability of materials and workmanship site. The definitive work, which was started by the construction of the church (Carvalho, 1982) should reflect the establishment and continuity of the activities of the Jesuit Order in Brazilian territory. In general, as Costa explains the Jesuit religious complexes in Brazilian lands were divided into three parts concerning their religious duties and day-to-day life of priests:

The program of Jesuit buildings was relatively simple. Can be divided into three parts: for worship, the church with the choir and sacristy; for work, classes and workshops; to the residence, the "cubicles", the infirmary and more service areas, beyond the "fence", with garden and orchard (Costa, 1941: 13).

This division of functions was present physical and symbolic form in its architecture: the church (with its sacristy), first building to be executed of the final building, marked the place. It was the church who carried the Christian symbols of the Rome Church and represented, ultimately, European architectural culture that moment. The fence, where was the orchard and vegetable garden or as well as, sometimes, the water well is discordant point between some authors because their position and existence¹⁹⁴. Carvalho indicates the presence of the fence, as reserved space to the livelihood of the priests in their Brazilian complex, and the social and symbolic distinctions of the same, as illustrated below:

In all these buildings were almost always a 'fence'. There were cultivated fruit trees, vegetables, aiming to help the maintenance of the inhabitants of the residence or College. This kind of orchard was fenced (there, the name 'fence'), and Inácio de Azevedo, when he visited in 1568, has forbidden women to enter there, even for cleaning and should be made this deal with men who could hire women to work, but whose entry would be on the outside, not through the Jesuits house. (Carvalho, 1982: 27).

The Carvalho's definition complete what Lucio Costa, quoted above, states the fence as an important part of the Jesuit religious buildings. Cardim describes the College of Salvador in Bahia, 1583 (see Figure 6), with its extensive fence and its access to the sea: "The fence is very large, it hits the sea, in its inside priests will embark, has a perennial source of good water, with

¹⁹⁴ See as an example NAJJAR Rosana (Jan.-April 20112001). Para além dos cacos: a Arqueologia Histórica a partir de três superartefatos (estudo de caso de três igrejas jesuíticas). Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas, vol. 6, n. 1: 71-91.

your tank ... "(Cardin *in* Santos, 1966 note 3: 50). Therefore, the fence conforms with an external place to the building of the Jesuit complex. Even after completion of the building, about the place serves the livelihood of the Order, through the gathering of fruits, vegetables and other plant products, in addition to housing a water well - in some cases - for the supply of the building (Figure 8). In Carvalho's explanation, the fence is not a constant in all Jesuit buildings because it demand, like the rest of the complex, material support and labor to do it.



Figure 8. Detail of the Jesuits property situation in Vitória city, capital of the state of Espírito Santo (BR), in a survey done in the eighteenth century by the military engineer José Antônio Caldas. The building of São Tiago (Ca) complex and the layout of the fence demarcating the Jesuits property. Source: Miranda Ribeiro and Pessoti in 2011 Edited by the author.

In the Jesuit religious architecture the typology repeats in a mixed of physical protection and sacred. The architecture is built at the same time, bound and limited by no more sacred representation of some pagan god, as Fustel de Coulanges (2004) explains, but the Christian God, his church and his clergy. It is Temple and home; palace and fortress; housing, shelter, garden and place of worship and God's presence in new lands. Outpost of the Church, organized and representative of European culture, its architecture superior technical quality, complex compositions and striking symbolism differ it of the surroundings built and natural, becoming, in the town or village, the main building of the early occupation of Brazilian urban centers.

The Jesuit typological complex with its “quadra” (court)¹⁹⁵ format is organized by complementary parts, with marked functions, spatial and formal hierarchies: the court frames the courtyard, while the patio conforms to the block. Both have a higher limit on the fence (regardless of its format and concept), and the church, where was everything began.

¹⁹⁵ This article follows the term used by Lúcio Costa in his article about jesuit architecture, 1941, to meaning the regular design typical of brasilian jesuit buildings, maked by parts with its functions and especific uses that was modeled by the local relief, started always by the church construction that's used to close one of the parts of the block as one of its sides. And at the end, when finished, it give form to the typical brasilian jesuit architectural building. As a rule of translatio, it was chosen to translate the term “quadra” to the english “court” because its proximity with “courtyard”, because of the “quadra” sides that surrounded the central courtyard.

The Jesuit court presents interesting constructive process (Figure 9) therefore creates over time of its execution, historical relations with the urban evolution of the place itself, gradually and slowly, shaping their place of deployment, with characteristic morphology and distinct from civil buildings of that time. Also impressive for its size, height and strong impact on the local environment because it constructed at this time the beginnings of a distinctly urban landscape on the natural landscape.

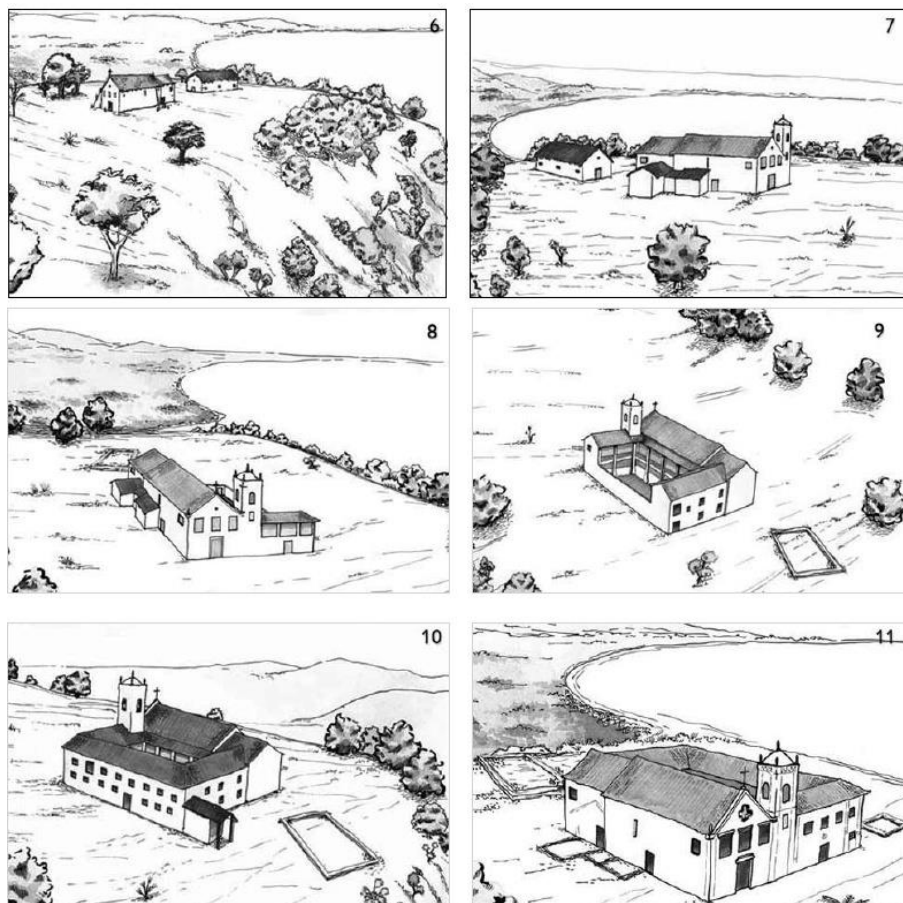


Figure 9. The form of Jesuit occupation: following, the church building, the main building, and then the continuous process (which could take centuries or never be completed or executed) the closure of the court and the formation of the inner courtyard. Source: Najjar, 2011.

The houses, schools and residences are typical Jesuit establishments of the fixation of the Order in Brazil¹⁹⁶, and its center of "raid" for catechesis of the Indians (Carvalho, 1982). The

¹⁹⁶ Santos (1966) lists the Jesuit buildings and their functions installed in colonial Brazil, which were not limited only to education and faith: "Among the establishments founded included: for education, homes, residences, schools, and seminaries; for catechesis, missionary villages; for the treatment and retreat, the halfway houses or Thursdays of rest, mental hospitals, gatherings, hospitals; and religious preparation, novitiates, where the waves of soldiers leave for his army. Because in fact they constituted an army, even if surprisingly brief given the magnitude of the work undertaken - work more than educational and catechetical, because it starts of the colonizing action itself, built at the best clay - the education and faith. "The farms, barns and mills built by the Jesuits, as the author explains, emerged as a way to aid in the costing of the Jesuit work in Brazilian lands. See in particular: Santos, Paul (1966). Contribution To The study of the architecture of the Society of Jesus in Portugal and Brazil. Coimbra: V International Colloquium on Luso-Brazilian Studies.

differences are related to their function within the Order, but because of an urgent needs of the spread of the Catholic faith in Brazilian lands invariably it takes education as a priority function. These Jesuit establishments are defined based on their location and function, according to Carvalho explains:

The building built in the main portuguese village of a captaincy was always the headquarters for raid operations inside in search of native villages for future settlements. In Portuguese village, the headquarters received the designation house when it was not able to perform the duties from the college, while establishments in settlements received the designation of residences (Carvalho, 1982: 20-21).

Carvalho explains that these differences between colleges and residences are in level of teaching that develop (Carvalho, 1982), colleges addition to being devoted to the teaching of reading and writing Portuguese and the indigenous populations of the colony, they also develop higher education facing training new missionaries in Brazilian lands (Carvalho, 1982). The settlements are formed by Jesuit residences, according to Carvalho, the way of the Order to keep the Indians catechized around and about its religious auspices. These were arranged along a large central square, opposite the church, in houses built by them constantly referred these back, as Carvalho explains, the image of the Indian village. But the great square beyond something aggregator it's the principle of being space and domain Christian and European discipline. At one end of the rectangle to conform the square, one finds the imposing church as brand of the new faith about the customs and traditions of the Indians.

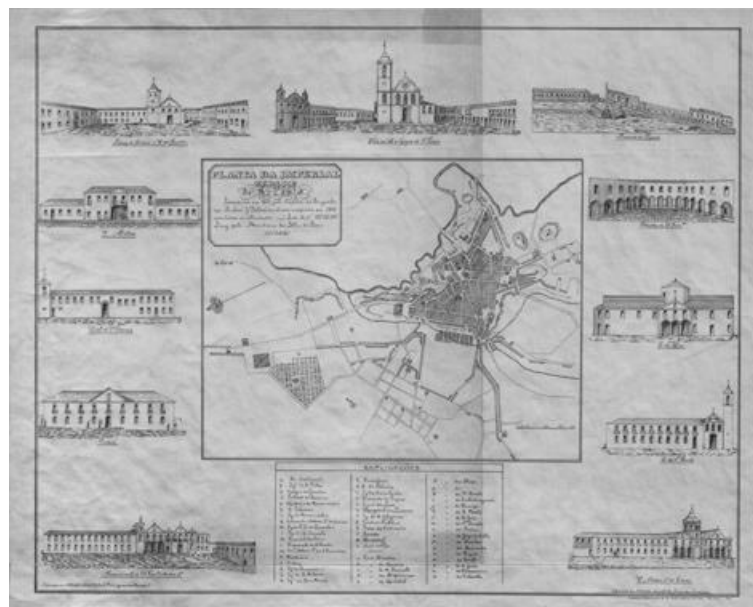


Figure 10. Plan of the city of São Paulo (BR), 1810, updated in 1841, with the following caption: "Plant of the imperial city of são paulo. Surveyed in 1810 by Captain Rufino J. Felizardo of Engineers e Costa in 1841 and copied with all changes. - Lat. South. 23°, 33' 30" Long. At the Meridian Iron Island 331° 24' 30". Above left, drawing the Jesuit College of St. Paul, considered ground zero of the city building. Source: Municipal Historical Archives of São Paulo, 2014.

Therefore, in one way or another, the Jesuit Order is concerned to establish or participate in the creation of urban centers in Brazilian territory, such as the Jesuit College of St. Paul (Figure 10), based on a morphological type or constructive typology of urban proportions. As noted, the Jesuit buildings, originally, or were present in the Portuguese first urban cores, the headquarters or villages or the captaincies were in remote areas, however strategically close enough these towns and / or the Indians to be catechized. Its elevated position relative to the rest of the

territory¹⁹⁷ and next to the rivers or the sea ensure proper protection, and mobility needed for their evangelizing missions from inside the captivity.

The Jesuit typological composition: form, function and symbolism

The establishment of Jesuit buildings on the block should be the role of the court typology as a synthesis between architecture (building construction and urban and spatial occupancy) and urban morphology (or part of the urban fabric), introduced as an effective way that has adapted to the hardships of the new uncivilized and unchristian world, the example of colonial Brazil (Carvalho, 1982). This spatial organization that revolves around a central courtyard (Figure 11), open to the heavens, becomes its own form of organization of life and the daily lives of missionaries priests in Brazilian territory, adapting to the harsh and dangerous reality of early colony:

(...) This type of construction was very specific to the environment found in Brazil, since it presented an aspect of fortification, with few openings on the ground floor, in addition to entrance doors (sometimes one on each side of the court) and with freedom within the court where it stood all the movement of work (Carvalho, 1982: 24).

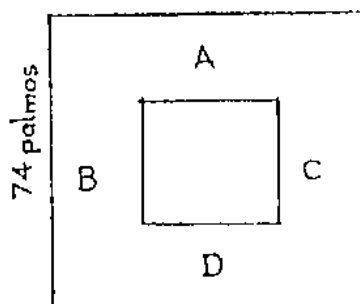


Figure 11. In the picture developed by Santos, from the guidelines Nóbrega, according to Oliveira (.1988: 58), the division of the block for its main functions: A - wing of the church, first to be built; B - wing of priests and brothers, as his permanent home; C - wing of the young men; and D - ward services, the last to be completed. In the center courtyard typical of Jesuit architecture in court. Source: SANTOS, 1966.

For Carvalho, the fact that brand building court in the Jesuits and what differentiates them from other religious orders is the appropriation that their clergy did the central courtyard (Figure 12 and Figure 13). The ordinary meaning of the religious orders was to give to the courtyard an aspect of place meditation, silence and introspection. But in contrast to the Jesuits, the courtyard was a place of service organization's day-to-day, especially in Brazilian territory, feature this, since this use of the Monastery of Santo Antônio, the Elder, in Lisbon, as first home Jesuit.

The Jesuit courtyard expresses the "active life" (Costa, 1941: 23) of the Order, because different from the seclusion that the courtyard represented in other religious orders, the Jesuits was the place of moving priests in their daily educational, religious commitments and

¹⁹⁷ As Oliveira recalls, the case of the Paranaguá College, in Paraná, is the exception to the rule typological of the Jesuits in Brazil, citing Cardim, the priests have chosen instead to deploy his college in high place, a place close to the River Itiberê and "a little more than three hundred feet from the water source, the public fountain built in 1714, and where the ships that arrived at Paranaguá to supply of water" (Cardim *apud* Oliveira, 1988: 39). In explanation of the author, in this particular case of Paranaguá, priests exchanged protection for "extreme functionality" because of "proximity to the port, the trade area; place where we could embrace and therefore have strict control of the most significant events of the metropolis "(Oiveira, 1988: 40).

administrative, students and their banter and exchanges, support for everyday services complex. It was a lot of activities that the central courtyard of all this confluence, constituted in a "noisy creative center" (Carvalho, 1982: 24), because the buildings of the complex that revolved around this courtyard housed the classrooms, dormitories, workshops, administrative and support areas to school and church.



Figure 12. Picture of the inner courtyard of the College and Church of St. Alexander, in Belém city (state of Pará). Source: Ribeiro, 1988.

Instituted by the Company, thinking in problem solving "technical and economic in places of work, derived from inexperience" (Patetta, 2012: 393), it was created six plants of churches adaptable enough to adversity of each place, designed by architect Francesco de Rosis in 1580, for new buildings of the Society in the world at your fingertips¹⁹⁸. Are variations of scale and proportion (Figure 14), in their dimensions, which refer to a first analysis, the design of the church of Gesù in Rome, with its unique longitudinal nave. But, within the types presented were two typological possibilities of plants with three naves, appearing to be extensions of the longitudinal side chapels. In all types was maintained the retracted transept and three apses at the bottom, with formal variations. According Patetta, these plants:

¹⁹⁸ Custódio in a concise outlines the organizational process of the Society of Jesus for creating your architecture to be propagated mainly by the New World. In addition to characterizing their architecture from the functionality of its buildings - the church building, place of liturgy and sacred buildings and the common use and services of the priests (the schools, homes and houses) - the Jesuit organization had need, along the sixteenth century, to establish roles technical and operational support for the construction of Jesuit buildings. The creation of the post of director of construction was important for the initial systematization of edilicia typology of the Society of Jesus. The first was Giovanni Tristano, a lay brother who worked beside Vignola in the Church of the Gesù, establishing the use of longitudinal plan as a single nave and a Latin cross. Others came replace Tristano's function, including Francesco Rosis, responsible for plant-type sent to the new churches.

Effectively, the systematization of the architecture of the Society begins to happen from the imposition of *Instructiones Fabricae et Supellectilis Ecclesiasticae* of 1577, creating the first general guidelines and standards for buildings, as Custódio says, "incorporating ideas drafters, without giving the necessary guidance of architects. "And how full the author, among the drafters of reference for the Society of Jesus are, Vitruvius, Cataneo, Vignola, Palladio and Serlio. It was based on the creation of the Common Rules of the Society, including the architectural, Rosis that creates the sixtype plans which spread the new territories catechized by Jesuit hand. Even though this organization held responsible by the Society at its beginning has been lost with time and lack of control, she was instrumental in creating and establishing the Jesuit identity in the new lands, through a typological construct that according to Custódio, "was the result of both expressing the functional needs as references to iconic works of architecture treaties and the contribution of professionals from different countries." See in particular: Custódio, Luiz Antônio Bolcato. *Diretrizes arquitetônicas e ordenamentos urbanos nas missões jesuíticas dos Guarani*. In: Souza, Luciene Pessoti de; Ribeiro, Nelson Pôrto (2011). *A construção da cidade portuguesa na América*. Pod Publisher, Rio de Janeiro, RJ.

(...) They reveal an elaboration of the original type with varieties of solutions either within the schema itself (elliptical plant with lateral chapels and atrium, plant with a central vain with dome and atrium), both in layout and depth of the side chapels, the apse and transept (Patetta, 2012: 393).



Figure 13. Inner courtyard of the Church and Residence of Kings in Nova Almeida, Serra city (state of Espírito Santo) Source: Loc.alize.us, 2012.

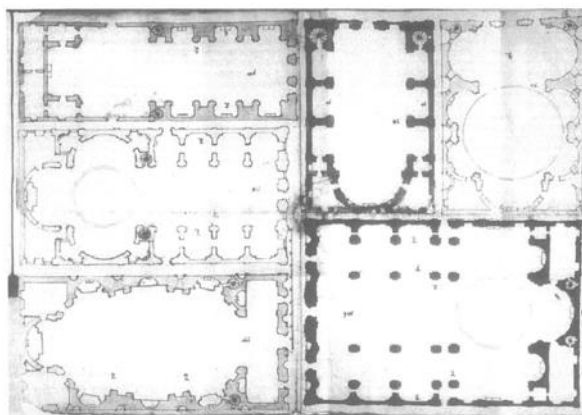


Figure 14. Types of plants developed by De Rossis, 1580, to the Jesuit buildings. Source: Patetta 2012.

For Costa, the typology of churches and their built complexes are architectural parties or "reference" (Costa, 1941: 23), adopted or created "by Jesuit architects, or laymen architects in the service of the Society of Jesus" (Costa, 1941: 23) that have influence and propagating in Brazilian Jesuit buildings. In Brazil, according to the author, are adopted by the Jesuits, four kind of plants which the single nave is the most used typology (Costa, 1941). Churches developed in these kind of plants differ by the degree of simplicity of its parts: the simplest, according to Costa (1941), the first to be built in Brazil, where the chancel and a single nave formed a single body (Figure 15), which were divided "conventionally into two parts by a cross arch" (Costa, 1941: 29).

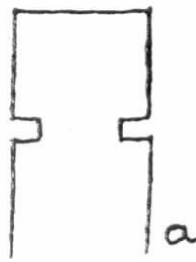


Figure 15. Layout plan of the Jesuit churches of simpler type according Lucio Costa (source: Costa, 1941).

A second typology, wider, according to Costa (1941), where the constructive simplicity still holds, but there is already a clear differentiation between the nave and the chancel (Figure 16), especially through the smaller dimensions of the latter in relation to nave (Costa, 1941).

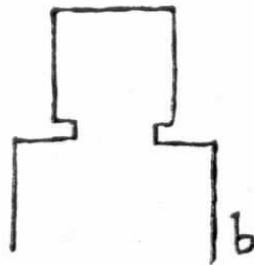


Figure 16. Typology which the nave differs from the chancel (source: Costa, 1941).

The third typology with larger churches, mainly from the seventeenth century, where the simplicity of the early days is mixed with more complex compositions (COSTA, 1941). In this typology, besides the characteristics of the former type, are increased side chapels on the chancel (Figure 17) "of greater or lesser depth" are added, according to Costa (1941: 31);

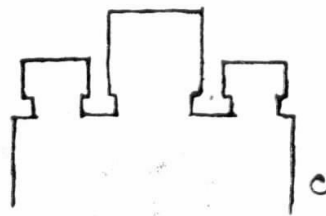


Figure 17. Type of Jesuit churches where the simplicity of its architecture is mixed with more complex solutions (source: Costa, 1941).

And the last type, the churches, as the author explains, are built under the influence of the church of the Gesù in Rome. In this type of church, in particular and the Gesù way, chapels spread along the lateral of the nave (Figure 18), each one with its specific altar. The greater detail is the two mirrored chapels that were closer and just below the chancel, for "they were almost ever wider and taller, if not also deeper, with that same goal to score, the plant, the cross" (Costa, 1941: 31).

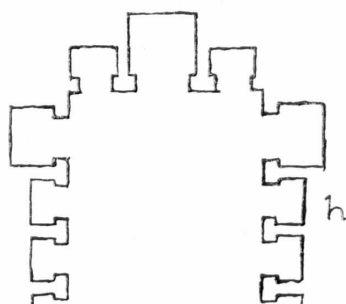


Figure 18. Type of Jesuit churches of greater complexity, based Gesù (source: Costa, 1941).

In most instances, was the presence of a tower that made up the whole and at the same time, separating the body of the liturgy - formed by the church - the body of the services and bedrooms, the latter on the college and other dependencies. The towers themselves were one of the striking elements of Jesuit architecture, with little time high in relation to the set in order to balance it between their horizontal and vertical proportions. But, according to Costa (1941) these were not always finished, and were only started after the expulsion of the Jesuits in Brazil (held in 1759), and finished "without regard then, (...) the characteristics of the original building" (Costa 1941: 24). Costa completes the analysis with other elements of architectural composition and construction techniques that close the typological characterization of Brazilian Jesuit architecture¹⁹⁹: the use of eaves on their roofs against the excessive rains of the great in Brazilian territory; the roofs of the towers varied according to the constructive technique and the availability of material and labor in that place (Figure 19); the pediments of churches that in the first Brazilian churches even follow the Renaissance rigor, it enter the Baroque with more elaborate designs (Figure 20); portals that change in number according to the level of detail among the simplest sixteenth century churches until the most worked churches of the following centuries; and lastly, the wings that close the typology of the block with the church (Figure 21), more austere designs, giving due importance and hierarchy to the main church building.

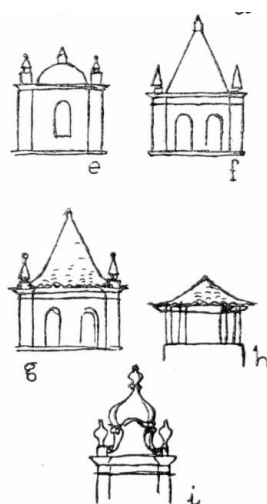


Figure 19. Changes in typological roofing of the Jesuit towers.(source: Costa, 1941).

¹⁹⁹ See in particular: Costa, Lúcio (1941). 'A arquitetura dos jesuítas no Brasil'. In: Revista do Serviço do Patrimônio Histórico e Artístico Nacional. Serviço do Patrimônio Histórico e Artístico Nacional/Ministério da Educação e Saúde, Rio de Janeiro.

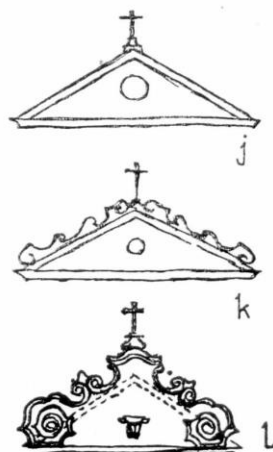


Figure 20. Typological variations of churches pediments, from the most simplified drawings even on Renaissance influence, to the most ornate the Brazilian Baroque period (source: Costa, 1941).

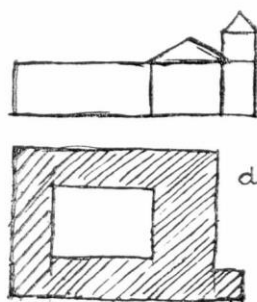


Figure 21. The court way and architecture in mixed of residence and fortress (source: Costa, 1941).

The composition of the parties seeking a balance of shapes, volumetries at the same time that purposed the hierarchy of functions and meanings without losing the "visual unity of the whole" (Oliveira, 1988: 59). According to Costa, scenic construction extended into the interior of the church, the principal place of God's presence, joining the ritual and symbolism of the liturgy.

The Jesuit church was a beginning and end, the building symbol of a new way to express and propagate the faith. Since the implementation of the building, with the choice of the ideal place, under the Jesuit security guidelines, visibility and ease of displacement; through its construction which marks the place and the landscape, reaching its way to transmit their faith by the symbolism embedded in its architectural typology, became the expression of this religious order throughout the centuries.

In Brazil, it has become more prevalent in the urban establishment of several towns where the Jesuit Order settled, their buildings were mostly the buildings better finished, more volume and height. Both his buildings and the manner of their priests were, as Oliveira, direct way their relationship with society and its time explains:

The deployment location of the colleges at the heart of the urban core activities, on top of a prime elevation in the chosen place could provide the desired contact with society, the proximity needed to show them their dynamism, their intellectual erudition, his brilliance in various technical issues, their ability in practical matters, and thus their indispensability in the colonial urban daily life. Symbol of militant faith, these institutions only by its placement in

urbe, the sight of his austere elevations, were also a symbol of the new age of reason (Oliveira, 1988: 101-104).

The morphological type in Jesuit block shows the significance in the settlement and expansion in Brazilian lands. In different Brazilian cities, the Jesuits complexes - the church and the court - shape both the landscape rehearsing their urban beginnings as urban morphology, drawing and narrating for centuries, the image and the symbolic significance of the places. Elevated and highlighted front the environment, deployed at strategic locations for the domain and protection, the Jesuit complexes were invariably in their urban cores originating, one of the driving forces of urban expansion over the Portuguese colonization centuries, and even after the expulsion of Society of Jesus in Portuguese territory in 1759.

This way, the typology in urban scale, the Jesuits complexes were involved both in the construction of cities, defining, the priori, the scale of traditional block brought by Portuguese colonization, which was modeled by local relief and their conditioning, but also of its urban landscape - before, it was isolated as an architectural object, which by its own morphological characteristics were able to join the growing Brazilian urban fabric that expanded and diversified the long centuries. His typological flexibility adapted itself to the sinuous design of the first Brazilian cities, as was also able to change positions after the forced departure of the Jesuits. In major urban centers maintained their religious functions, in large majority, but in the hands of the government (Portuguese, Brazilian Empire and Republic) were adapting their duties to the bureaucratic requirements or turned into new symbols of power: the Church out, the State in. In extreme cases, like the ancient church complex and the College of São Tiago, in Vitória city, capital of the state of Espírito Santo, the change of political regime, raised a new aesthetic and a new image for the complex transformed into government headquarters - today, the current Anchieta Palace. The simple architecture of the early Jesuit sixteenth century no longer exist on the new composition of facades, volumes and eclectic decorative elements, the beginning of the twentieth century, also marking the new functions and internal reforms of the building.

One may consider that this is an architectural typology that crossed the country's urban history, experienced its transformations, being a fundamental part of the morphological and landscape constructions of these early urban centers, which can be understood as historical narratives, principiadas, largely by this typology.

Notes

From that exposes Waisman (2013), the typological construct is a cultural process, due to the opening that the types have to external influences. To Waisman, while the type is the "principle of architecture" (Waisman 2013: 102) is also a "historical subject" (WAISMAN 2013: 102), given that in its essence the possibility of transformations, adaptations and "provide the basis for new inventions, maintaining, however, a continuity that could be considered structural basis" (Waisman 2013: 102).

This article seeks to integrate the typology study, from a new meaning their cultural content associated with urban morphology through narrow approach of Jesuit building in Brazil. It also argues that the typology exists only because of its relationship with the city shape, it is a constructive process of cultural projects, covering not only the urban fabric, but all the cultural content that surrounds or fenced throughout history. The type is, ultimately, a cultural and historical example of a moment, not as a model, but represents a not static historical moment, subject to modifications and changes in form, use and meaning moment. Thus, reaffirms Waisman proposition itself, on the type as a cultural element of the story, turning culture in a possible interaction between type and morphology with the landscape.

Finally, the landscape designed and narrated by the Jesuits, specifically in Brazilian lands, it was defined from an urban architectural typology with own meanings about their functions,

integral part of shaping the urban morphology of most Brazilian cities originating on the coast during the sixteenth century.

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A construction perspective of urban morphology study in Shanghai Alleyway House

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Abstract. *The Shanghai Alleyway House which was 57.4 percent of the gross residential area in the modern Shanghai in 1949 is the major object of this paper. 2 typical individual house which is a special type of the alleyway house called Lilong Mansions are chosen as the case to take deeper research. And construction is the main and also architectural research perspective. It is discussed in two ways: construction technology and construction organization, and is focused on the particularities of Lilong Mansion as a physical object in the former modern Shanghai. i) Construction technology: the way to take deeper research of the 2 Lilong Mansions case-study objects are based their location; completed time; the shape of their plans, and to the construction level, there are mainly three partial issues: structural system; tectonic style; material. Then by contrastive analysis from these phenomena, the variation of construction technology from the traditional timber-frame style to the brick-wood hybrid style would be acquired. ii) Construction organization: Summing up the information on the construction organization of the alley houses among the archives to find out the features during the progress from the 'craftsman' system to the 'contractor-architect' system. Thus, the research significances come out, firstly, the historical course of how the Shanghai alleyway house developed till traditional Chinese house to the Western-Chinese house could be unscrambled in a more microcosmic way. Secondly, it is also a sort of supplement of the urban morphology study on the modern Shanghai besides the spatial geographic form and the Social cultural form.*

Key Words: *Former modern Shanghai, the Shanghai alleyway house, Lilong Mansion, construction technology, construction organization.*

Background

The Former Modern Shanghai which is commonly defined as the Shanghai from 1943 to 1945, its urban space is a research object containing Historical continuity and Spatial richness. And of which the most typical elements and special forms are the public buildings, public spaces (the Bund and the Nanjing Road) and the mass-developed residential units (the Alleyway House) (Figure 1). What is chosen as the research object is called Lilong Mansion, a special type of the Alleyway House (Figure 2).

The lucid definition of Lilong Mansion is that, the house built for self-living by the land owner which is also called the squire. It differs from the lilong house developed for rent (Figure 2). There's a saying mentioned in the book *Shanghai Longtang* by Prof. Luo Xiaowei in 1997 that, the 'longtang mansion' was another special feature of Shanghai. And it re-indicated the possibility to be chosen as an individual research object. Besides the difference of development and type of owner, the speciality of its physical level and the elements during its construction process also differ from the alleyway house for rent. Which are often embodied as the commodious of spatial arrangement, the variety of material use, the delicacy of details and the mix of different styles, etc. The lilong mansion gives a multifarious cognitive dimension of understanding alleyway house which is a typical element of the urban space in former modern Shanghai.

Besides, to understand the urbanization issue of former modern Shanghai under a dynamic perspective, the research of the physical ontology of lilong mansion provides a strong frame of reference. By the vertical comparison with the different individual cases during its develop

period and the horizontal comparison with other type of architectures in the same time, it has great value to get better understanding of these issues: firstly, the location of the construction system of lilong house inside the whole Shanghai construction system; secondly, the transformation of the construction system in shanghai from the carpenter system to the architectural system; thirdly, the vicissitudes of the physical and social space of former modern Shanghai from vernacular to urban. Compared with taking the economic rationality as the first stage value of lilong house for rent, the construction system of lilong mansion contains rich information.



Figure 1. The Bund, Nanjing Road, typical Shanghai Alleyway House.



Figure 2. The different classification method between former research works and this paper.

Because of the characteristic of self-living of the lilong mansion, it always locates inside a block by individual way as the feature of special distribution. Its building space usually take a role of the catalyst of events (Aldo Rossi, 1966). That means the social and historical elements inside is still typical and abundant, and by the contrast between its special and social structure, we can dig out more information of the former modern city's transformation. This also lead to a

research method of individual case study. That is ‘After answer what, we should also illuminate the social meaning, and analysis in both formal way and social way’ (Lai Delin, 2002).

Case Study

The research method of this period, is that by preliminary calculate the number of lilong mansion in Shanghai (about 300-500), taking two typical lilong mansions as the objects of case study (Figure 3). As what is mentioned above, construction is the entry point of this paper. And the detailed classification method, is that summarized introduction, special functional use, structure, material, decoration and characteristic detail.



Figure 3 the location of the 2 Lilong Mansions.

Case 1 – House Zhaozhou

Summarized introduction: The first case is called House Zhaozhou (Figure 5), its location is No.148, Lane 200, Zhaozhou Road (Figure 4), it's a lilong mansion built before 1920s, and is located inside the third expansion area of the former French Concession. It is 2-floor high and hides inside the block surrounded by lots of lilong house for rent. And the feature of House Zhaozhou differs much from the surrounded buildings.



Figure 4. The location of House Zhaozhou.



Figure 5. Photo of House Zhaozhou.

Special functional use: The special distribution inside House Zhaozhou has obvious functional separation (Figure 7). There are two functional clusters separated by the back courtyard (Figure 6), those are the main part and the assist part. The main part is composed by the principal room, the wing room and a main entrance gate. The principal room has three bays, but actually the two side bays belongs to the wing room. And the principal room has the living room function while the wing rooms have the bedroom function. Turned to the assist part, it contains the kitchen and the maid room function, and on the west top of the roof there's a balcony having both hanger and fireproof function. The back courtyard is the part where mainly used to put the wash basins.

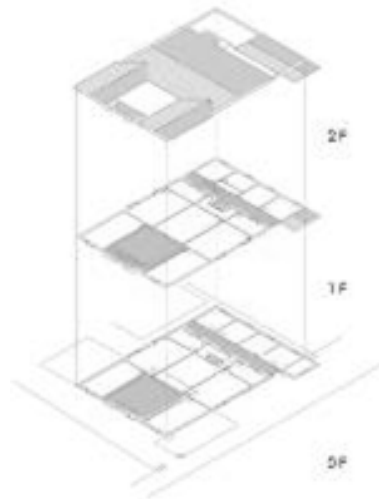


Figure 6. The courtyard.

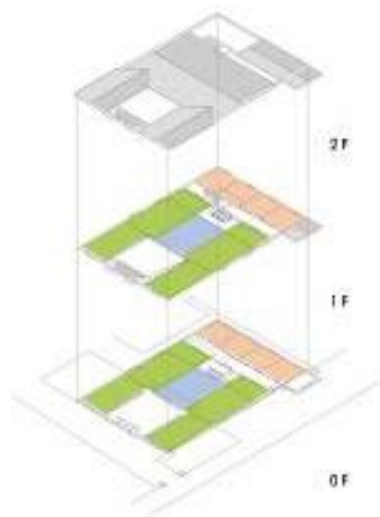


Figure 7. Function separation: ■ living room ■ bedroom ■ maid room.

Structure: The foundation part is a typical shikumen style, it is consisted of detritus and sand to form a 600mm³ cube. What is built on top of the foundation is the supporting system composed by brick walls and timber frames. The 360mm-wide brick walls surrounds the whole building with 12 200mm²-square timber pillars inside. These combined with the wood rib floor, the triangle roof truss, the purlines and the rafters to form the whole structure system of the house (Figures 8 and 9).

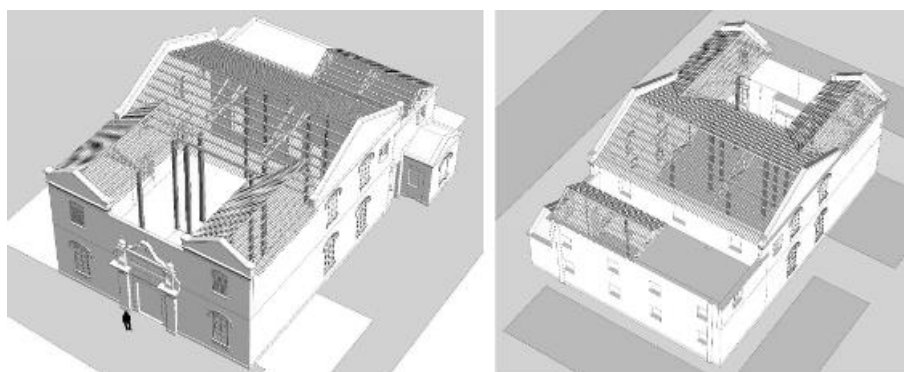


Figure 8. The structure model of House Zhaozhou.

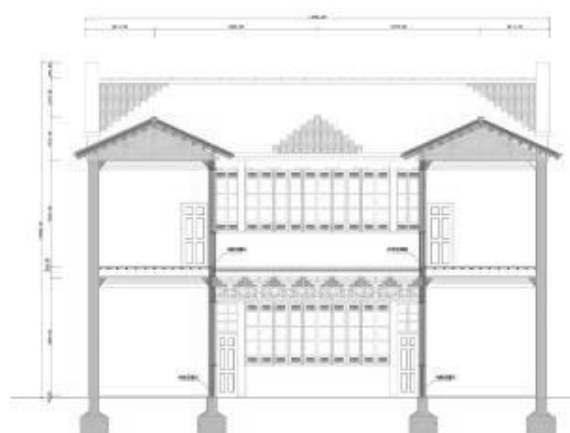


Figure 9. The force analysis.

Material: Turned to the material using, firstly, about the wood use, a large number of the timber material is Oregon pine, which contain the pillars, beams, doors, windows, ceilings, skintles and stairs, and lots of them were made by machine (Figure 10). Secondly, about the brick use, all use the machine made red and black brick with the size $50 \times 120 \times 240 \text{ mm}^3$. They are also used in the brick carving on the outside wall. The outer wall has the width of 360mm while the inner wall 120mm (Figure 10). Thirdly, about the plaster use, the outer wall is in a dry-wall way, with no plaster and with grass-lime mortar as the bonding layer, also with a special pointing called 'Yuanbao Feng'. The inner wall is the same way as the outer wall except the plaster part. It has white lime as the plaster. Fourthly, about the floor part, first floor with red floor tiles while second floor with strip pine floors. The second floor of the west part of the assist room is different, it has reinforced concrete floor. Fifthly, about the roof, it has pine triangle trusses, purlines and rafters. With small bricks called 'Wangzhuan' and Chinese black tiles on top of the roof.

Decoration: House Zhaozhou has a quite mixed decoration situation. The outer side of the main gate is decorated in a western style while the inner side is a traditional Chinese style (Figure 11). The ceiling is western style, but the doors and windows are Chinese style. And the other mix part is the different class from the main house and assist house, there's complicated decoration inside the main house while little decoration inside the assist house (Figure 11).

Characteristic detail: Firstly, There are iron gutter outlets at the eave of the house. Secondly, the reinforced concrete balcony on the roof of the assist house was made for a bi-functional use, one is to be the fireproof ceiling for the kitchen downstairs, the other is to create a space for hanger in the crowded block (Figure 12).

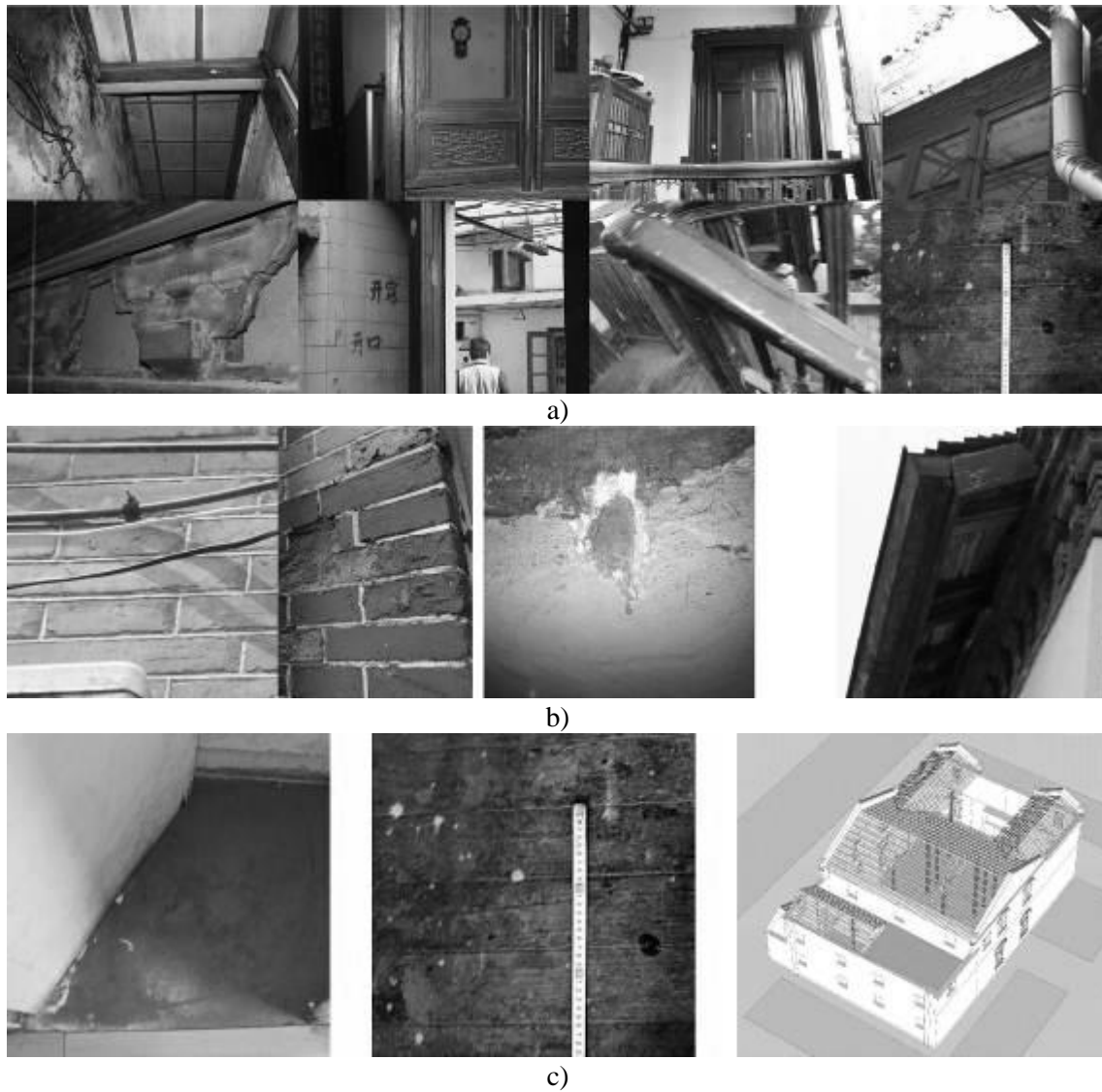
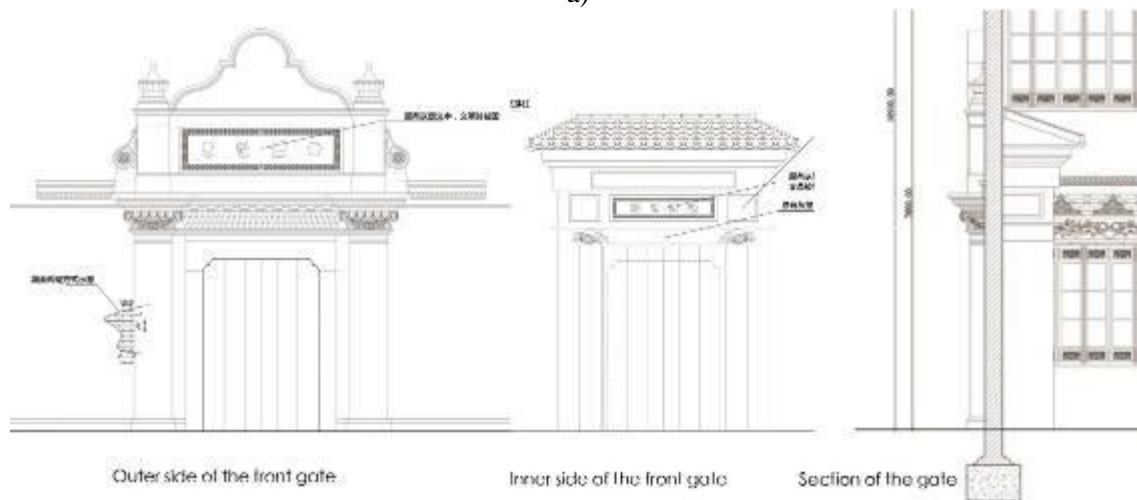


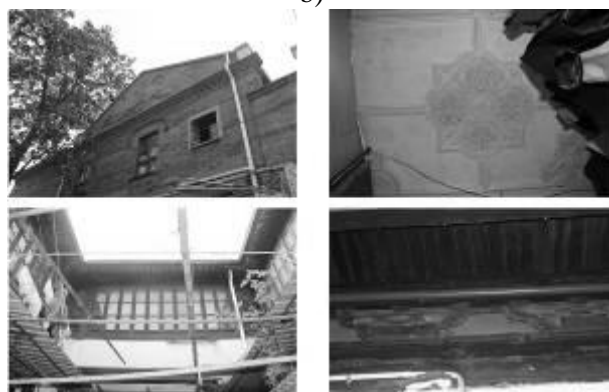
Figure 10. a) Wood material - Oregon pine, and most of them are operated by machine; b) brick material - the outer wall, the inner wall, and the roof; c) floor material - 0F: clay with red painting; 1F: timber floor; 2F of the maid room: reinforced concrete



a)



b)



c)

Figure 11. a) the main gate from outside and inside view; b) the elevations of the outside and inside view of the main gate & the section of the main gate; c) Outer wall with Western-style decoration Windows with Chinese-style Ceiling with Western-style pattern Architrave with Chinese 'Dougong'.

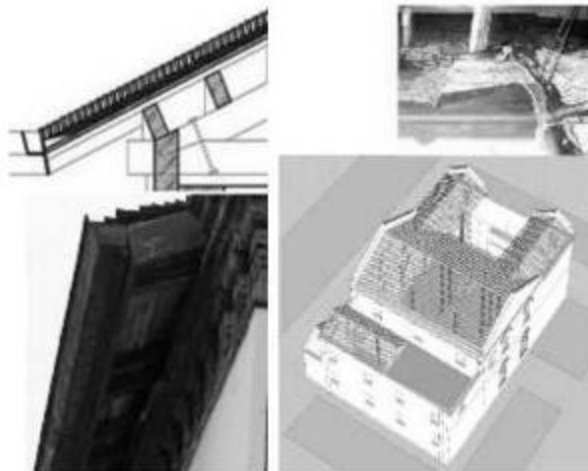


Figure 12. The iron outlets the reinforced concrete floor of the maid room.

Case 2 – House Yulin

Summarize introduction: The second case is called House Yulin, its location is No.3, Lane 449, Yulin Road(Figure 13), it's another lilong mansion built at 1893, and is located inside the eastern part of the International Settlement. It is 1-floor high, and compared with House Zhaozhou, it's more like a local style house in Shanghai. And also hides at the back side of a row of 2-floor commercial lilong houses built by the owner (Figure 14).



Figure 13. Location of House Yulin.



Figure 14. House Yulin.

Special functional use: The special distribution of House Yulin has little difference with the traditional Jiangnan-Style houses. One principal room with two wing rooms and one gate to form a courtyard space. The inner space has no functional separation with only partition wall to separate the house. But only a small part at the east bay of the principal room has different roof style and this part is used for cooking and washing. The north wall of the principal room set back 1m to make the under-eave space a common corridor connecting the two wing rooms and the principal room (Figure 15).



Figure 15. ■ living room ■ bed room ■ kitchen ■ reconstruction.

Structure: The foundation part is more like the traditional Jiangnan-Style house, use small black brick to form the tube foundation units, which is called 'Hangshi'. What is built on top of the foundation is the supporting timber frame structure system called 'Chuandou' Style. And on top of the timber pillars, the purlines, rafters, tile brick and the Chinese black tile compose the roof part (Figure 16, 17).

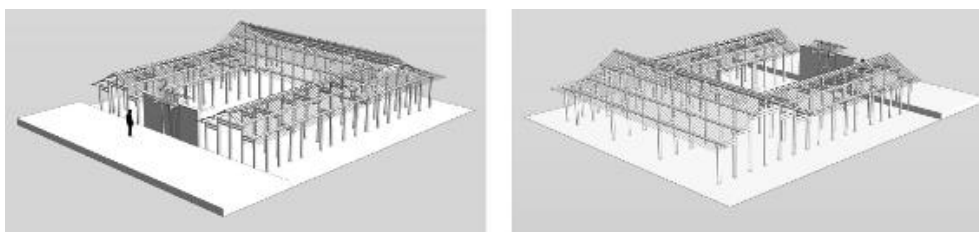


Figure 16. The structure model of House Yulin.

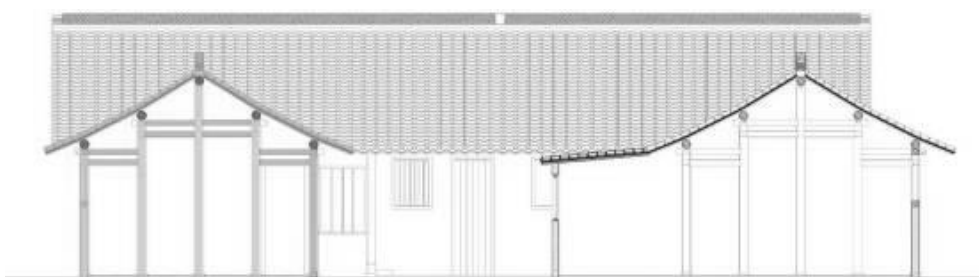


Figure 17. The force analysis.

Material: Firstly, about the wood use, all of the timber frames, doors, windows and roof structure are made by a special wood material called China Fir. And all the wood materials are painted by varnish and tung oil to make the color in a wood or dark red (Figure 18). Secondly, about the brick use, all the bricks inside the house are called Chinese black brick. It's a little bit smaller than the late machine-made brick with the size of 40*100*200mm³. But it is also mass manufactured by brick factory (Figure 18). Thirdly, about the plaster use, the outer wall is painted with yellow grass-lime mortar plaster while the inner wall with white lime. Fourthly, about the floor part, the outer floor in the courtyard is made by Chinese black bricks and stripe granite stones while inner floor by bricks and concrete (Figure 18).

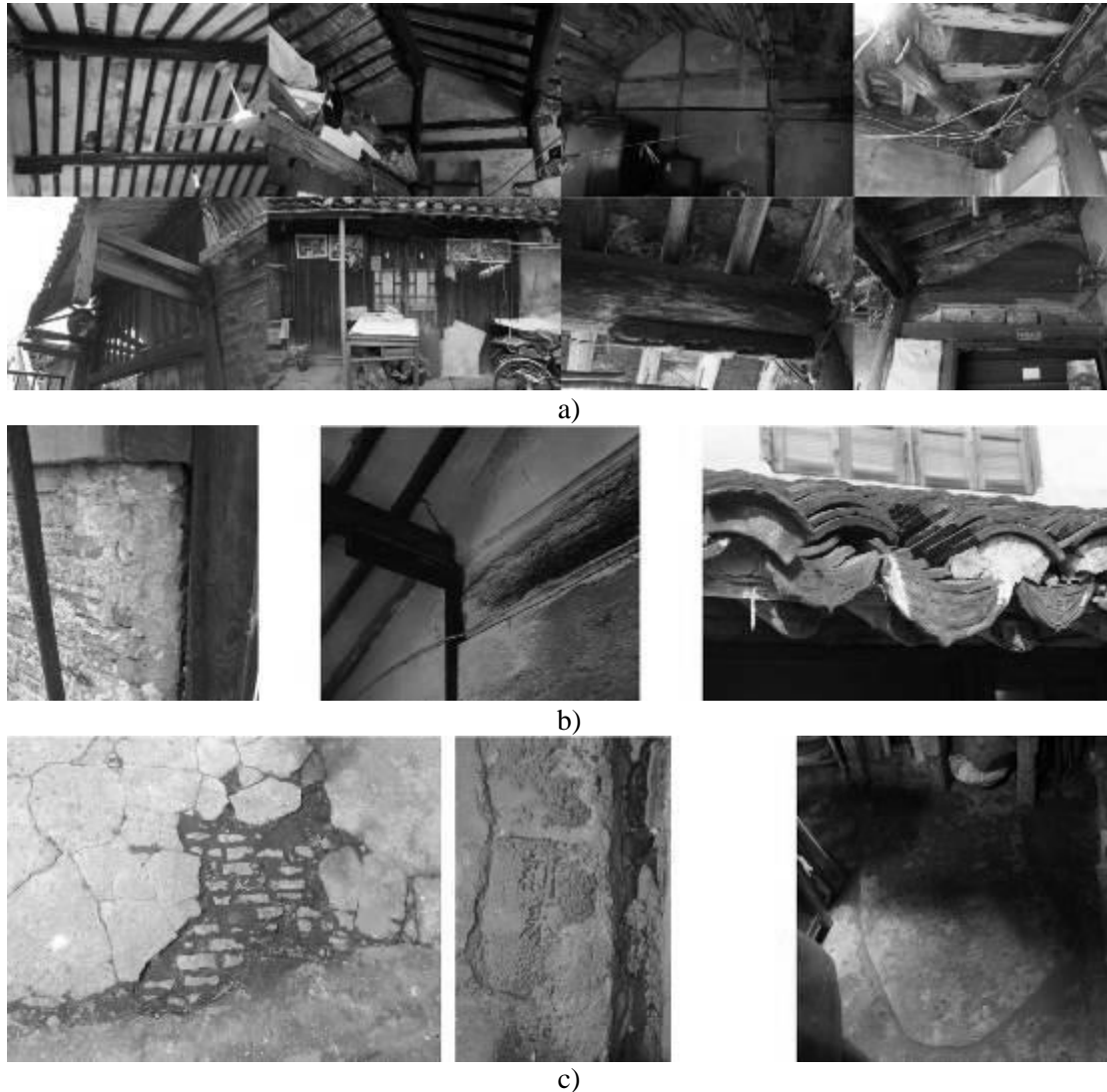


Figure 18: a) Wood material - China Fir, and most of them are operated by machine; b) brick material - the outer wall, the inner wall, and the roof; c) floor material - Outdoor: black brick & granite stone; Indoor: black brick covered by cement.

Decoration: House Yulin little decoration except the brackets of the beams in the Northside of the principal room with cloud pattern, the beams cross the under-eave corridor with a moon-beam pattern. There's no ceiling, no other decoration inside the house. About the door and window, no complicated but in a humble way, with only vertical wood batten. And the eave part is also in a traditional way, with beautiful eave tiles called 'Dishui' and 'Wadang' (Figure19).



Figure 19. Decoration of the ceilings, beams and eave.

Characteristic detail: The entrance wooden gate of House Yulin is the most special symbol of a so-called town house for its location is inside the urban area. But the pattern turns to be a really vernacular style which is rare in the Lilong house area (Figure 20).



Figure 20. The entrance gate.

Analysis and Conclusion

After the case study in the construction of the two lilong mansion, I try to put these two samples together with the previous research and make comparisons. This comparison can make sense because firstly, they're both constructed in the concession city after 1843, that is the year when Shanghai started its urbanization. Secondly, although they belong to different concessions, there's little discrepancy in construction system based on the statute. The main conclusions are:

i) The functional separation became more enhanced, and tended to fit with the construction system reciprocally. The conclusion can be draw from the comparison between the two kitchens.

ii) The decoration inside House Yulin has still the vestige of the handicraft from the subtle difference between the same components. But inside House Zhaozhou, all the same components are like copy from each other. That is because they were made by machine. So this shows that way of manufacture has changed from the handicraft way to the machinery way.

iii) Based on the transformation of the structure system, we can see that because of the increasing urbanization strength, there are new demand on the buildings, that is much higher and more intensive. But the structure of House Yulin can't fit the change. For it is hard and expensive to be built higher using 'Chuandou' style, and the structure would be too complicated to make terrace house. So we can find that in House Zhaozhou, the wall becomes more important in structure. The house can be built higher easily and it can be adjoined with other house. But there are still deficiencies in House Zhaozhou. The wall-timber pillar system is unbalanced with force stress. And the structure between the main house and maid house cannot become a unit.

iv) In the previous study, they chose alleyway house for rent as research object. Economic rationality becomes the main issue when being built. So if we put all types together during

1870s to 1920s to compare, there's little difference between each other. And it's hard to explain why the garden & apartment alleyway house have so mature construction system when they first came into appearance at 1930s-1940s. And based on the comparison we did, the conclusion or guess that the types appeared in these period are all transforming types can be established.

v) On the basis of the change in materials, in operating ways, in the styles, decorations and in some panel joint just like the eaves, it's easily to find that construction system was changing at that time. But what was not changed is the house owner always wants to regress to traditional type. This somehow shows that the type of alleyway house was partly transformed from the local type rather than fully transplanted from western style.

The study of Lilong mansion which as a residential type that is not paid much attention projects mass information with cohesion and variety to understand the transformation issue of former modern Shanghai. It needs to be cared and researched with more and more attention.

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The effects of urban form on levels of integration of housing schemes and social interaction among residents

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Abstract. *The paper investigates how levels of integration of housing schemes can affect social interaction among residents within the scheme and with its urban context, further affecting resident social and emotional health. The study incorporates global configuration aspects and their cognitive dimensions within a single framework in investigating the relationships between man and built environment, more specifically those involving the analysis of relationships between the configuration characteristics of accessibility, legibility and perception of environmental performance. Methodological procedures consisted of post-occupancy evaluation of four low income housing schemes comprised of different layout, size and location in the city of Montenegro, southern region of Brazil. Data were collected by complementary techniques, such as mental maps, interviews, observations of behaviour, physical measurements and questionnaires. Quantitative data were analyzed through non-parametric statistics and qualitative data by meaning and frequency. Following the perceptive approach adopted, user satisfaction and environmental behaviour were employed as indicators of environmental performance and social interaction. Space syntax measures were used in order to analyze spatial configuration as measured by the axial map of local and global integration and analysis of street connections with the immediate surroundings and with different locations in relation to the consolidated urban area. Results indicate that successful integration of the housing scheme in its urban context helps residents integrate into the neighbourhood and the city, increase satisfaction with their place of residence and promote sense of belonging and citizenship, all of which support residents' well-being.*

Key Words: *social housing, spatial configuration, environmental performance, social interaction, resident well-being.*

Introduction

It is argued in this study that Brazilian public housing has been negatively affected by standardization of project design and the nature of the system of provision based on economy of scale, with overemphasized priorities for quantitative targets. Consequently, the design of most housing schemes built so far was not appropriate for the satisfaction of user needs and aspirations and often have common features that distinguish them from the rest of the urban area in which they are located. The attribute mainly identified as usually affecting public housing, is its artificiality – a ‘cyst’ in relation to its urban context. In short, the spatial configuration generally provided in low-income housing schemes is characterized by: lack of relationship with its urban context, as streets designed to serve the housing scheme do not integrate with the existing urban network; low density; uniformity and dispersion, which imply high costs in infrastructure, maintenance and replacements; location on the urban periphery, lack of attractors to motivate surrounding residents to use the environment and integrate as part of the neighbourhood. The repercussion of the number of standardized projects with similar problems in its urban context looked as damaging to neighbourhood residents and to the city as a whole.

Therefore, it is clear that the spatial structure of social housing provided in Brazil and its performance need to be further analyzed in terms of quality, as attempted in this study, in order to identify the relevant factors requiring change and the nature of change that will promote significant improvement in mass housing provision. When bad performance exists, the massive scale and number of those projects in Brazil, which replicate poor quality housing schemes has

been creating a major negative impact on the cityscape, propagating “ulcers” in extensive parts of cities (Lay and Reis, 1994). The consequences of this are predictable, in that the attitudes, motivations and behaviour affected by the adversely perceived performance of housing schemes and entire lower-income neighbourhoods might encourage further deterioration of the cityscape, adversely influencing citizens’ feelings of self-esteem, their social standing in the community, their relationships to neighbours, sense of belonging, and sense of identity with the place, further affecting maintenance of social order, encouragement of self-development and promotion of well-being for the population.

The process of social and spatial differentiation that characterizes the urbanization of Brazilian cities is marked by strong segregation and segmentation of urban space in terms of social groups (Maricato, 2001). Segregation is also derived from a dispute for convenient location within the city. It is a process in which different classes or social strata tend to concentrate more intensively in certain regions or groups of neighbourhoods, sometimes creating a significant concentration of low-income population in large areas. The problem seems to be directly related to characteristics of spatial configuration and location of housing schemes, since segregation can be related to the geometric distance (location) or topological distance (configuration). Marques (2007) points out that segregation means, besides the social separation, inequality of access, which can restrict circulation or hinder the establishment of frequent contact between groups. In this sense, the urban space is inherently unequal; availability of equipment, infrastructure and quality of buildings, as well as the inequality result from differences in accessibility to all points of urban space. In order to account for the attested influence of the built environment on spatial behaviour and well-being, this investigation focuses on the configuration characteristics that affect user attitudes and the perception of environmental image of social housing schemes.

The network of social relationships is regarded as essential to residents’ effective integration in the community they live, and territorial behaviour is part of a system that allows social organisation take place, promoting neighbourhood interaction and community formation. Consequently, legibility of site layout, which results from how the site is organised and how the buildings and spaces are located and related to each other, affect the ways spaces are used (Lay, 1998). That is, despite spatial behaviour or user satisfaction cannot be determined by design, it can establish a number of physical and spatial qualities that can support or inhibit patterns of behaviour, consequently affecting the intensity of contact among residents. The literature on human cognition suggests that configuration aspects of built environments have significant consequences. Lynch (1960) says that legibility, which is highly related to configuration aspects, may play a decisive role in acquiring a sense of spatial control in spatial experience. He notes that, in order to be “imageable”, an area needs to be apprehended as a pattern of high continuity, with a number of distinctive but interconnected parts. Moreover, he argues that in the process of way finding, the strategic link is the environmental image: a generalized mental picture of the exterior physical world, which benefits from architectural legibility as experienced by an individual, further emphasizing affective qualities of spatial form that is central to the emotional and physical well-being of the inhabitant population, personally as well as socially.

Moreover, Golledge and Stimson (1997) emphasize that the path or network structure used in everyday spatial behaviour becomes critical feature of the image of a spatial environment. Others suggest that spatial layout of the built environment influences the accuracy of cognitive representations of real world spatial information (e.g. Appleyard, 1969; O’Neill, 1991). Downs and Stea (1973) note that the process of cognitive mapping is a means of structuring, interpreting and coping with a complex sets of information that exist in different environments: cognitive maps are useful instrument for recovering information about the way we represent the environment, the regularity or irregularity of frameworks such as street systems, and the most salient positive and negative elements, which further denote user attitudes towards that environment.

From a different approach, Hillier (1996) has argued that spatial configuration may face constraints on spatial experience since it appears to encourage or impede aspects of human activity through spatial cognition and subsequent behaviour. Since 1984, Hillier and Hanson set out a theory of space as an aspect of social life, which has developed in the direction of better understanding the spatial nature of buildings and cities through techniques of configuration analysis, such as space syntax analysis tool applications, which allow dealing graphically with the numerical properties of spatial layouts in order to measure accessibility. In simple terms, spatial configuration deals with a set of interdependent relations originated by a network structure in which each part is determined by its relation to all the others. According to Peponis and Wineman (2002), built space can be defined as a field of structured co-presence, co-awareness and encounter. It follows that built space is to be understood as a relational pattern, a pattern of distinctions, separations, interfaces and connections. The theorem chosen by Peponis and Wineman (2002) to illustrate ways in which built space works socially deals with linear spaces, such as streets in urban areas and the paths of movement along those spaces, and argue that high accessibility implies a higher probability that a space will be used for movement. That is, the degree of accessibility and consequently potential of movement and presence of people in the urban space would affect the choice of path to be followed by pedestrians, since people would be attracted by spaces with people and would tend to avoid deserted spaces, as Gehl (1987) points out.

So far, space syntax has contributed sophisticated ways for dealing with urban layouts as differentiated patterns of large-scale connections. This complements the emphasis on local attributes (such as the dimensional profile of street sections, the characterization of boundaries, or the attributes and qualities of individual open spaces) that is typical in many studies of urban space use (e.g. Whyte, 1980). Since Jane Jacobs (1961), the circulation of people and appropriation of public space has been mentioned as a crucial element to the *urban vitality*, as the number of encounters increases potential interactions among users and urban security. In addition, Jacobs claims that certain conditions can also affect interaction, such as *population density*, where higher densities are associated with higher number of interactions; *interface between public and private spaces* that generate permeability, favouring greater movement of people and interaction between them and positively affecting perception of security; *urban diversity* with variety of uses, activities, built form, social classes and lifestyles, coexisting in the same space; and *limited distances* that might increase opportunities for social contact. Then, it is assumed that urban structures and spaces that do not have these conditions can hinder or discourage social interaction among residents and generate segregation, which appears as negative consequence of the lack of social interaction.

Therefore, it is understood that the essential quality of cities is to fulfil the need to provide meeting places and support social exchange and social interaction is considered a key indicator of housing performance, which according to Alexander (1965), is an essential mechanism for the functioning of the city. Authors (e.g. Cooper 1975; Lay, 1998; Basso, 2001; Gambim, 2007) highlight the important role of public open spaces play in residential areas on promoting social interaction and indicate that the open spaces, depending on how they are configured and in accordance with the existent physical elements, can encourage contact between people. It follows the premise that certain urban structures can encourage or discourage the occurrence of more intense social interaction. Complementary, Hillier (1998) argues that, independent of density of a certain area, if the configuration makes the natural movement of pedestrians more difficult, there will not be a sufficient number of people to generate the perception of a well appropriated and used space.

In this context, this study incorporates global configuration aspects and their cognitive dimensions within a single framework in investigating the relationships between man and built environment, more specifically those involving the analysis of relationships between the configuration characteristics of accessibility, legibility and environmental image. It attempts to identify configuration patterns that might be collectively perceived as fulfilling or not residents' satisfaction with the housing scheme and their responses to it through positive or negative

behaviour, and higher or lower social interaction. It is further assumed that good or bad environmental performance of social housing is reflected, among other things, on resident social behaviour and self-esteem, affected by the degree of satisfaction with the place where they live. Finally, it explores the effects of levels of integration of housing schemes on the legibility and imageability of the area and degrees of social interaction among residents and neighbourhoods, in order to produce evidence to base the production of more qualified residential environments that facilitate sociability, promoting sense of belonging and citizenship, all of which support residents' well-being.

Methodology

In order to achieve the objectives of this study, the relationship between housing schemes of different layouts, sizes and location in the city, and the level of interaction among dwellers in the scheme, interaction between the housing scheme and the immediate surroundings and the city, were analyzed. The case study consists of four housing schemes produced by COHAB - Housing Company of the State of Rio Grande do Sul, located in the city of Montenegro, characterized by single-family housing units. The sample of housing schemes was selected based on the axial maps. The housing schemes show different levels of integration in the urban fabric, as measured by the axial map of global and local integration (Figures 1 and 2) and the analysis of street connections with the immediate surroundings. Integration measure is a key global measure in syntactic analysis which relates each space in the settlement with all the others, providing information about accessibility of each one in relation to all other spaces (Hillier, 1996). In the global integration (Figure 1), each street that constitute the housing scheme is analyzed in relation to all the streets of the urban system, whereas in the local integration (Figure 2) each street that constitute the housing scheme is analyzed in relation to a specific number of streets, departing from each of these streets. Therefore, global integration tells about the accessibility of a housing scheme in relation to the city as a whole, while local integration tells more about accessibility in the housing scheme: the shallower the axial line (red and orange lines), the more integrated or accessible is the space. On the other hand, spaces with more depth are the most segregated (green and blue lines: yellow is in between integrated and segregated lines), as they are less accessible in relation to all the other.



Figure 1. Axial map of Montenegro, Global Integration.



Figure 2. Axial map of Montenegro, Local Integration R3.

The schemes are of small size (up to 50 housing units), medium (51 to 200 housing units) and large (more than 201 units) and are differently located in relation to the consolidated urban area of the city (Table 1).

Table 1. Sample of housing schemes

Housing scheme (h.s.)	Number of residential units	Distance in relation to the city	Configuration – integration in the urban fabric
Cinco de Maio	Medium size 172 units	Close to the old city centre	Not integrated
Vila Popular	Medium size 107 units	Close to the old and new city centre	Integrated
Vila São Pedro	Small size 20 units	Close to the new city centre	Integrated
Germano Henck	Large size 366 units	Far from the old and new city centre	Not integrated

The factors most mentioned in the literature that might promote or inhibit social interaction such as characteristics of open public spaces, relations with the surrounding buildings, quality of infrastructure, services, retail and entertainment available, as well as the morphological characteristics of the scheme and the socioeconomic characteristics of dwellers, were investigated.

Methodological procedures consisted of record information, physical survey (use of buildings, vegetation, furniture and equipment in the housing schemes and surroundings) and mental maps with interviews in a sample of 72 interviewees residents of the housing schemes and residents of the surrounding areas (verification of perceived territory). Systematic observations of behaviour registered in 112 behavioural maps and application of 210 questionnaires to residents of the housing scheme and residents of surrounding area, were also carried out in order to measure the degree of social interaction and attitudes among residents in the h.s. and within the neighbourhood. The sample of respondents was defined to fulfil at least 30 residents in the h.s. and 30 residents in the surrounding area, except in Vila São Pedro, with a total of 20 units. The statistical analysis of quantitative data through frequencies and non-

parametric tests such as Kruskal-Wallis and Spearman allowed inferring relationships and correlations between variables. Map of barriers and syntax analysis (Hillier & Hanson, 1984) were further used.

Results

The results focus upon the analysis of relationships between spatial configuration and social interaction, and the verification of the intensity of social interaction among the housing schemes investigated.

Characterization of the housing schemes

Cinco de Maio h.s. was built in 1969 and represents not integrated scheme at local and global levels, medium size and located near the city centre. It has two kindergartens, a school, a community centre and a gymnasium. Despite its steep slopes and lack of equipment, the existing green area in the neighbourhood is used by residents of the h.s. to perform social activities. There are few retail outlets and service in the housing scheme and surroundings (Figures 3 and 4).



Figure 3. Cinco de Maio h.s. and surroundings.

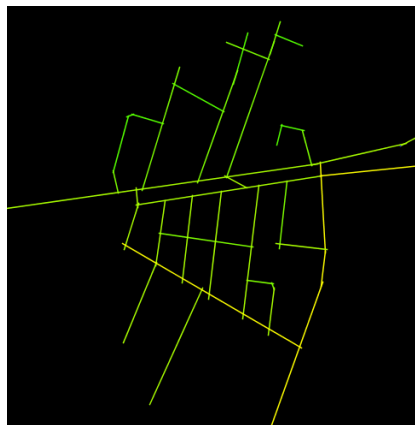


Figure 4. Axial map Cinco de Maio h.s. and surroundings (Global Integration extracted from Fig. 1).

Vila Popular h.s. was implemented in 1968, medium size with 107 single-family housing units. This scheme is integrated to the surroundings, with an integration line of high integration

value in relation to the system, is located close to the city centre and has a green area and a community association.



Figure 5. Vila Popular h.s. and immediate surroundings.

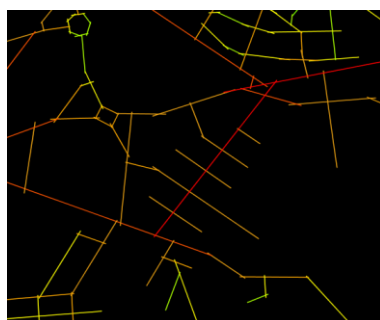


Figure 6. Axial map Vila Popular h.s. and immediate surroundings. (Global Integration extracted from Figure 1).

In the surroundings, there are two schools, a nursery, a religious temple and a recreational space with a football field, and a reduced number of retail outlets and service in the scheme and its surroundings (Figures 5 and 6 above).

Vila São Pedro h.s. was built in 1970, with 20 single-family units. It has a green area and a school. In the surroundings, there are four houses of worship and a parish pavilion, which features group activities and meetings of community associations.



Figure 7. Vila São Pedro h.s. and immediate surroundings.

There are many retail outlets and services, as this area has become a new centre of commerce and city services, that is, the new city centre. The existing shops are located along a street peripheral to the housing development and serve the residents of scheme and also the residents living in the surrounding and in the city (Figures 7 and 8).

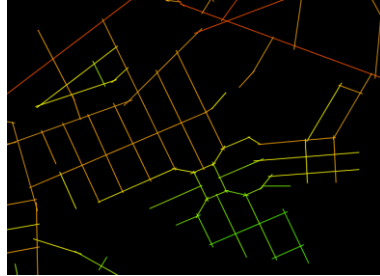


Figure 8. Axial map Vila São Pedro h.s. and immediate surroundings. (Global Integration extracted from Figure 1).



Figure 9. Germano Henck h.s. and immediate surroundings.



Figure 10. Axial map Germano Henck h.s. and immediate surroundings. (Global Integration extracted from Figure 1).

Germano Henck h.s. is the largest and most segregated scheme, built in 1984. It has a school, a nursery, two places of worship, and a community centre and a church under construction. In the surroundings, there are health clinic and two places of worship. There are few retail outlets

and services in the neighbourhood, which are located in the most integrated streets, but only serve the residents of the scheme (Figures 9 and 10, below).

Relationship between spatial configuration and social interaction

It was investigated whether the integration of the scheme in the existing urban fabric, due to spatial configuration, helps the residents to integrate into the neighbourhood/city and recognize as belonging to the city. When integrated schemes were analyzed, it was found that Vila São Pedro h.s. (small size) is integrated because it is blended with the existing urban fabric, and Vila Popular h.s. (medium size) is integrated into the environment via a central street that connects neighbourhoods. However, it was verified through the axial maps (Figures 5 and 6) that the small h.s. presents continuity of urban fabric and medium size housing schemes do not, indicating greater homogeneity in the area where the small-size scheme is located.

It was found that Vila São Pedro h.s. (small-size and integrated) is inserted in the neighbourhood boundaries perceived by residents of the scheme and in the surroundings, and variations in perceptions refer to the structural pathways that serve as physical barriers, indicating that the continuity of streets in the surroundings influence the perception of integration. However, in the Vila Popular h.s. (integrated and medium-size), resident perception of neighbourhood boundaries includes only the scheme, possibly because it is a concentrated occupation, facing the main street and with few connections in the existing urban fabric. Furthermore, the perception of boundaries is also related to structural pathways that generate physical barriers. Thus, it was found that the existence of very integrated streets in the system did not influence the perception of integration, and just indicates good accessibility. Behavioural observations confirmed that the green space is heavily used by residents, despite having little equipment and furniture. It also became evident that the proximity between the scheme and the city centre, contributed to a more urban pattern of co-presence and possibilities of interaction.

Meanwhile, in Vila Popular h.s. (mid-size and integrated), behavioural observations underscore the importance of the main road system, the heavy flow of vehicles and pedestrians in different neighbourhoods, confirming researches showing that the degree of integration of a space is strongly correlated with the number of people moving in it. According to Peponis (1992), spatial configuration only determines the potential for others to notice, as the backdrop for an active society, but do not prove that people interact, share and exchange experiences among themselves, or even notice each other. In addition, it was confirmed that open spaces in Vila Popular do not meet the necessary requirements to perform activities of social life, for example, due to narrowing and irregularity of sidewalks, lack of vegetation and shading in the square, making it difficult to stay in the place, reducing opportunities for social and informal contact and negatively influencing the level of interaction among residents.

Results further indicate that residents in Vila São Pedro h.s. (integrated and small) are the most satisfied with where the place they live and the neighbourhood, while residents in Vila Popular (integrated and mid-size) are less satisfied than those from Vila São Pedro, but have better evaluation than the other schemes (not integrated) and the surroundings. Residents in Vila São Pedro also showed better evaluation relationship with neighbours in the scheme and neighbours in the surroundings while Vila Popular appears in third place in the evaluation of quality and intensity of relationship among the residents of the scheme neighbourhood where they live, being superior only to the assessments of residents, probably due to the fact that maximizing the integration increases the control of the strangers in the place, to the detriment of the local control, i.e., the main road with high-value integration enhances the flow of strangers and decreases the control of residents, therefore decreasing opportunities of interaction among the residents. Regarding the relationship in the neighbourhood, residents in integrated mid-size scheme have a better assessment than residents of other non-integrated schemes and surroundings, but with lower assessment than residents in the integrated small-size scheme. It is noteworthy that a significant percentage of respondents of this scheme consider as

“neighbourhood” only the area of the housing scheme. Finally, residents of two integrated schemes and respective surroundings are among those who reported having more friends in the place where they live, however, also indicate a high percentage of friends outside the neighbourhood, showing interaction with residents in the scheme, in the immediate surroundings and the city. The results suggest that the integration of the scheme with the existing urban context, due to spatial configuration, helps the residents to integrate into the neighbourhood/city and to become recognized as belonging to the city as well as with satisfaction with where they live. However, it appears that the perception of integration of the scheme is more related to the continuity of streets of the scheme in the vicinity, than the existence of more integrated streets in the system.

Intensity of social interaction among housing schemes

Vila São Pedro h.s. is inserted into an existing subdivision and therefore within the existing urban fabric. The continuity of the urban fabric indicates a homogeneous area. Through interviews and mental maps, it was found that the dwelling units in the scheme are perceived as part of the neighbourhood in which they inserted, both by residents in the h.s. and by residents in the surroundings. The behavioural observations indicate that the green area is heavily used by residents of all age groups, despite not having sitting facilities along the sidewalks, which facilitates social interaction among residents of the scheme and immediate surroundings. It was also noted that the sidewalks, due to inadequate width and maintenance, are not used for passive activities or socialization. Besides, the proximity of the h.s to the new city centre generates great flow of pedestrians and vehicles, contributing positively to residents’ satisfaction with where they live and with the neighbourhood. There was a continuity in the flow of pedestrians on the streets of the settlement, due to the existence of services used on a daily basis (possibility of movement on foot), giving a more urban pattern of co-presence and possibility of interaction, which tends to be influenced by the geometric distance (Holanda, 2002). When comparing all schemes, results indicate that residents living in Vila São Pedro are the most satisfied with where they live and with the neighbourhood. They also had a better assessment than the others h.s. of relationships among residents where they live and in the neighbourhood, besides presenting a high percentage of friends outside the neighbourhood, showing interaction not only with the residents of the scheme, but also with the immediate surroundings and the city (Table 2).

Table 2. Intensity of friendship among residents

	Cinco de Maio		Vila Popular		São Pedro		Germano	
	scheme	surrounding	scheme	surrounding	scheme	surrounding	scheme	surrounding
	30	24	30	24	20	31	40	11
	(100%)	(100%)	(100%)	(100%)	(100%)	(100%)	(100%)	(100%)
+ friends in the h.s.	19	7	15	13	8	15	27	5
	(63,3)	(29,2)	(50,0)	(54,2)	(40,0)	(48,4)	(67,5)	(45,5)
+ friends in the neighbourhood	0	2	1	0	1	3	1	0
	(0,0)	(8,3)	(3,3)	(0,0)	(5,0)	(9,7)	(2,5)	(0,0)
+ friends outside the neighbourhood	11	8	11	8	7	8	8	3
	(36,7)	(33,3)	(36,7)	(33,3)	(35,0)	(25,8)	(20,0)	(27,3)
equal	0	7	3	3	4	5	4	3
	(0,0)	(29,2)	(10,0)	(12,5)	(20,0)	(16,1)	(10,0)	(27,3)

The analyzed data allowed to verify that the size of the housing scheme may influence the degree of social interaction with residents of the immediate surroundings, where the smaller the number of units of the set, the greater the degree of social interaction with residents of the

immediate surroundings. However, it is important to note that the h.s. investigated, in addition to its small size, is characterized by being integrated and well located near a commercial centre, which can influence the results, i.e., a segregated small-size scheme could provide different results. Moreover, it was investigated whether the most segregated housing scheme Germano Henck, located far from consolidated urban areas present higher interaction among residents of the scheme than the more integrated housing developments located in central areas. It was found through the mental maps that residents of the scheme consider as part of the scheme just the occupation on the south part of the main road, possibly because it is concentrated, segregated from the surroundings (connected at only one point), with well defined limits and the presence of the road, which seems to work as a physical barrier. It was confirmed that the deeper the system (low integration) more difficult is appropriation by the pedestrian, particularly by strangers to the place that, in general, are most people in public spaces (Holanda, 2002). It was possible to identify through the interviews the existence of 'social cohesion', as residents point out that everyone knows everyone, are protected and feel safe ('nothing happens with the people here').

Through questionnaires, it was verified that residents in this large scheme have one of the best assessments in relation to satisfaction with security, indicating the existence of territorial control and internal cohesion. Besides, behavioural observations confirm that the green area, soccer field and pedestrian crossings are heavily used by children, young adults and elderly, facilitating social interaction among residents, despite the lack of equipment and furniture. It was further observed that the pedestrian flow starts from the bus stop at the entrance of the scheme, since the shift to the city centre happens basically by bus. The continuous flow of pedestrians contributes to a more urban pattern of co-presence and possibility of interaction among residents. This scheme has the highest percentage of residents who have more friends in the place where they live. However, it was not found a positive assessment higher than in the other schemes that might indicate a better relationship or a stronger relationship among the residents in Germano Henck. Nonetheless, it must be pointed out that due to its location, far from consolidated urban areas, outsiders do not penetrate in the inner parts of the place, which indicates the existence of friendships restricted to the place where they live, confirming that schemes more distant and isolated can cause residents to relate only to each other and encourage social segregation in relation to the city.

Conclusion

Results indicate that the level of integration of the housing scheme in the pre-existing urban fabric, due to its spatial configuration, can help residents to integrate into the neighbourhood/city and feel recognized as belonging to the city. It was noted that residents in integrated schemes tend to be the most satisfied with where they live and socially interact more intensively with residents in the housing scheme, with residents of the immediate surroundings and with the city. In this sense, spatial configuration seems to be the variable with more direct influence on social interaction among residents, confirming Hillier and Hanson's (1984) results, that put accessibility as the most effective component in the dynamics of segregation, as stated by the social distance through the natural implication of movement networks. According to the authors, from the urban structure and dynamics of social classes' point of view, segregated areas would be used by relatively homogeneous populations and morphology of these housing areas could show these pre-determinations, as well as the contrast of juxtapositions of segregated areas. Nonetheless, when compared to larger housing schemes, smaller schemes tend to have better assessment regarding the relationship among residents in the place where they live and with neighbours in the surrounding area. That is, those residents develop friendships in and outside the neighbourhood, and at the city scale, as a result of higher accessibility. It is worth noting that smaller schemes require smaller areas for implementation and can be easily inserted

into the existing urban fabric, with better location and closer to local services, which can positively affect residents' satisfaction with where they live and the neighbourhood.

It was further confirmed that housing schemes located distant from the consolidated urban area, usually of large size, tend to prevent strangers to naturally penetrate to the inner parts of the scheme, thereby maximizing local control and friendship among residents and reducing opportunities of interaction with outsiders. On the other hand, the small size and good location of social housing schemes can not be a sufficient condition for the integration of residents together with the surroundings and the city, as spatial configuration seem to be more crucial. However, it is important to note that although there is a common sense that certain characteristics are more favourable to the performance of housing schemes for the effects on social interaction, there are no conclusive studies. Finally, this study highlights the importance of assessing the effects of spatial configuration in order to produce more integrated and qualified residential environments that support and facilitate social interaction among residents, promoting a sense of belonging and citizenship, further confirming that the architecture of settlements can positively influence our physical, social and emotional health.

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Characterization of the relationship between commercial plots and building patterns: a general survey in urban area of Nanjing, China

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Abstract. *Following Conzenian tradition of urban morphology, several studies have explored characteristics of commercial plots in China in a framework identifying the fundamental elements of urban form: Streets, plots and buildings. However, previous researches lack exploration on the relationship between building patterns and plots, without taking the complex controlling factors of commercial plots into account. Therefore, interdisciplinary approach must be applied to explain the formation rules of building patterns. Building typology and planar geometry rules as typomorphological base must be applied into the characterization of public plots. In this paper all the 645 commercial plots along the main roads in Nanjing are grouped into a hierarchically structured category according to plot shape and building outline. It focuses on two morphological criterions: the shape similarity and positional relationship between plots and buildings; and demonstrates how these correlates to plot coverage ratio and arrangement of open space. Such knowledge of rules can support subsequent urban analysis, planning, and guide future design of commercial plots.*

Key Words: Commercial plot, building outline, coverage ratio, positional relationship

Introduction

Public buildings in China have undergone a rapid development in the last 60 years. Since the different functions of sites within an urban area tend to be differentiated by physical form, each morphological category tends to have distinctive form and therefore can be studied individually (Whitehand, 2009; Abramson, 2008). However, commercial plots in urban area are under control of especially complicated conditions both from land use indicators and boundary conditions. The public buildings within commercial plots are required to meet the demand of public activities and an elaborate organization of the internal pedestrian and car circulation. With the pursuit of becoming a landmark, public buildings in China especially the high-rise mixed-use buildings show a great diversity of building forms.

Controversies have existed for long whether the architectural arrangement of public plots follows certain common rules, regardless of the functions of the buildings. Since the modern public building design have for long been use-led design codes, rather than form-led principles.

However, from the architecture designer's perspective, even under the seemingly disordered situation lack of form control, there seems to be certain rules restricting a 'design envelope', that is to say, the suitable buildable area for the public building within the plot, such as the circulation inside the plot, the surrounding traffic condition, the intention of creation of public spaces within the site, etc. These rules on site plan control bring certain similarities to the architectural arrangement within the commercial plots, regardless of the function or contents of the buildings. The difficulty of research lies in which morphological criterion to choose, in order to evaluate and illustrate the underlying rules in building arrangement of commercial plots.

This paper is based on a general survey of all the 645 commercial plots in Nanjing and proposes several morphological indicators in description and prescription of the morphological relationship between commercial plots and buildings inside.

Research Background

The combination of hierarchical framework of urban morphology and building typology

Within urban morphology there is general consensus on the core, fundamental elements of physical built form: streets, plots and buildings, following the tradition of Conzenian school. On the other hand, the Italian school established by Muratori and further developed by Cannigia focuses on mainly on the architectural typology research.

The understanding of urban morphology and the evolution of building typologies are keys to the zoning and design nowadays. Several scholars have tried to combine the two theories together to provide an efficient way to evaluate the morphological characteristic of urban tissue and to guide the zoning and design of urban area. Based on the work of Conzen and Caniggia, Kropf proposed a framework combining building typology and urban morphology and illustrate an example of the application of typomorphological principles (Kropf, 1998).

The selection of assessment criteria in morphological description on the plot level

Several previous studies on plots and buildings provided inspiring research framework and criterions for assessment of the morphological relationship between street, commercial plots and buildings within the plots.

The shape Grammar theory (M.Tapia, 1999) describes shapes and compositional logics by simplifying the spatial elements such as plot edge, building, open space as well as access into basic components of a relative network, in which way topological relationships of the morphological elements are revealed and described. Through implement of the shape grammar rules space structure of certain area is revealed.

Following the conzenian tradition, the assessment methodology named morpho (Oliveira, 2013) proposed by Vitor Oliveira provide a quantitative framework to assess the fundamental elements of urban form at different scales, that is to say, streets, plots, and buildings, and each relation between the pairs of element. He chose several morphological criteria such as ratio of building height to street width and alignment of buildings as well as dimensions of street blocks to evaluate the morphological characteristics of a given area quantitatively.

The addition of geometry rules in morphological description on the plot level

The plots as study objects in former studies on plot characteristics are usually of square or rectangular form lying in a regular order. However, the forms of blocks and plots in China are much more complicated with various shapes and sizes. Besides, the assessment of the positional relationship between building and plot must be based on the recognition of plots and building outlines as geometrical units. Therefore, planar geometry rules for necessary simplification of the plot shapes and building outlines must be applied in the study (Stiny, 2011).

This paper combines the methods above following the hierarchical framework of assessment between streets, plots and buildings and mainly focuses on the discussion of morphological relationship between commercial plots and public buildings inside by evaluating the shape similarity and positional relationship between plot and building.

The general description of the commercial plots in Nanjing

Nanjing is the capital city of Jiangsu Province, which situates in the more developed eastern region of China, with a population of more than 8.16 million, and a total area of 6597 square kilometers. Public plots in Nanjing have undergone complex transformation due to the change in land ownership in the past decades. The public buildings in Nanjing represent a very broad category which includes the buildings of different purpose and contents.

In total, there are 862 commercial plots among the main roads and secondary main roads in Nanjing, which account for 75% of all the commercial plots in Nanjing. The selection of research objects is according to the rules as follow, in order to clarify the basic condition and to avoid certain unnecessary exceptional cases along branch roads. Plots under construction or without constructional development are excluded; Shops along the streets, which are mostly extensions affiliated to residential buildings, are excluded; commercial plots, which are used as temporary garages are excluded; historical buildings which are now in public use, are excluded, because they don't follow the modern design principles.

Therefore, 645 commercial plots with the land use of office buildings, hotel buildings, and shopping malls or mixed use of the mentioned functions are chosen as the analysis database among all the plots.

The sizes of commercial plots varies dramatically from 131 m² to 248314 m². Above all, the most of the plots have a total area at the level of 5000 m². Generally, the size of the hotel plots are the smallest.

Six types of plot shapes

The shapes of the plots are categorized into six types according to geometrical rules: Square form rectangular form, triangle form, L shape, Z shape and U shape. The last three types are transformed from the square form or rectangular form due to the several plot property transitions during the last decades of land use change.

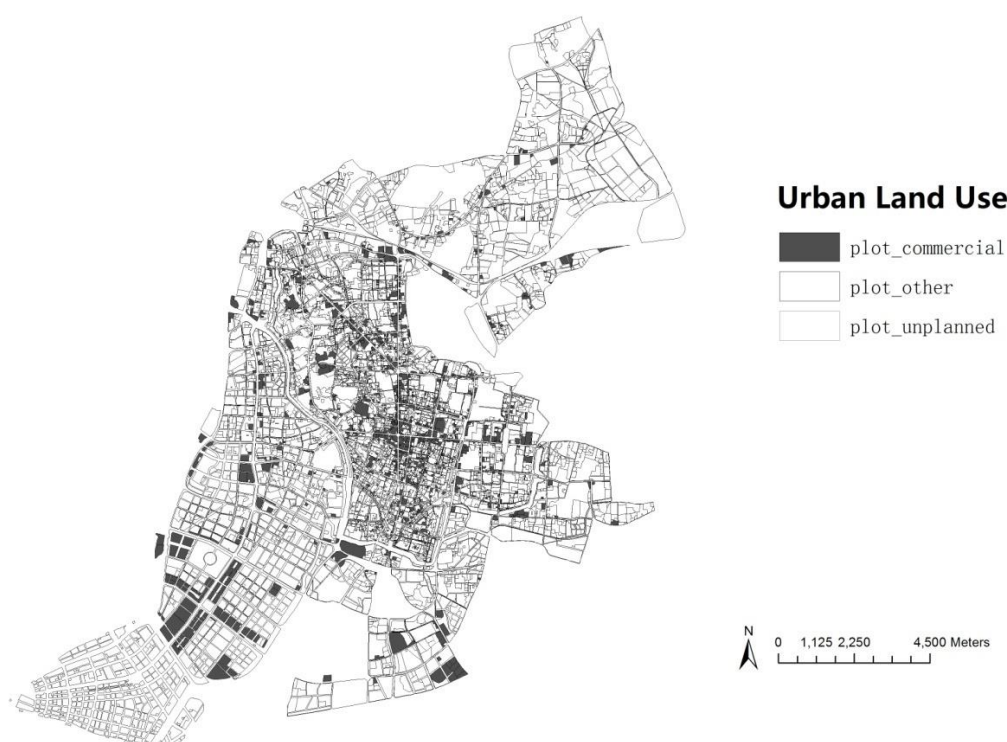


Figure1. The distribution of commercial plots all over Nanjing.

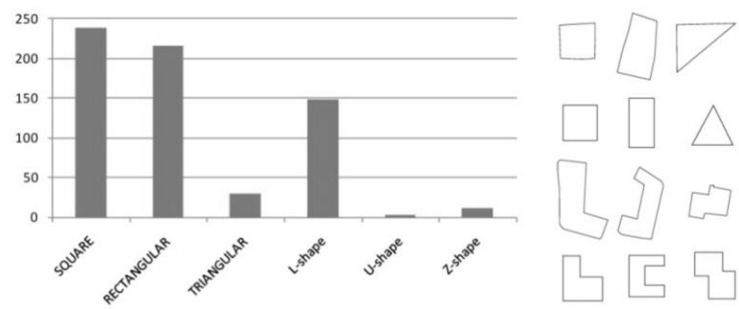


Figure 2. The 6 types of plot shapes.

At the street level: the boundary conditions of the commercial plots

Plot boundary conditions contribute a lot to the pedestrian flow and car circulation organization within the plot. The study of plot boundary firstly focuses on the plot boundaries, which are adjacent to highest-ranking roads.

The road network in Nanjing is a hierarchy system, composed of the main roads, the secondary main roads, and the branch roads. Blocks are divided by main roads and secondary main roads. Semi-blocks are divided by branch roads within the blocks. Due to the complex natural conditions (rivers, mountains) and several morphological transformation of the street system, the blocks of Nanjing varies significantly in block size, and proportion, which brings variable boundary condition to the plots inside (Zhang, 2013).

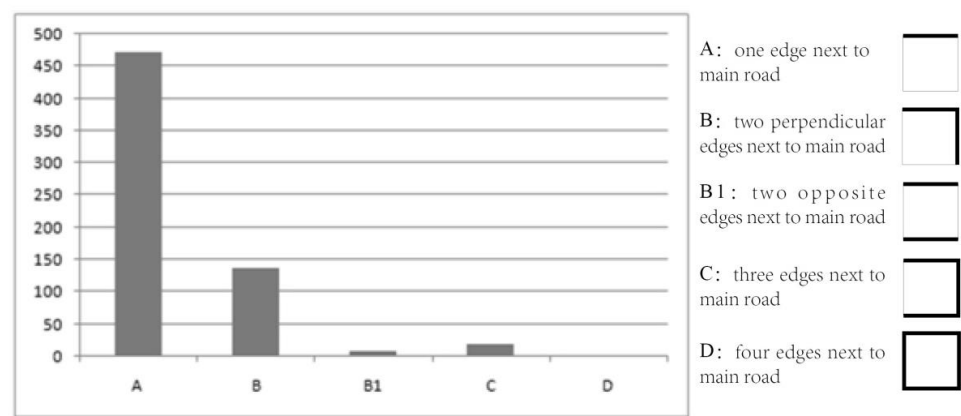


Figure 3. The existing boundary condition of commercial plots.

At the street level: Assessment of the relationship between Street and building:

Since the plot boundary adjacent to streets is parallel to streets, and the plot boundary is usually 4.5 meters setback from the street edge, the distance of building setback from main streets can be evaluated by the setback distance from building outline to the plot edge adjacent to highest-ranking road.

The setback distance of buildings from the plot boundary adjacent to the main roads (secondary main roads) vary dramatically from 0m to 120m.

As we can see from the statistics, the setback distances of buildings from the main streets in the Hexi (new city) area are averagely larger from those in the main city area of Nanjing.

This situation indicates, that the urban tissue formed by public buildings has a fragmented boundaries to the streets. This is due to the lack of urban planning code of the setback distance of building layout to the streets.

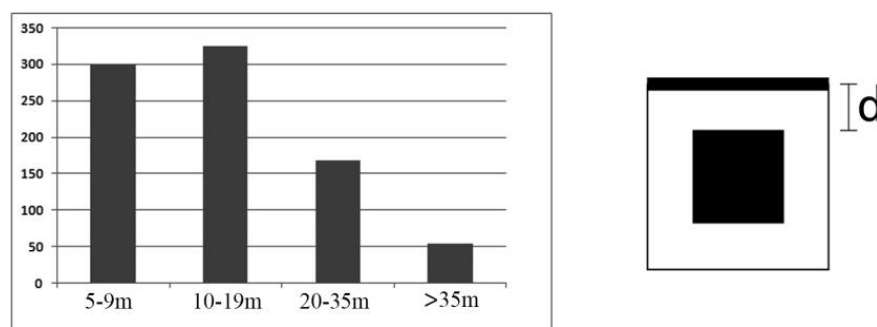


Figure 4. The building setback distance from the highest-ranking road.

Further comparison of four commercial districts in Nanjing

Four public districts situated in four part of Nanjing are chosen for closer study of the relationship between streets and commercial plots.

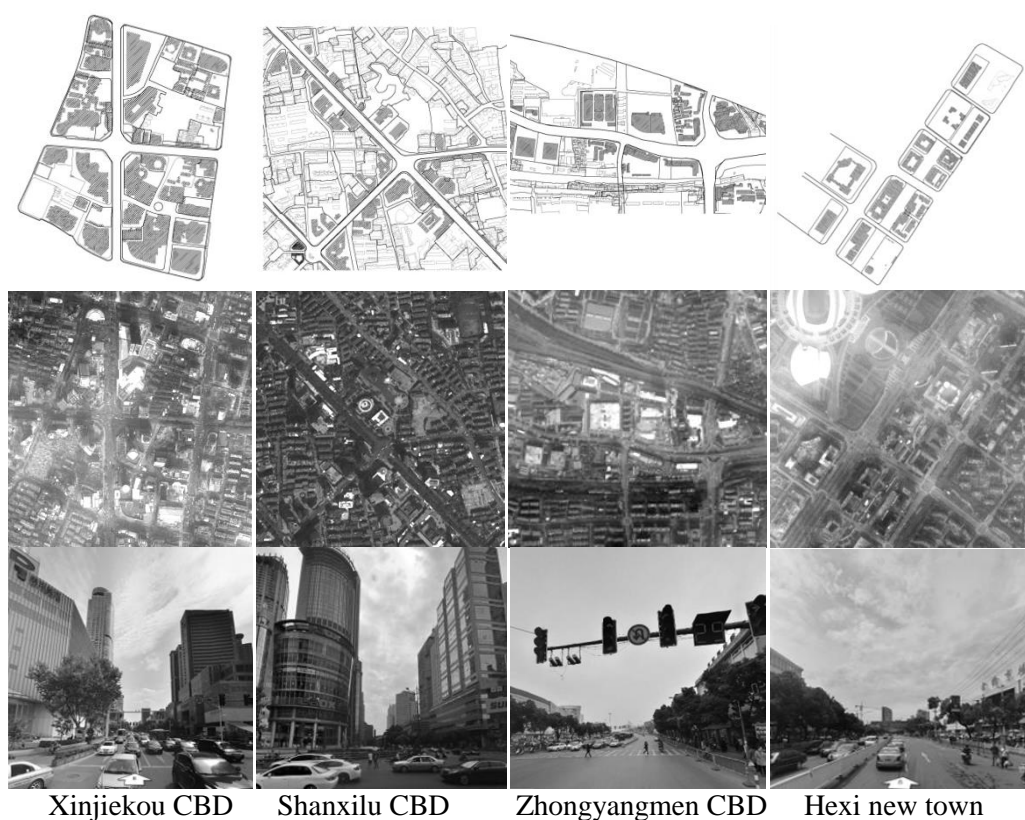


Figure 5. Four commercial districts in Nanjing.

Tissue I: Continuous frontages of public buildings in Xinjiekou CBD district which lies in the central of old city, which has the highest density of commercial plots in Nanjing, with 31 commercial plots inside. The commercial plots are mostly shopping malls and mixed use

buildings. The plots in Xinjiekou CBD are mostly of fragmented shapes like L, Z, or triangle shape. This phenomenon is due to the several phases of morphological transformation of the street structure in different period of time (zhang, 2013). The shape of the plots then accommodate to two road systems in two unparallel coordinate system, one of which is closely related to the ancient water system (about 24 degree to the east of north), the other of which is mainly determined upon the Zhonshan Avenue system completed by 1937 following the design principle of straightness.(zhang, 2013) More than that, the several phases of plot development also contribute to the fragmented plot shapes due to the change of plot ownerships. Adjacent plots appear to be interlocking while the plot are redivided and integrated with morphological information of the former land owners remains in the plots.

Tissue II: Continuous public building frontages and plots in Shanxilu CBD. This area serves as a sub-commercial -center of Nanjing, with 33 public buildings including theaters, shopping malls, commercial office buildings and governmental buildings.

Tissue III: Isolated public buildings in the Zhongyangmen CBD lies in the north fringe part of Nanjing. The district serves as a sub-commercial-center with agglomerated shopping malls and high-rise hotel buildings. The total area of the 15 shopping mall plots vary from 2679m² to 43191m², showing great discrepancy of plot sizes.

Tissue IV: Isolated public buildings in the Hexi CBD district locates in the new town of Nanjing, which is planned as the future administration center of Nanjing. The development of the Hexi CBD started from 2002, controlled thoroughly by the modern planning principles of average block grids. The plots are mainly used for Headquarters of state-owned companies, governmental buildings, and commercial office buildings. The district consists of 11 commercial plots whose total area range from 10667m² to 49456m².

Most of the plots are perpendicular to the streets. The examination of locations of the plots within the block indicates the adjacency condition of plots to main roads. Other boundaries of the plots are adjacent to branch roads or other plots. In the old city area of Nanjing, most of the commercial plots locate along the edge of the blocks, with one boundary adjacent to the main road or secondary main road. In addition, several commercial plots occupy one corner of the block. In the New town (Hexi) area of Nanjing, commercial plots often occupies the whole block, while in the fringe area of Nanjing, the commercial plots often occupies three edges of its block. In certain areas in the Zhongyangmen district in the north fringe part of Nanjing, the main roads (secondary main roads) exist also on the opposite side of the plot.

According to the above analysis, the main morphological distinctions of the commercial plots in different areas exist in three aspects: size, shape and boundary condition.

The assessment of morphological relationship between plot and building

The simplification of building outline and plot shape

To simplify the morphological relationship between the plot and the building, this paper focuses on the planar outline of the building, regardless of the spatial compositions of the building forms, neither the internal spatial arrangement. Slight variations of quadrilateral shape like the bays or short hangouts are ignored in the study.

Simplification rules of building outline and plot shape: The length-width ratio of the building outline and that of the plot is considered as the main factor to distinguish whether it is a square or a rectangular. Since the extremely high length-to width ratio of a plot can lead to different design strategies in building arrangement compared to the square plots with even length and width. When the two adjacent boundaries are slightly not perpendicular, they are considered perpendicular.

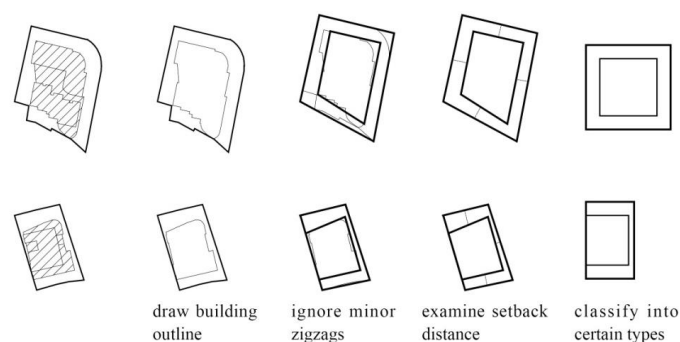


Figure 6. Examples of Simplification Rules of the Shapes.

The similarity and non-similarity between plot shape and building outline

According to the above principles of shape simplification, the plots shapes are simplified into two main categories: the quadrilateral plots and the deformed quadrilateral plots. The quadrilateral category is subdivided into two types: square plot with a length-width ratio from 1/1 to 2/1; rectangular plot with a length-width ratio larger than 2/1. The deformed quadrilateral category consists of three plot types: L-shape plots with one corner encroached; U shape plots with middle part encroached; Z-shape plots with two corners on the diagonal encroached.

The building outlines are classified into six types: square shape, rectangular, L shape, U shape with a half surrounded open space in the center, Z shape with two corners on the diagonal encroached, multiple separate buildings in one plot.

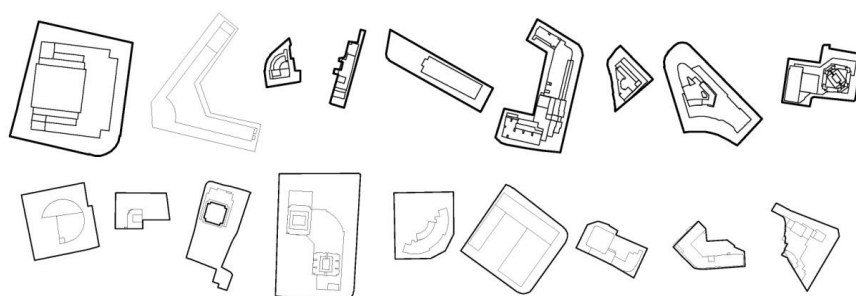


Figure 7. Plots with similar-shape building outlines and plots with non-similar-shape building outlines.

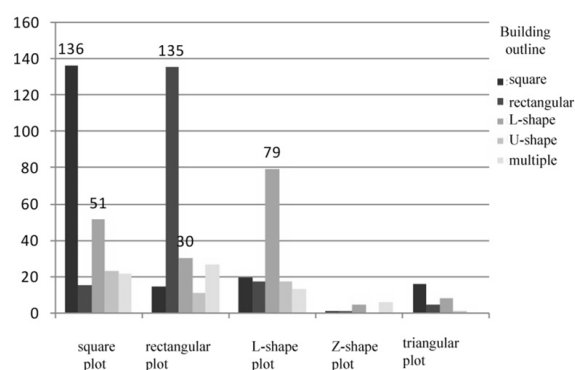


Figure 8 (left). Amount of building outline types within plots.

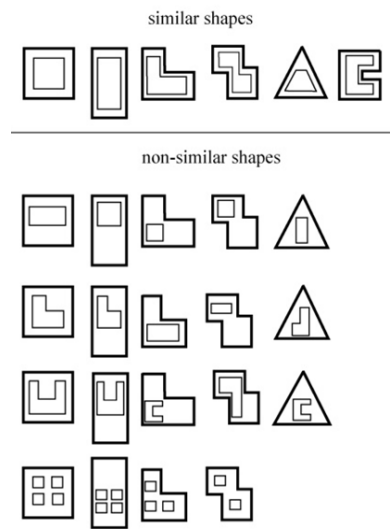


Figure 9. All existing shape relationship between plots and buildings.

Morphological relationships between plot shape and building outline are further classified into two types: similar shapes and non-similar shapes. All the existing morphological relationship types are listed in sequence according to the coverage ratio of the certain plot.

Firstly, 90% of all the 645 commercial plots have one single building inside the plot. Therefore, this paper mainly discusses the single-building plots.

Statistics show that there are 136 square building outlines in square plots, 135 rectangular building outlines in rectangular plots, and 79 L-shape building outlines in L-shape plots. Consequently it can be concluded, that those plots, within which the buildings have similar shape with its plot shape, play a dominant role among all the commercial plots.

However, as a matter of fact, many factors of a broad range from land use indicators to plot boundaries conditions as well as internal spatial arrangement are responsible to the architectural composition of commercial plots. In this way, it is dubious to assert that the building outline within the commercial plot is controlled by the plot shape. Further study on the relative plot indicators is required to explore the underlying factors which control dominantly the morphological relationship between plot and building pattern. Through the examination of several land use indicators, plot coverage ratio stands out as a dominant factor affecting building pattern.

Comparison of plot coverage ratio and building-plot shape similarity

The coverage ratios of all the commercial plots differ remarkably from 0.04 to 1, and the majority of the plot coverage ratio lies in the range from 0.2 to 0.9.

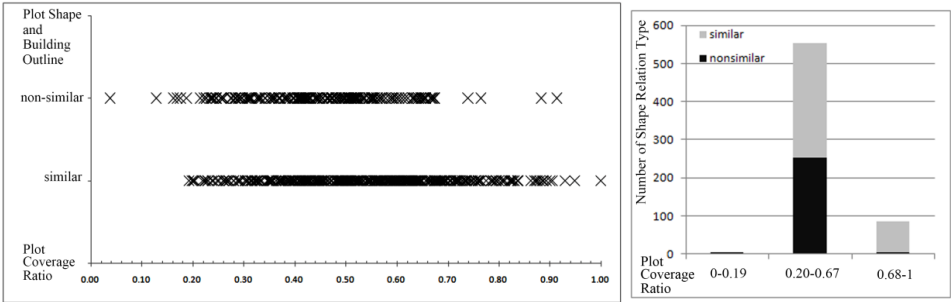


Figure 10.The shape similarity and plot coverage ratio.

Despite four square plots of high coverage with L-shape building outline inside, all of the commercial plots with a coverage ratio of over 0.68 have similar building outline with the plot shape. For plots with coverage ratio from 0.20 to 0.67, there is no obvious rule for whether the building outlines have similar shape relation with the plot or not. For plots with a coverage ratio less than 0.19 the buildings outlines inside are all non-similar to the plots.

It can be concluded that when a plot has a coverage ratio of over 0.68, the building outline usually duplicate the plot shape.

Besides the shape relationship between the building outline and the plot, another important morphological factor is the position of the building within the plot. The urban tissue formed by commercial plots is significantly influenced by whether the adjacent plots share a consistent and continuous building setting, in which way a continuous or a disordered frontage is formed.

Assessment of building position within the plot

The void space in the plot can be used to evaluate the position of building. Since the building outlines are generally parallel to the adjacent plot boundary, the position of the building inside the plot can be described by measuring the setback distance of each building edge to the adjacent plot boundary.

The setback distance of building within the plot can be divided into kinds of uses: one is linear space for traffic; the other is open space mainly for static activities.

1.0m There is no void space between the building edge and the adjacent plot boundary.

2.1-3m. The aisle between the plot boundary and building edge is designed mainly for necessary pedestrian access.

3.4-6m. The path is left for fire engine access, which follows the design code for public buildings. The 4-meter paths also serve as the car path inside the plot.

4.10 meters and more. The open space usually has three uses: pedestrian open plaza, parking lot, landscape area, or the combination of the mentioned functions.

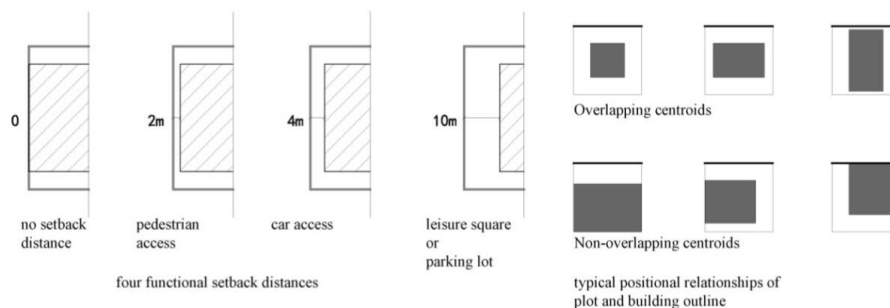


Figure 11. Existing setback distance with function.

Therefore, building positions can be classified into two types: overlapping centroids of plot shape and building outline, non-overlapping centroids of plot and building outline.

When the centroid of the building outline overlaps that of the plot shape, there exist two circumstances: the setback distances of each edge of the building outline are equally the same; or the opposite setback distances of the building outline are the same.

When the centroid of the building outline does not overlap that of the plot shape, it indicates that each access between the building and the plot boundary are not equal and are of different uses.

The plots with similar-shape building outline are simplified into quadrilateral within quadrilateral prototypes with various positional relationships. The plots with non-similar-shape

building outline are simplified into quadrilateral with an addition of void space of different position within the quadrilateral plots.

Based on the careful examination of all the 645 commercial plots, the building position are classified into the following table according to the setback distance of each building edge from the plot boundary. The table is classified into two main categories: plots without open squares and plots with open areas.

no open square					with open square											
no setback	1 setback	2 setbacks	3 setbacks	4 setbacks	1 setback	2 setbacks	3 setbacks	4 setbacks	partial square							

Figure12. All the existing building positional type within the plot

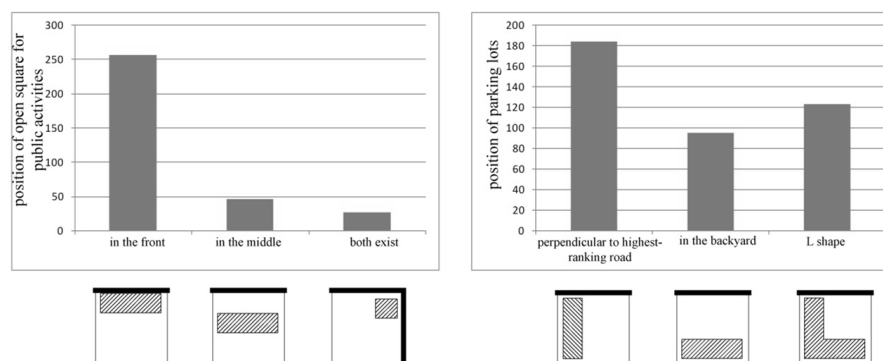


Figure 13. Types of open squares for public activities and parking lots in different location within plot.

Among all the plots with an open square, the most frequently existing positional relationship between plot and building outline are as follows:

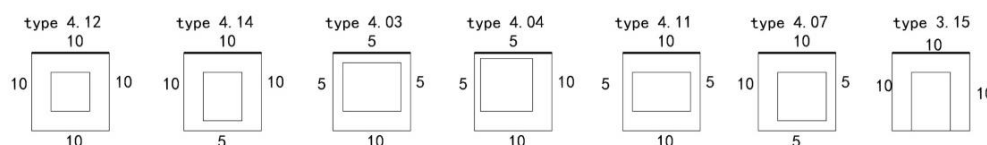


Figure14. Seven most frequent existing positional relation types of plot and building.

The position of the open space within the plot plays an important role in controlling the urban tissue which the commercial plots form together. Statistic of all the existing building position type within the plot shows several rules of internal arrangement:

i) for the plots along the edge of the block, the open squares for public activities mainly exist in the front part of the plot parallel to the highest-ranking road. For the plots on the corner of the block, open squares for public activities usually prefer to locate adjacent to the corner of the highest-ranking roads;

ii) parking areas usually locate perpendicular to the highest-road or lie in the backyard of the plot. Sometimes the parking lot exists as an L-shape area continuing from the perpendicular area of the plot to the backyard. Generally the parking lots in the back of the plot have a larger size.

Conclusion and discussion

Based on a general study of all the 645 commercial plots in Nanjing, the study aims at exploring the underlying formation rules of the urban tissue formed by commercial plots. After a series of assessment of the relationship between streets and plots as well as streets and buildings, the study finally focused on the morphological relationship between plot shape and building outline with two assessment criteria: shape similarity between plot and building and building position within the plot.

Firstly, the plot shapes in different areas of Nanjing present to be discrepant. The commercial plots in the old city of Nanjing are usually fragmented due to the several transformation of street system and interlocking to each other. In contrast, the plots in new town and fringe area of Nanjing generally have more complete shapes like squares or rectangles.

Secondly, statistics show that the level of the plot coverage ratio plays a significant part in the rules of the building arrangement within the commercial plots. For plots with a coverage ratio over 70%, the outline of the building usually follows the shape of its plot. For plots with a coverage ratio of less than 70%, there seems to be no dominant rules of building outline. Furthermore, the positional relationship between building and plot is carefully classified. Four types of setback distance indicate the different functions of the void space in the plot. The setback distance is mainly decided by the location of the open space for public activities and car circulation inside the plot.

In the end, the study on the commercial plots in Nanjing proves that interdisciplinary rules must be applied in studying the commercial plots and the modern buildings within them. Knowledge of architectural typology and planar geometry are indispensable in exploring the underlying rules controlling the building arrangement within commercial plots. Other relevant factors such as floor area ratio, building height, as well as building function must be further investigated.

It is worth noting that with the development of construction techniques, there exist more buildings with stilt floor of large area. The above covered area can also serve as pedestrian plaza or parking lot, in which way the simplification of the building outline in this paper is no longer

applicable. Further studies on the stilt floored buildings are required to accommodate the ever-developing topology of modern public architecture.

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Municipal average building capacity: a strategic instrument for economic and financial sustainability of urban developments

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Abstract. *The main goal of this research consists in the development of a methodology – based on territorial plans and urban morphologies - that supports the computation of how much average gross built surface is allowed in each municipality. It fits into the overall scope of the revision of the juridical regime of Territorial Management Instruments currently taking place in Portugal, in the wake of the approval of the new Portuguese Basis Law of Land Policy, Territorial Ordering and Urbanism. The assessment of building capacity herein proposed supports the application of current territorial management instruments (such as the Municipal Urbanization Tax) or new instruments - based on a fiscal monitoring over urban developments - in a clear, accurate and objective way. It, thus, enables the implementation of the most innovative goals of this new Basis Law: raising equity and social cohesion, and ensuring that urban development processes are sustainable from an economic and financial perspective. The methodology to compute the average municipal building capacity is applied, as a case study, to the municipality of Ourém, considering the classification of spaces and the urban indexes settled in Ourém's Municipal Master Plan, in Fátima's Urban Development Plan, and in the Detail Plans currently enforced. It can be concluded that urban morphologies that derive from territorial plans support the design of new management instruments in order to: (i) strengthen municipal finance, ensuring municipalities' economic and financial sustainability; (ii) assess, in a clear and objective way, the concrete building capacity of certain urban operations as compared with the municipal average building capacity; (iii) quantify the concrete values that can possibly be collected through current or innovative urban management tools; and (iv) warrant a better equity in the distribution of benefits and charges that accrue from urban development processes.*

Key Words: *economic and financial sustainability, territorial management instruments, equity, building capacity, urban indexes.*

Introduction

All the legislation concerning land, territorial ordering and urban development is currently underway in Portugal. The new Portuguese Basis Law of Land Policy, Territorial Ordering and Urbanism was already approved (Proposta de Lei nº 183/XII, 2014), linked together with the revision of the juridical regime of Territorial Management Instruments, the juridical regime of Urbanization and Edification, and the new Cadastral Law. This is a deep amendment that intends to surmount some drawbacks and contradictions that accrued from the previous legislation, on the one hand, and to contribute to the structural reform of the state in these matters, on the other. In fact, the previously enforced legislation revealed hard to apply and often contradictory especially due to different complex plans that overlapped on the same territories (that had adverse effects on the clearness of applicable rules), the existence of several territorial plans and urban development models specific to each municipality (that hampered integrated development and sustainable articulation among municipalities), and a planning model founded on urban sprawl (that was unable to stop the quick proliferation of vacant land).

Thus this revision involves the reassessment of the core paradigms that underlie land planning and management, territorial ordering, and urban development processes. The new

launched paradigm founds on three basic guidelines: planning increased flexibility; Municipal Master Plan's strengthening as a strategic tool; and a bet on urban rehabilitation to favour town development. One of the core innovative goals of this new paradigm sets that urban plans and programs should include an economic and financial sustainability model. This means that they should only be approved if they are able to engender incomes equal or higher than the charges they will involve. As a result, this model will also provide the achievement of all the other goals this new paradigm settles, namely the linked integration of territorial policies, the efficiency of plan execution devices, the economic and financial sustainability of urban development processes, and the promotion of social cohesion and equity.

The research reported in this article proposes a methodology to compute how much abstract average gross built surface/m² is allowed in each municipality, according to the enforced territorial plans (that is to say, according to the parameters settled in the Municipal Master Plan, Urban Development Plans, Detail Plans, parcelling out procedures, or other territorial management instruments). It is applied, as a case study, to the municipality of Ourém.

The measurement of the abstract average gross built surface/m² is a required condition for a more efficient application of a set of already existent territorial management instruments (such as Municipal Development Charges, that can anyway be reformulated) and newly proposed ones (so to ensure that surplus values engendered by plans, planning decisions and/or public investments should be reassigned to social purposes). It supports the search for more objective and clear urban parameters that underlie municipal decisions and their succeeding implementation that ensure: the economic and financial sustainability of territorial planning and urban developments; the fair collection of part of the land surplus values arising from planning decisions; the clarification of funds' origins and investments aimed at urban development; and a better fair distribution of benefits and charges arising from urban development within each municipality and among different municipalities.

This article finally debates the importance of the average gross built surface/m² for municipalities proper - founded on this new paradigm of territorial planning economic and financial sustainability - to enhance sustainable development and people's quality of life.

Computation of the abstract municipal average gross built surface/m²

Methodology

It is herein proposed the measurement of the municipal average abstract gross built surface/m² according to the urban parameters settled by the territorial plans enforced in a certain municipality, weighed by respective land surfaces (Figure 1).

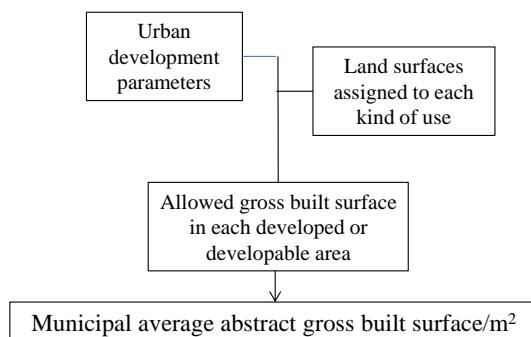


Figure 1. Systematization of the data required to compute the municipal abstract average gross built surface/m².

The municipal average abstract gross built surface/m² represents the gross surface (expressed in m²) allowed by the enforced territorial planning instruments in a certain area. It is computed through the quotient between the sum total of the surfaces where urban parameters of different planning tools apply, multiplied by respective occupation indexes (quotient between the implanted surface and the land surface, expressed in %) and land use indexes (quotient between the total gross built surface and land surface, expressed in m² per m² of land), weighed by the percentage assigned to each type of use, and the total municipality's buildable area.

Case study

Brief characterization of the municipality of Ourém

The municipality of Ourém locates in the Portuguese central region, in the district of Santarém. It is bound in the east by the municipalities of Ferreira do Zêzere and Tomar, in the southeast by Torres Novas, in the south by Alcanena, in the west by the municipalities of Leiria and Batalha, and in the north by Pombal and Alvaiázere. It spans a surface of about 417 km², is made up by 18 parishes, and has a population density of 98,2 inhabitants/km² (www.infopedia.pt) (Figure 2).



Figure 2. Map of the municipality of Ourém with respective parishes.
(Source: <https://www.google.pt/>)

Territorial planning instruments enforced in the municipality of Ourém

The Municipal Master Plan of Ourém²⁰⁰ is the legal planning instrument that frames the urban development activities in this municipality, and that guides the applicable Urban Development Plans and Detail Plans (Article 6th, Urban hierarchy). In the absence of Urban Development Plans, Detail Plans and municipal regulations worked out according to the main guidelines of the Municipal Master Plan for the planning and management operational units, only the precepts

²⁰⁰ The Municipal Master Plan of Ourém was approved by the Resolução do Conselho de Ministros n.º 148-A/2002. This plan was ratified on the 12th March of 2009 (Aviso n.º 5416/2009), and later on, in the 15th October 2009 (Aviso n.º 18200/2009), being afterwards adjusted to the Regional Plan of Territorial Ordering of West and Tagus Valley – PROTOVT (Aviso n.º 11779/2010, ratified by the Declaração de Retificação n.º 1614/2010, of 12th August), and changed on the 29th March 2011 (Aviso n.º 7841/2011). On the 9th April 2013 a modification was enforced in the plan for Pias Longas site (Aviso n.º 4800/2013), which involved a change in the National Environmental Reserve map of Ourém (Aviso n.º 4735/2013).

of the latter are applicable, as well as the statements settled in additional municipal regulations (Article 7th, Supplementary application).

According to Article 8th (Enforced planning instruments) of this same plan, inside the urban perimeter of Fátima applies the respective Urban Development Plan²⁰¹; and in some areas inside the urban perimeter of Ourém apply the enforced Detail Plans.

After the passing of the Urban Development Plan of Fátima, two Detail Plans were enforced inside its urban perimeter, becoming applicable their urban parameters instead of those from the Urban Development Plan: Detail Plan of Avenida Papa João XXIII (Aviso n.º 15622/2009); Detail Plan for the block formed by Rua Francisco Marto, Estrada da Lomba de Égua and Rua do Mercado (Portaria n.º 67/99).

The Detail Plans enforced inside the urban perimeter of Ourém are: Detail Plan of the industrial area of Casal dos Frades (Despacho n.º 195/91); Detail Plan of the Health Centre of Ourém (Portaria n.º 190/97); Detail Plan of Caridade (Portaria n.º 496/93; Portaria n.º 445/97; Declaração n.º 376/99); Detail Plan of Quinta do Ribeirinho (Resolução do Conselho de Ministros n.º 159/2000).

Regulation of land use in the municipality of Ourém

In the regulation of the Municipal Master Plan of Ourém - Chapter III, concerning land uses, Article 33rd (Classes of spaces) - spaces are classified according to their land occupation, use and land use changes, within the following classes²⁰²: urban spaces; developable urban spaces; tourism; industry; extractive industry; equipment; agricultural; forest; agricultural-forest mixed uses; natural; canal-spaces and infrastructures.

In the same article (point 3.) urban perimeters are pointed out as including urban spaces, developable urban spaces, and industrial spaces, according to the delimitating borders settled in the ordering plan.

Article 35th (Urban hierarchy network) settles tree levels for built-up urban areas belonging to the municipality of Ourém, according to the functions anticipated for each one (they may eventually include sets of close built-up urban areas) (Table 1): Level 1 encompasses built-up urban areas with trade, services and equipment functions at municipality and above municipality grounds; Level 2 includes built-up urban areas or sets of areas with trade, services and equipment functions at local grounds; Level 3 comprises the remaining built-up areas or sets of areas.

Section I of chapter III of the Municipal Master Plan of Ourém lays down the rules for the use of urban spaces. Article 36th (Scope and main goal) features the urban spaces (demarcated in the ordering plan) as made up by the existing built urban knitwear provided with urban infrastructure, equipment and services. These spaces are predominantly aimed at housing, despite including other uses, such as tertiary activities, industry, agriculture or tourism, provided they hold housing-compatible characteristics.

Consolidated urban spaces (point 4. of the same article) rank, by their turn, into level 1, 2, or 3 subcategories of urban spaces.

As aforementioned, the urban perimeters of Ourém and Fátima correspond to level 1 built-up urban areas (article 39th, urban built-up areas of Ourém and Fátima). This article further states that rules laid down in articles 40th and 41st should be applied in Ourém and/or Fátima in the absence of Urban Development Plans or Detail Plans inside respective urban perimeters, considering: As medium-density urban spaces the wholly infrastructured urban areas where

²⁰¹ Portaria n.º 633/95, on 21st June, which revision was approved by the Resolução do Conselho de Ministros n.º 148-B/2002 of 30/12; this plan underwent, after its approval, a simplified change on 30/01/2009 (Aviso n.º 2766/2009), and a later ratification on the 15th October of the same year (Aviso n.º 18200/2009).

²⁰² These classes are delimited in the ordering plan, according to the exclusive or dominant use category in each one.

streets make up a close knitwear together with bordering parcels and plots, that are already built-up in over 50% of parcels and plots, with four or five-storey buildings; As low-density urban spaces the remaining developable urban areas, as well as the wholly or partly infrastructured urban areas.

Table 1. Classification of built-up urban areas belonging to the municipality of Ourém according to the urban network hierarchy settled in respective Municipal Master Plan

Level	Parishes	Built-up urban areas
1	Fátima	Town of Fátima, Cova da Iria, Moita Redonda, Lomba d'Égua, Aljustrel, Moimento, Casa Velha and Eira da Pedra
1	Nossa Senhora das Misericórdias/Nossa Senhora da Piedade	Town of Ourém, Ourém/Castelo, Santo Amaro, Lagoa da Carapita, Vale do Lobo, Hortas, Regato, Corredoura, Lagarinho and Penigardos
2	Alburitel	Alburitel
2	Atouguia	Atouguia, Mourã, Murtal, Outeiro do Murtal, Pinheiro do Murtal, Feteira and Fontainhas
2	Casal dos Bernardos	Casal dos Bernardos and Casal dos Moleiros
2	Caxarias/Urqueira	Caxarias, Vendas, Caxarias/Carvoeira, Pontes, Pisões, Cavadinha and Mata
2	Cercal	Cercal, Vale do Feto and Ninho de Águia
2	Espite	Espite, Cimo da Igreja, Braga, Casal Monte; Meliceira and Vale do Ugreiro
2	Formigais	Formigais, Casal da Igreja and Porto Velho
2	Freixianda	Freixianda, Abades, Várzea do Bispo, Casal do Pinheiro, Aldeia de Santa Teresa, Porto do Carro and Vale do Carro
2	Gondemaria	Gondemaria, Cidral, Fartaria, Palheiro and Cardiais
2	Matas	Matas, Achada, Casal Menino, Cubal and Barreirinhas
2	Matas	Lavradio, Vesparia and Perdigão
2	Nossa Senhora das Misericórdias	Vilar dos Prazeres
2	Nossa Senhora das Misericórdias	Melroeira and Pinhel
2	Nossa Senhora da Piedade	Vale Travesso, Casal Matos and Casal Castanheiro
2	Nossa Senhora da Piedade	Alqueidão, Cartacha, Quinta Nova and Casais da Caridade
2	Nossa Senhora da Piedade	Pinheiro, Pimenteira and Cabiçalva
2	Olival	Olival and Aldeia Nova
2	Ribeira do Fárrio	Fárrio and Reca
2	Rio de Couros	Rio de Couros
2	Rio de Couros	Sandoeira and Castelejo
2	Seiça	Seiça, Pombalinho, Outeiro, Alqueidão, Carvalho, Chão de Maçãs and Estremadouro
2	Seiça	Peras Ruivas and Pedreiras
2	Urqueira	Urqueira

3 - The remaining built-up urban areas correspond to level 3

The rules laid down in article 40th (Medium-density urban spaces in Ourém and Fátima) apply to buildings' construction and enlargement in wholly infrastructured parcels or plots in medium-density urban spaces, in the absence of Urban Development or Detail Plans.

Article 41st (Low-density and very low-density urban spaces) settles that level 2 built-up urban areas correspond to low-density urban spaces, and level 3 built-up urban areas correspond to very low-density urban spaces. However, medium-density areas may be settled through Urban Development or Detail Plans in level 2 built-up urban areas with delimited planning and management operational units (point 2. of this article).

Article 42nd (urban-use parameters for low and very low-density urban spaces) specifies the following parameters for low and very-low density spaces, respectively:

Table 2. Urban parameters for low-density spaces in the municipality of Ourém settled in respective Municipal Master Plan.

Density level	Dimension of the buildable plot (m ²)	Maximum occupation percentage or maximum implanted surface (*)	Maximum gross built index or maximum built surface (*)	Maximum waterproofing index or surface	Maximum number of floreys (**)	Maximum number of dwellings
Low	From 500 to 1200	25%	0,45	0,35	2	2
	> 1200	300 m ²	540 m ²	420 m ²	2	2

(*) Including all the built surfaces

(**) Use of attics is admitted

Table 3. Urban parameters for very low-density spaces in the municipality of Ourém settled in respective Municipal Master Plan.

Density level	Dimension of the buildable plot (m ²)	Maximum occupation percentage or maximum implanted surface (*)	Maximum gross built index or maximum built surface (*)	Maximum waterproofing index or surface	Maximum number of floreys (**)	Maximum number of dwellings
Very low	From 500 to 1500	20%	0,36	0,3	2	2
	> 1500	300 m ²	540 m ²	450 m ²	2	2

(*) Including all the built surfaces

(**) Use of attics is admitted

The urban parameters that industry-solely plots (compatible with other urban uses) must conform to are:

Table 4. Urban parameters for industry-solely spaces in the municipality of Ourém settled in respective Municipal Master Plan

Dimension of the buildable plot (m ²)	Maximum occupation percentage or maximum implanted surface (*)	Maximum gross built index or maximum built surface (*)	Maximum waterproofing index or surface	Maximum number of floreys (**)
From 500 to 2000	35%	0,4	0,45	2
> 2000	700 m ²	800 m ²	900 m ²	2

(*) Including all the built surfaces

(**) Buildings' maximum height is 7,5 m

Section II of the Municipal Master Plan of Ourém impinges on developable urban spaces. Article 43rd (Scope and main goal) features urban developable spaces as aimed at urban spreading, namely housing and respective complementary functions, and also at industrial uses compatible with other urban uses.

Point 2. of this article stresses that the conditions stated by the current regulation to urban developable spaces intend to master the urban growth and consolidate the existing urban spaces, creating urban areas provided with the required infrastructures and collective equipment, making profits on investments in built or to be built infrastructures and amenities. Urban developable spaces may result in medium-low, low or very low density spaces, according to the urban spaces they fit (delimited in the ordering plan).

Methodology to compute the abstract average gross built surface/m² in the municipality of Ourém

Within this legal and regulatory context, the methodology to compute the abstract average gross built surface/m² in the municipality of Ourém pursued the following steps: Identification of the areas encompassed by the urban perimeter of Fátima, where the Urban Development Plan of Fátima is enforced (Portaria n.º 633/95; RCM n.º 148-A/2002; Aviso n.º 2766/2009; Aviso n.º 18200/2009); Identification of the areas encompassed by the urban perimeter of Ourém (level 1 built-up areas), where the Municipal Master Plan of Ourém is enforced (RCM n.º 148-B/2002; Aviso n.º 5416/2009; Aviso n.º 18200/2009; Aviso n.º 11779/2010; DR n.º 1614/2010; Aviso n.º 7841/2011; Aviso n.º 4800/2013; Aviso n.º 4735/2013); Identification of the areas inside the urban perimeter of Fátima where the Detail Plans are enforced (Detail Plan of Avenue Papa João XXIII (Aviso n.º 15622/2009) and Detail Plan for the block formed by Francisco Marto Street, Lomba de Égua Road and Mercado Street (Portaria n.º 67/99)); Identification of the areas inside the urban perimeter of Ourém where the Detail Plans are enforced (Detail Plan of the industrial area of Casal dos Frades (Despacho n.º 195/91); Detail Plan of the Health Centre of Ourém (Portaria n.º 190/97); Detail Plan of Caridade (Portaria n.º 496/93; Declaração n.º 376/99); and Detail Plan of Quinta do Ribeirinho (RCM n.º 159/2000)); Identification of level 2 and 3 built-up urban areas in the municipality of Ourém, where the Municipal Master Plan is enforced; Application of the urban parameters correspondent to each previously identified area, in order to set up respective maximum allowed gross built surfaces, according to the applicable plans; Computation, for each area, of the concrete gross built surface/m², through the quotient between the maximum allowed gross built surface and respective territorial surface (expressed in m²/m² of land); Determination of the percentage of each of these areas in relation to the total developed and developable urban area in the municipality of Ourém; Computation of the average gross built surface/m² through the sum total extended to all considered territorial areas, of the product between respective percentage in relation to the whole studied developed and developable space, and correspondent gross built surface.

Computation of the abstract average gross built surface/m² in Fátima

The Urban Development Plan of Fátima applies to Fátima built-up urban areas and the surrounding environment - article 2nd (Territorial application scope) of the regulation of this plan (Portaria n.º 633/95).

The urban area of Fátima includes the following level 1 built-up urban areas²⁰³: Fátima; Cova da Iria; Moita Redonda; Lomba d'Égua; Aljustrel; Moimento; Casa Velha and Eira da Pedra), that amount to a total surface of 7 004 853 m². The surface of the unit of Cova da Iria (1 731 829 m²) was subtracted from that value, as it corresponds, jointly with Cova Grande, to the area where the Detail Plan of Avenida Papa João XXIII are enforced. Thus level 1 built-up urban areas where the Urban Development Plan of Fátima is enforced, amount to a total surface of 5 273 024 m².

The average maximum gross built surface/m² allowed in level 1 built-up urban areas in the urban zone of Fátima is 0,5313 m²/m² of land (Table 5).

As aforementioned, there are two Detail Plans currently enforced inside the urban area of Fátima: the Detail Plan of Avenida Papa João XXIII; and the Detail Plan for the block formed by Rua Francisco Marto, Estrada da Lomba de Égua and Rua do Mercado.

The regulation board of the Detail Plan of Avenida Papa João XXIII points out a gross built surface of 0,5876 m²/m² of land (Table 6).

²⁰³ These built-up urban areas correspond to planning and management operational units.

Table 5. Surfaces, allowed gross built surfaces, and average maximum gross built surface/m² inside the urban perimeter of Fátima where the Urban Development Plan is enforced

Planning Areas	Surface (m ²)	Maximum gross built surface (m ²)
Aljustrel	156.180	63.450
Fátima	1.895.800	993.860
Moita Redonda	909.780	658.500
Lomba d'Égua	521.329	357.420
Moimento	371.878	167.400
Casa Velha/Eira da Pedra	1.418.057	560.700
Total	5.273.024	2.801.330
Gross built surface/m ² (Level 1 built-up urban areas)	0,5313	

Table 6. Surfaces and gross built surfaces/m² allowed in the intervention area of the Detail Plan of Avenida Papa João XXIII.

	Housing, trade, services and tourism	Equipment facilities	Collective urban development spaces (current and anticipated)	Construction of the new church	Total
Maximum gross built surface (m ²)	374.047	63.570	137.753	33.910	609.280
Total surface of the Detail Plan (m ²)	1.036.814,0				
Gross built surface/m ² of the Detail Plan (m ²)	0,5876				

As far as the Detail Plan for the block formed by Rua Francisco Marto, Estrada da Lomba de Égua and Rua do Mercado is concerned, the maximum allowed gross built surface amounts to 1,2476 m²/m² of land (Table 7):

Table 7. Surfaces and gross built surfaces/m² allowed in the intervention area of the Detail Plan for the block formed by Rua Francisco Marto, Estrada da Lomba de Égua and Rua do Mercado

	Housing, trade and services
Maximum gross built surface (m ²)	35.558
Total surface of the Detail Plan (m ²)	28.500
Gross built surface/m ² of the Detail Plan (m ²)	1,2476

The remaining area encompassed by the Urban Development Plan of Fátima includes the following planning areas²⁰⁴: Fazarga/S. Miguel, Charneca, Tapada and Valinhos (that cover a surface of 2 665 635 m²). The maximum anticipated gross built surface/m² for these areas is 0,2627 m²/m² of land (Table 8):

When the Municipal Master Plan of Ourém was voted through (2002) (Correia et al., 2002), the urban area of Fátima amounted to 696,6 hectares, and its developable urban area to 286,4 hectares, what added up 983 hectares. In the urban area that results from the difference between these 9 830 000 m² and the surfaces of 5 273 024 m², 1 036 814 m², 28 500 m², and 2 665 635 m² (correspondent to level 1 built-up urban areas where the Urban Development Plan of Fátima,

²⁰⁴ Chapter IV (Special precepts applicable to each area) of the Urban Development Plan of Fátima, article 27º (Definition of the planning areas): UE4 – urban growth area (car parks); UC8 – north environment of Monte de Valinhos; VU1 urban park; VU2 – Valinhos (Moimento); VU3 – Fazarga; RS – urban reserve that encompasses the areas of Fazarga/S. Miguel, Charneca, Tapada and Valinhos.

the Detail Plan of Avenida Papa João XXIII, the Detail Plan for the block formed by Rua Francisco Marto, Estrada da Lomba de Égua and Rua do Mercado, and the remaining surface where the Urban Development Plan is enforced, respetively) are applicable the urban parameters settled by the Municipal Master Plan of Ourém.

Table 8. Surfaces and allowed gross built surfaces/m² in the remaining urban area of Fátima under the Urban Development Plan.

Planning Areas	Surface (m ²)	% of surface in relation to total surface	Land occupation index	Land use index	Gross built surface/m ²
Fazarga/S. Miguel	880.301	33,02%	0,4000	0,5000	0,2000
Charneca	443.208	16,63%	-	-	0,6586
Tapada	353.587	13,26%	0,2700	0,4500	0,1215
Valinhos	988.539	37,08%	0,3000	0,6000	0,1800
Total	2.665.635	100,00%			0,2627

This area (826 027 m²) corresponds to level 3 built-up urban areas, as settled in the Report of the Municipal Master Plan of Ourém (Correia et al., 2002). So it is subject to the urban indexes settled in article 42nd (Urban use parameters for low and very low-density urban uses). Under these circumstances the gross built surface amounts to 0,0720 m²/m² of land (Table 9):

Table 9. Surfaces and gross built surfaces/m² allowed in the remaining urban area of Fátima (level 3 built-up urban areas), under the Municipal Master Plan of Ourém.

Planning Areas	Surface (m ²)	Maximum occupation percentagem	Maximum gross built index	Gross built surface/m ²
Total	862.027	0,2000	0,3600	0,0720

After that, the average gross built surface of the urban area of Fátima is reckoned according to the following methodology (Table 10):

Computation of the percentage that each of the considered areas represent in relation to the whole developed and developable urban area of Fátima;

Multiplication of the maximum allowed gross built surface in each area by respective percentage;

The abstract average gross built surface in the urban area of Fátima corresponds to the sum of the previous values for the different considered areas, and its value amounts to 0,4262 m²/m² of land:

Table 10. Synthesis of the gross built surface/m² in the developed and developed urban areas of Fátima

	Surface (m ²)	% of surface in relation to total surface	Gross built surface/m ²
Level 1 built-up urban areas	5.237.024	53,28%	0,5313
Detail Plan of Avenida Papa João XXIII	1.036.814	10,55%	0,5876
Detail Plan for the block formed by Rua Francisco Marto, Estrada da Lomba de Égua and Rua do Mercado	28.500	0,29%	1,2476
Remaining urban area of Fátima (Urban Development Plan)	2.665.635	27,12%	0,2627
Level 3 built-up urban areas (Municipal Master Plan of Ourém)	862.027	8,77%	0,0720
Total surface of developed and developable urban areas of Fátima	9.830.000	100,00%	0,4262

Computation of the abstract average gross built surface/m² in Ourém

The urban area of Ourém includes a set of level 1 built-up urban areas that belong to the parishes of Nossa Senhora das Misericórdias and Nossa Senhora da Piedade (Ourém; Ourém/Castelo; Santo Amaro; Lagoa da Carapita; Vale do Lobo; Hortas; Regato; Corredoura; Lagarinho; and Penigardos).

As aforementioned, the following four Detail Plans are currently enforced in the urban area of Ourém: the Detail Plan of the industrial area of Casal dos Frades; the Detail Plan of the Health Centre of Ourém; the Detail Plan of Caridade; and the Detail Plan of Quinta do Ribeirinho.

The Detail Plan of the industrial area of Casal dos Frades allows a maximum gross built surface of 0,0795 m²/m² of land²⁰⁵ (Table 11):

Table 11. Surfaces and gross built surfaces/m² allowed in the intervention area of the Detail Plan of the industrial area of Casal dos Frades

	Housing, trade, services, and equipments
Maximum gross built surface (m ²)	65.000
Total surface of the Detail Plan (m ²)	817.500
Gross built surface/m ² of the Detail Plan (m ²)	0,0795

In what concerns the Detail Plan of the Health Centre of Ourém, the maximum allowed gross built surface amounts to 0,9401 m²/m² of land (Table 12).

Table 12. Surfaces and allowed gross built surfaces/m² in the intervention area of the Detail Plan of the Health Centre of Ourém

	Housing, trade and services	Equipments	Total
Maximum gross built surface (m ²)	97.097	27.000	124.097
Total surface of the Detail Plan (m ²)	132.000		
Gross built surface/m ² of the Detail Plan (m ²)	0,9401		

The Detail Plan of Caridade considers different kinds of land uses in its intervention area: ZUHM – Buildable area assigned to single-family houses; ZUHB – Buildable area assigned to blocks of flats; ZUE – Buildable area assigned to social equipment and facilities; ZI – Buildable Area assigned to industry; ZVU - Non-buildable area of urban green; ZVP – Non-buildable area of green environmental protection; ZD – Non-buildable sports area.

The maximum average gross built surface allowed by the Detail Plan – considering the maximum allowed gross built surfaces in each of its areas – amounts to 0,5710 m²/m² of land (Table 13).

In the Detail Plan of Quinta do Ribeirinho the maximum allowed gross built surface amounts to 0,5238 m²/m² of land (Table 14).

²⁰⁵ An height of 7,5 meters was admitted for industrial pavilions.

Table 13. Surfaces and allowed gross built surfaces/m² in the intervention area of the Detail Plan of Caridade

	ZUHM	ZUHB	ZI	ZUE	Remaining	Total
	Housing	Housing	Workshops	Equipment		
Maximum gross built surface (m ²)	4.200	39.520	3.600	6.200	6.440	59.960
Total surface of the Detail Plan (m ²)	9.600	32.500	11.000	20.900	31.000	105.000
Gross built surface/m ² of the Detail Plan (m ²)	0,4375	1,2160	0,3273	0,2967	0,2077	0,5710

Table 14. Surfaces and gross built surfaces/m² allowed in the intervention area of the Detail Plan of Quinta do Ribeirinho

	Housing, trade, services, and equipments
Maximum gross built surface (m ²)	9.330
Total surface of the Detail Plan (m ²)	17.813
Gross built surface/m ² of the Detail Plan (m ²)	0,5238

When the Municipal Master Plan of Ourém was approved (2002), the urban area of Ourém amounted to 287,3 hectares, and its developable urban area amounted to 107,9 hectares, what adds up to 395,2 hectares (that supposedly represent the current situation) (Correia et al., 2002).

Thus, the remaining area of level 1 built-up urban areas of Ourém has a surface of 2 879 687 m², that results from the subtraction from its developed and developed urban area (3 952 000 m²) of 817 500 m², 132 000 m², 105 000 m², and 17 813 m² (correspondent to the intervention areas of the Detail Plan of the industrial area of Casal dos Frades; the Detail Plan of the Health Centre of Ourém; the Detail Plan of Caridade; and the Detail Plan of Quinta do Ribeirinho, respectively).

The urban parameters settled in article 40th (Medium-density spaces in Ourém and Fátima) of the regulation of the Municipal Master Plan of Ourém are enforced in this area (where the maximum net land use index is 0,75, that is to say, the maximum allowed gross built surface amounts to 0,75 m²/m² of land) - considering the characteristics defined in article 39th, 2.a) concerning the urban areas inside the urban perimeters of Ourém and Fátima.

The average gross built surface/m² comes up, finally, as 0,6119 m²/m² of land, adding up the gross built surfaces of the different considered areas, weighed by the correspondent percentages in relation to the total surface of the urban area of Ourém (Table 15).

Table 15. Synthesis of the gross built surface/m² in the urban area of Ourém

	Surface (m ²)	% of surface in relation to total surface	Gross built surface/m ²
Detail Plan of the industrial area of Casal dos Frades	817.500	20,69%	0,0795
Detail Plan of the Health Centre of Ourém	132.000	3,34%	0,9401
Detail Plan of Caridade	105.000	2,66%	0,5710
Detail Plan of Quinta do Ribeirinho	17.813	0,45%	0,5238
Remaining urban area of Ourém	2.879.687	72,87%	0,7500
Total surface of the urban area of Ourém	3.952.000	100,00%	0,6119

Computation of the abstract average gross built surface/m² in level 1 and 2 built-up urban areas in the municipality of Ourém (excluding Fátima's).

In low-density (level 2) and very low-density (level 3) built-up urban areas are enforced the urban parameters settled in article 42nd (Urban-use parameters for low and very low-density urban spaces) of the regulation of the Municipal Master Plan of Ourém.

As far as level 2 built-up urban areas are concerned, the whole developed urban area amounts to 1 507,5 hectares and the developable urban area amounts to 736,9 hectares, what adds up to 2 244,4 hectares (Correia et al., 2002). According to article 44th (Edification in urban developable spaces), point 2. of the regulation of the Municipal Master Plan of Ourém (RCM n° 148-A/2002), the precepts settled in articles 38th, 39th, 40th, 41st and 42nd are applicable to urban developable areas. So, in these level 2 developed and developable urban areas are enforced the urban parameters settled in articles 41st and 42nd.

Thus the allowed gross built area amounts to 0,1125 m²/m² of land (Table 16).

Table 16. Surfaces and gross built surfaces/m² allowed in level 2 built-up urban areas under the Municipal Master Plan of Ourém.

	Housing, trade, services, equipments, and industry
Maximum percentage of land occupation	0,25
Maximum gross built index (m ² of gross built surface/m ² of land)	0,45
Developed and developable urban area of level 2 built-up urban areas (m ²)	22.444.000
Maximum gross built surface (m ²)	2.524.950
Gross built surface/m ² of level 2 built-up urban areas	0,1125

The total surface of level 3 developed built-up urban areas amounts to 2 310,3 hectares, and of developable urban areas amounts to 620,4 hectares, what adds up to 2 930,7 hectares.

The application of the urban parameters correspondent to very low-density areas (article 42nd) leads to an average allowed gross built surface of 0,0720 m²/m² (Table 17):

Table 17. Surfaces and gross built surfaces/m² allowed in level 3 built-up urban areas under the Municipal Master Plan of Ourém.

	Housing, trade, services, equipments, and industry
Maximum percentage of land occupation	0,2
Maximum gross built index (m ² of gross built surface/m ² of land)	0,36
Developed and developable urban area of level 3 built-up urban areas (m ²)	29.307.000
Maximum gross built surface (m ²)	2.110.104
Gross built surface/m ² of level 3 built-up urban areas	0,0720

Computation of the abstract average gross built surface/m² in the municipality of Ourém

The abstract average gross built surface/m² in developed and developable urban areas in the municipality of Ourém amounts, therefore, to 0,1716 m²/m² of land, according to gross built surfaces, weighting the different studied areas by respective percentages in relation to the total developed and developable municipal urban area (Table 18).

Table 18. Synthesis of the surfaces and gross built surfaces/m² of the different delimited areas in the municipality of Ourém, and abstract average gross built surface/m² in the whole municipality.

	Surface (m ²)	% of surface in relation to total surface	Gross built surface/m ²
Total surface of the urban area of Fátima	9.830.000	15,00%	0,4262
Total surface of the urban area of Ourém	3.952.000	6,03%	0,6119
Developed and developable urban area of level 2 built-up urban areas (m ²)	22.444.000	34,25%	0,1125
Developed and developable urban area of level 3 built-up urban areas (m ²)	29.307.000	44,72%	0,0720
Total developed and developable urban area of the municipality of Ourém	65.533.000	100,00%	0,1716

Conclusions

Within the scope of the revision of the whole legislation concerning land, territorial planning and urban development – currently underway in Portugal – this article tried to show how (current and/or anticipated) urban morphologies support the development of territorial management tools able to ensure the economic and financial sustainability of urban developments, as well as the sustainability of the municipalities they belong to.

The computation of the municipal abstract average gross built surface/m² further supports reaching other goals that underlie the new land planning and management, territorial ordering and urban development paradigm. In fact, it stands as a benchmark for assessing current and new territorial management tools, in order to ensure higher equity and a fair redistribution of costs and benefits that arise from urban developments among all the inhabitants within a certain municipality.

Indeed, the municipal abstract gross built surface/m² proposed in the current article can be further integrated as a parameter or indicator in different land policies, especially the fiscal-oriented ones that allow, namely, to: Assess, in a clear and objective way, the allowed average gross built surface/m² of specific urban developments, in comparison with the municipal average gross built surface/m²; Contribute to a more accurate definition of municipal development charges intended to fund infrastructures execution, maintenance, and reinforcement provided by the municipality (Almeida et al., 2013; Leitão, 2011; Rebelo, 2013a; Silva, Deus and Tenedório, 2012); Develop new territorial planning and management tools aimed at capturing the surplus-values that arise from planning decisions or public investments, so that municipalities can reassign them to social purposes (Rebelo, 2013b); Clarify the origins of funds, and accurately quantify the contribution of the (current or proposed) territorial management tools to the strengthening of municipal finance, thus ensuring municipal economic and financial sustainability; Assure a better intra-municipal equity in the distribution of benefits and charges that accrue from urban development processes.

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Legislation

- Aviso n.º 2766/2009 (simplified change of the Urban Development Plan of Fátima)
- Aviso n.º 5416/2009 (ratification of the Municipal Master Plan of Ourém)
- Aviso n.º 18200/2009 (new ratification of the Municipal Master Plan of Ourém and of the Urban Development Plan of Fátima)
- Aviso n.º 15622/2009, de 4 de Setembro (Detail Plan of Avenue Papa João XXIII) Aviso n.º 11779/2010 (adjustment of the Municipal Master Plan of Ourém to the Regional Plan of Territorial Ordering of West and Tagus Valley (PROTOVT))
- Aviso n.º 7841/2011 (changing in the ratification of the adjustment of the Municipal Master Plan of Ourém to the Regional Plan of Territorial Ordering of West and Tagus Valley (PROTOVT))
- Aviso n.º 4735/2013 (change in the National Environmental Reserve map of Ourém)
- Aviso n.º 4800/2013 (modification in the plan for Pias Longas site)
- Declaração n.º 376/99, de 17 de novembro (alteration of the Detail Plan of Caridade)
- Declaração de Retificação n.º 1614/2010, de 12 de agosto (ratification of the adjustment of the Municipal Master Plan of Ourém to the Regional Plan of Territorial Ordering of West and Tagus Valley (PROTOVT))
- Despacho n.º 195/91, de 3 de Dezembro de 1991 (Detail Plan of the industrial area of Casal dos Frades).
- Portaria n.º 496/93, de 10 de maio (Detail Plan of Caridade)
- Portaria n.º 633/95, de 21 de junho (Urban Development Plan of Fátima).
- Portaria n.º 190/97, de 20 de março (Detail Plan of the Health Centre of Ourém).
- Portaria n.º 445/97, de 7 de julho (alteration of the Detail Plan of Caridade)
- Portaria n.º 67/99, de 28 de janeiro (Detail Plan for the block formed by Rua Francisco Marto, Estrada da Lomba de Égua and Rua do Mercado)
- Proposta de Lei n.º 183/XII (Proposal of the New Basis Law of Land Policy, Territorial Ordering and Urbanism)
- Resolução do Conselho de Ministros n.º 148-A/2002 de 30 de dezembro (Municipal Master Plan of Ourém)
- Resolução do Conselho de Ministros n.º 148-B/2002 de 30 de dezembro (Revision of the Urban Development Plan of Fátima)
- Resolução do Conselho de Ministros n.º 159/2000, de 20 de novembro (Detail Plan of Quinta do Ribeirinho)

The morphological sense of commerce – theoretical review and lessons learned in four Portuguese medium sized cities

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Abstract. *Shopping has been considered the principal wealth-generator of post-modern societies. Yet, two elements continually elude current theories and practices about the role of commerce on a wider perspective. Rarely is it considered an active agent in the structuring of the city and, furthermore, most studies have solely focused on the geographical, economic and social dimensions of shopping, neglecting its morphological dimension. Only in the last 10 years have authors addressed this perspective, although sporadically and presenting focused views, resulting in a lack of knowledge and, ultimately, in the lack of proper public policies. This paper aims to address the structuring nature of commerce and the influence of its morphological component. For that it combines knowledge from various fields of research and a large array of morphological variables at various resolution levels. Using as test-beds four Portuguese medium-sized cities, GIS-models containing commercial, morphological, structural and temporal variables were produced, explored and compared. Findings include i) the definition of commercial / morphological indicators, that can constitute values of reference or comparison for commercial policies and other planning studies; ii) the evidence that morphological, rather than statistical similarities generate, on the micro-scale, more commercial similarities; and iii) the main bridging aspects between commercial activity and the form and structure of cities.*

Key Words: commerce; medium-sized cities; urban morphology; Space Syntax; urban planning

Introduction – From geography and economy to morphology

Ever since the Industrial Revolution, when the ‘shop’ gained a permanent physical location within the city and became ‘aware of itself’ (Pessoa, 1926), the act of shopping has become an integral part of city-living. If cities have evolved from ‘artifacts’ (Karaman, 2001) to ‘organisms’ (Moudon, 1997), commerce has evolved from being considered just an ‘economic activity’ to an ‘experience’ (Pine, Gilmore, 1999), as the paradigms of both commerce and consumption change (Cachinho, 1994). Indeed, there is a growing interest in the proven capacity commerce has of driving urbanization processes, and of promoting and developing successful urban spaces, boosting their economic and social value (Whysall, 1995; OdC, 2000a; Evers, 2001; Lowe, 2004, 2005; Emery, 2006; Fernandes, 1994; Balsas, 2000, 2001; Moreira et al, 2006).

Yet this understanding of commerce as a structuring element of the ‘organic’ city has never been given enough importance, nor in the literature nor in policy-making (Balsas, 2001; Musso, 2010; Grant and Perrott, 2011). Commerce has mostly been considered a consequence of markets and urban and social behaviours (Borchert, 1998), i.e. commerce was deemed to seek the best locations after-the-fact, and furthermore no-one assumed that the presence of retail spaces could be, in itself, a cause for the shifts in value of given locations.

In this framework, various fields of research have studied commerce. Historians and geographers have weaved the evolution of commercial patterns and hierarchies over time (Kwan-Yiu, Kong-Sut, 1971; Guy, 1976; Lee, McCracken, 1982; Axenov et al, 1997; Borchert, 1998; Wang and Jones, 2002; Fernandes, 2003; Fernandes and Martins, 2003; Shan, 2004,

Cachinho, 2002, cit in GECIC, 2005), based on hierarchical organizational theories such as the Central Place Theory, the Spatial Interaction Theory, the bid-rent theory or the principle of minimum differentiation (for a review see Clarkson et al, 1996; Saraiva, 2013). Sociologists have tried to understand the behaviour of the shopper (Gregson et al, 2002; Sinha, 2003; Sinha and Unyal, 2005; Sarma, 2007) and of those who sell (Varanda, 2004). And economists have dwelt on the values of location, in terms of market-shares (the retail location theory – RLT), using various mathematical models (reviews in Yrigoyen and Otero, 1998; Hernandez et al, 1998, Mendes and Themido, 2004, Reynolds, 2005, Saraiva, 2013). In this case the relationships with the external environment, with the location mix and with the consumer, are only briefly considered as catalysts for the optimization of sales.

These studies perform, all things considered, ‘simple’ geographical pattern comparisons, between the location (or future location) of the store with the value (economic, social or statistical) that location generates. The site may ‘make the shop’ (Alexander et al, 1999), but the notion of location entails much more than a set of coordinates or statistics, the economic capacity of the customers in the catchment area, or the market competition. Location is accessibility. Location is built landscape. Location is layout and design. In other words, location is also morphology.

The morphological sense of commerce

In 1958 Nelson wrote: ‘the emotional aspects of a location can be important to the success of a store or a shopping centre as the more obvious characteristics of convenience and access’. But his prophetic afterthought remained unanswered for decades: ‘But can stores or shopping centres be as important to the emotional aspects of location?’ Only in the past decade, authors have been calling attention to the lack of an urban morphology dimension in the commercial literature (Van Nes, 2005; Sarma, 2006) and to the lack of knowledge on how urban form affects the spatial distribution of retail activities (Villain, 2011). Urban environment conditions have turned, according to Axenov et al (1997), into the major group of factors that shape the commercial spaces’ market.

Yet most morphological studies still present a narrow view, are context-specific, and lack an interdisciplinary approach. Initial studies followed, more than they actually assumed, previous geographical / economic research, overlapping commercial distribution maps with those of socio-economic densities (Barke, 1998; Joosten and van Nes, 2005; Kompil and Çelick, 2006; Smith, 2006) or of land-use and transport networks at city level (Joosten and van Nes, 2005; Jingman, 2009; Villain, 2011), or even at regional or national level (Marques, 2003). Joosten and van Nes (2005) noted that most literature focused on the macro-scale, and had not yet zoomed into the micro-scale (street, building).

And when it does have, there is also a distinction, seldom overcome, between the study of the store itself and the study of the urban environment the store is part of. The first has mostly been non-morphological, interpreting type of activity, sales data or employee information. There are nonetheless some exceptions. Barke (1998) analysed window size, building type and occupation, and the existence of storage facilities, noting distinct morphological characteristics, highly inter-correlated, in buildings with only commercial use. These were also more correlated with the catchment area population than that of the local area. Allegri (2010) analysed the evolution of the physical layout of shopping centres and arcades in the city of Lisbon, whilst crime researchers have also analysed store layout (Saraiva, 2008, 2011) or product design (Lester, 2001), albeit with different purposes. The second, the analysis of the surrounding store environment, has read as yet another time-line of context, unrelated to the intrinsic characteristics of both space and commerce. The works of Fernandes (1993) or Tokatli and Boyaci (1999) display demographic, urban and political changes on one side, and commercial dispersion changes on the other, not linking them. Tokatli and Boyaci (1999) go as far as to mention the ‘changing morphology of commercial activity’ yet, in truth, only occasionally are

references made to streets, floors and building types. The inverse happens in many commercial urbanism projects, and in marketing and place-attraction studies (Teller et al, 2010), which discuss physical improvements to exterior elements such as streets, parking spaces, shop windows, or urban furniture, aiming to produce attractive environments able to induce shopping. Yet, in all, there fails to be a direct connection between particular stores and their surrounding morphological context.

This connection has nonetheless started to steadily emerge in the literature. Yoshida and Omae (2003) and Jostens and van Nes (2005) have compared store dispersal with the properties of blocks and buildings. For the first authors commercial blocks are distinctly associated to larger areas, volumes and building-to-land ratios. For the second, stores tend to full block typologies, characterized by high floor space index and build up street sides, preferably of smaller size and in medium-density zones, usually near main junctions or along the main streets. Only chain-stores and shopping centres tend to occupy non-block typologies.

The relationship of the store location with the accessibility of the network has also been the object of Space Syntax literature, or analogue models. According to Hillier and Iida (2005), activities that depend on movement will follow the grid's logic, and there will be a gradation according to the necessities of each particular activity. Morphology is here characterized through concepts of connectivity, either distance to closest intersections (Villain, 2011), or the weight of the store's street segment in the network, according to the so-called 'integration' or the 'betweenness' of the grid. Jingman (2009), using segment analysis in Chinese cities, concluded that city's commercial centres exactly correspond to city's syntax centres, both at a local and a global scale, and that almost all large-scale stores are directly located within sub-local syntax centres, in places connected to major thoroughfares and bus routes. Likewise, for van Nes (2001, 2005) shopping areas are only successful if they are among the highest integrated streets and the higher the density of streets in the vicinity, the more intense is the shopping street in terms of number, size and variety of shops. Yet the same author, in Berlin, found a weak co-occurrence between integration and the presence of shops (Joosten and van Nes, 2005) and Porta et al (2007) were keener to defend that the strongest correlation occurs with global 'betweenness' rather than with 'integration'. Furthermore some authors believe that this is not entirely true for all cities and all types of activity – the 'gradation' Hillier had already hinted to.

Sarma (2006), Hossain (1999, cit in Sarma, 2006) and Villain (2011) agree that commercial spaces whose sales (movement) are generated by their own attracting potentialities (anchor or specialized stores) have the tendency to be clustered together in central locations, although surviving in isolation. On the other hand, functions whose movement is just attracted coincidentally, like convenience and multi-purpose shopping, because they are more affected by competition and movement, are more dispersed, although in spatially strategic locations with high through-movement potential and serving local catchment areas. Only first necessity and some convenience stores appear to be a global phenomenon in the market, correlating both globally and locally with through-movement. This leads Sarma (2006) to conclude that distance is directly proportionate to social and economic class in terms of movement and in terms of shops. Teklenburg et al (1994) also stress that in suburbia, although the busiest shopping street is in one of the most integrated lines of the axial map, other commercial streets or department store locations are not. They established that in most cases where the most integrated lines for pedestrians did not coincide with the major store locations there was a co-occurrence of pedestrian and intense vehicular traffic.

Methodology

Although the studies that have tried to establish a connection between urban morphology and commercial activity are becoming more frequent, they seem to suffer from an exaggerated spatial and theoretical focus. Commercial, economic and geographical studies seldom look at

the micro-scale morphological element, syntactic approaches do not regard any morphological characteristic other than the location in the grid, and morphological studies do exactly the opposite, associating the measure of form and structure with the mapping of evolutionary geographical patterns, something which led Conzen (1980) to state that these studies were ‘amorphological’, and Whitehand (2007) that a ‘typological’ component, i.e. land and building use, and an interdisciplinary integration was missing. Each study usually uses only one method for variable comparisons, does not usually divide stores by activity or type, and dwells exclusively on one city or urban area. Joosten and Van Ness’s (2005) conclusion that stores are located preferably in full-block typologies may hold for Berlin, but it is easy to question its validity elsewhere.

In this context, this article wishes to synthesize the first findings of the research performed by Saraiva (2013), whose main goal was to establish to what extent the morphological environment is connected to the location, characterization and performance of commercial spaces. A multiple case-study approach and a multidisciplinary variable-analysis approach, were carried out. Four Portuguese medium-sized cities: Vila Real, Aveiro, Leiria and Évora, were selected, in order to get a diversified sample, according to their geographical location, their number of inhabitants (20-60 thousand), their structural importance in the urban network and their permeability to new commercial formats and commercial-urbanism programmes. The study area was made coincident with the so-called urban perimeter as defined in the respective municipal master plan. Within this perimeter, commercial and morphological variables were collected, street by street, building by building and store by store. The cities were later divided into two areas: the ‘city center’, and the ‘periphery’, which was also, in turn, divided into homogeneous areas (e.g. ‘residential areas’, ‘industrial/commercial areas’), and the analyses were conducted at these different resolutions.

According to recent Urban Morphology literature, the ‘morphological sense’ could no longer be described as just the study of form, but of form and function over time, in a given context, i.e. form and structure, that is characterized as having morphological, but also topological and typological components, analysed according to three resolution-levels: street, neighbourhood and territory (Conzen, 1960; Lamas, 1989; Cannigia and Maffei, 1993; Moudon 1997; Karaman, 2001; Whitehand, 2001, 2007, Saraiva, 2013). Figure 1 portrays the general research framework in which these notions are present.

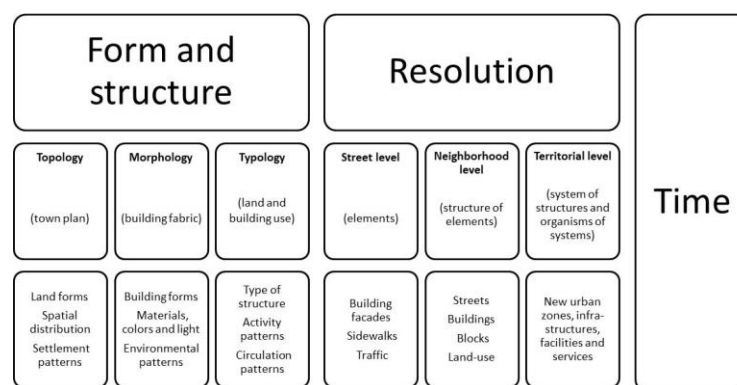


Figure 1. Components of the form and structure of a city, according to urban morphology literature (source: Saraiva, 2013).

Figure 2 lists the morphological variables considered in the research. Streets were characterized according to their type (exclusively pedestrian or not), width, quality and the size of sidewalks, building characteristics, an accessibility measure and the amount of movement. These last two were measured through Space Syntax. According to Hillier and Vaughan (2007),

60 to 80% of movement flows can be accounted by the configuration of the grid. Sixteen different radii (in meters) were considered, and the results were divided into six quantiles, ranging from the most central (first) to the most segregated (sixth). Blocks were characterized according to their typology (full, hollow), land-use mix, statistical information concerning families and dwellings, and a set of distances (between built elements, stores and store types). Buildings were characterized according to their type and amount of occupation, their height, area and volume, and their age (before and after 1975), style and preservation. A wider contextualization based on planning, historical and geographical backgrounds, expressed the ‘territorial level’ resolution.

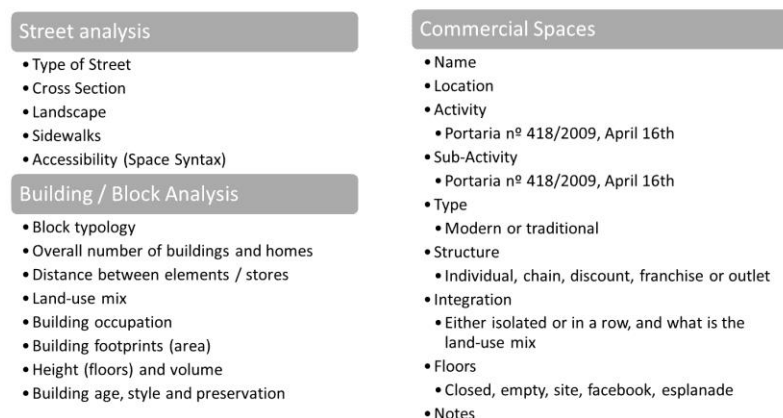


Figure 2. Morphological and commercial data collected in the research.

The collected commercial variables can also be seen in Figure 2, and are intended to answer more specifically to the ‘typology’ component. These have not changed significantly since earlier works on hierarchical retail geography and location modelling (Kwan-yiu and Kong-Sut, 1971; Guy, 1976; Lee and McCracken, 1982). The classification by activities and sub-activities (e.g. ‘Food & Beverages’ and ‘Butcher’, respectively) was based on the Portuguese legislation (Portaria nº 418/2009 of April the 16th), even though a more expedite ‘retail categories’ division, based on necessity, presented by Sarma (2006), was also used²⁰⁶. Stores were also categorized by their type (modern or traditional – Fernandes et al, 2000), their business model (individual or family-owned, chain, franchise), their integration in the building (building type and occupation, and how much space they occupy) their integration in the street (relation to other stores), their web-connection and their status (open, closed or empty).

During 2011 (the year of the most recent population Census) a total of 7.898 individual stores in the four cities were catalogued, and the information was uploaded into a GIS platform. Following Saraiva (2013), research was carried out in five main stages: an overall geographical, organic and statistical definition of the four cities; the assessment of the physical distribution of commerce; an extensive commercial characterization; the characterization of blocks and buildings containing commerce; and the characterization of streets containing commerce. This paper focuses on the last two stages, although the analysis is transversal and closely related to the other three stages as well.

²⁰⁶ Sarma (2006), inspired in Eaton and Lipsey (1982), divides commercial spaces in six categories: M1 (Multipurpose 1 – related to first necessity goods of local accessibility), M2 (Multipurpose 2 – rely on a larger customer base, such as banks or bookstores), MC (Multipurpose-Comparison – like fashion, telecommunication or sporting goods), C (Comparison – such as home or car related products) and S (Single Isolated Purchase).

Results and discussion

One of the most striking findings was the great commercial similarities between the case studies when the differences in study area and number of inhabitants were taken into account. The four cities have, approximately, the same number of inhabitants per store, stores per urban area and per street length, similar hierarchical commercial structures and location patterns, and similar percentages and distributions of store type, structure and status (Saraiva, 2013). When morphological variables are placed over these distributions, the similarities are maintained which can only mean that the distribution of stores is not random, depends on form and structure, and can be quantified. Accordingly, commercial spaces are usually in buildings with similar average heights (3-4 floors), with similar areas²⁰⁷ and volumes per store, and the same overall number of stores per block (6) – see Table 1. There are also similar hierarchical commercial street networks in all cities (from the central pedestrian street to the suburban thoroughfare), and there are even similarities in the distribution of stores that are in buildings constructed after 1975. Their percentage is approximately the same in all peripheries (around 70%), and so is, in all four cities, and for $r = n$, the percentage of these in the segments of the second and third quantiles of integration and choice (respectively 60% and 40% of buildings – Figure 3).

Obviously, there are exceptions, most of which are a consequence of particularities different cities present. For example, Évora never has similar indicators whenever building height or age is a variable, because the city centre is a world heritage site. The rural nature of Vila Real's periphery also leads to fewer stores, which reduces some indicators. Nevertheless, these exceptions usually occur in only one city. Furthermore, most of the indicators that are not in the same order of magnitude in all or in three of the case studies, are similar in pairs. And these pairings seem to be much less dependent on economic and even commercial variables (such as purchasing power, degree of local economic development and overall number of stores), and more on the morphological ones.

Table 1. Commercial building and block data, by cities, by city centres and by peripheries.

Cities	Vila Real	Aveiro	Leiria	Évora
City	183	258	244	204
City center	140	147	144	101
Periphery	292	403	376	300
City	3,71	3,76	3,77	2,23
City center	4,1	3,97	4,26	2,45
Periphery	2,82	3,49	3,14	2,03
City	233	358	442	441
City center	99	154	173	172
Periphery	134	204	269	269
City	6	6	6	4
City center	10	8	8	5
Periphery	3	5	4	3

Leiria and Aveiro are larger, more developed cities with more stores, commercial area and diversified store types, something which appears to corroborate Barke's (1998) proposal that commercial development is dependent on the regional number of inhabitants. Yet, when comparing store data with network and building properties this does not ring true. The similarities are clearer between Leiria and Vila Real, and between Aveiro and Évora (as it is seen in Figure 3 for local radii), simply because, in each pair, the cities have much more in

²⁰⁷ The store was deemed to occupy the whole implementation area of the building.

common in terms of form and structure. Exploring this idea, several considerations can be made.

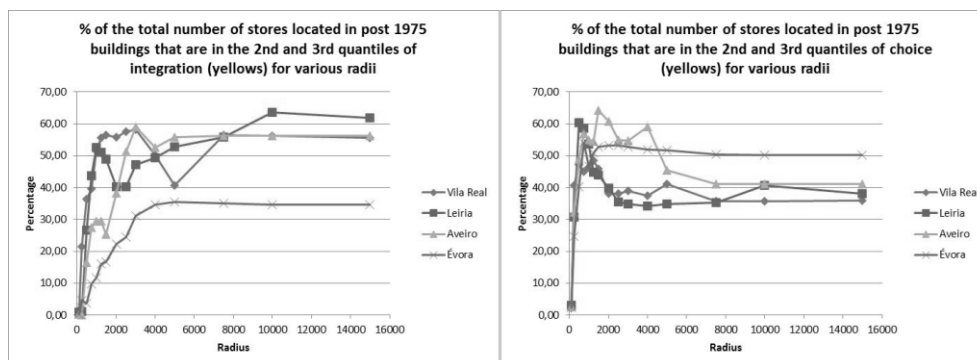


Figure 3. Percentage of the total number of stores located in post 1975 buildings that are in the second and third quantiles of integration and choice, for all considered radii.

The first, which is often neglected in commercial studies, is that it is virtually impossible to dissociate the ‘store’ from the building it is in. Only one in five stores (and one in ten in Aveiro) is in a purposely-built structure for accommodating exclusively commercial-use. It is then safe to assume that in most cases these buildings were erected bearing in mind the specificities of the existing other uses in upper floors (mostly residential), and not those of commercial spaces. The morphological variables associated to the store are therefore not their own, but are related to the building they occupy, and to the street and the block in which that building is located. If this establishes the building as the most important morphological element that influences commerce it also gives strength to the hypothesis that commerce is a mere consequence of land development.

But this constitutes a half-truth. This research found that residential neighbourhoods without stores are not crossed by main streets, are usually in segregated areas of the network, have closed and small street and block structures, and only seem to influence the structure of the public transport network, as they attract transit stops. Residential buildings with stores, however, assume an entirely new significance. In the city centres major traditional ground-floor commercial streets have been maintained, despite the proliferation of commerce in new centres and in main residential localities. The weight in these locations of activities such as MC, M1 and M2 (see footnote 2) has actually been crucial in the conservation of their liveability but this is not the only reason (all cities have, for example, 80-90% of all their fashion stores in just the main central streets). Structurally these corridors constitute the most central or travel-through locations in the city centres, so it can be said that commercial construction has influenced centrality instead of being a consequence of it. Vila Real’s secular and central pedestrian street is still one of the most integrated segments of the entire city-network. But, at the same time, this position of centrality may also explain why stores have established there and why they have a continuous success, which can mean that Nelson’s two questions may have exactly the same answer as ‘who came first, the chicken or the egg?’

This duality is maintained when recent construction containing commercial spaces is analysed. On one hand, these new buildings are generally located in the most central lines possible (‘integration’), but also in the lines with the greatest travel-through potential (‘choice’) when in peripheries, which seems to suggest that their location is to some extent dependent on the pre-existing network structure. But, on the other hand, the appearance of these new buildings, especially in the urban peripheries, has been simultaneous to the opening of new axis (the plot by plot development formed the street), so they have influenced, in their own right, the properties of the network, particularly at the local level, where only 20% of stores in post-1975 buildings are in segments of the last three quantiles (Figure 4). Consequently, new streets with

commerce have generated larger local centralities influence radius by establishing a connection to, or becoming, the main peripheral axis. This not only grants greater access of surrounding areas to the local commercial poles but also permits a greater connection to the thoroughfares leading to the city centre, maximizing their feeding capacity.

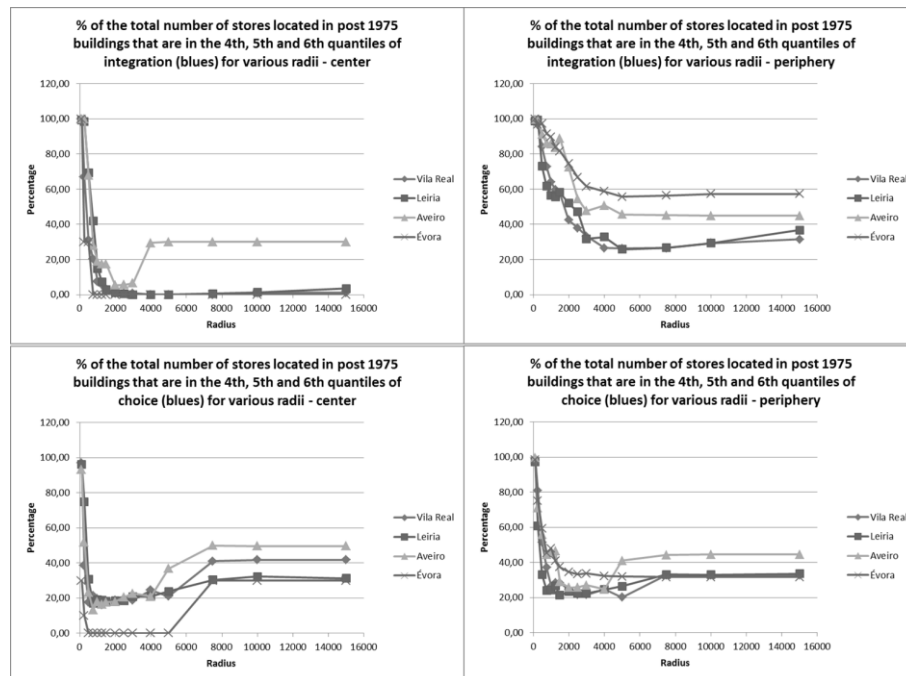


Figure 4. Percentage of the total number of stores in the centers and in peripheries, located in post 1975 buildings that are in the last three quantiles of integration and choice.

These new buildings are associated to specific morphological characteristics, which however seem to depend more on the location inside the urban perimeter than actually on the type of commerce they contain. The number of commercial poles of recent formation, as well as building heights, road-size and road complementarity decreases and block area increases with the distance from the centre. This contradicts the works of Yoshida and Omae (2003) or Joosten and van Nes (2005) that allocate specific, non-changeable, morphological features to commercial spaces. With the exception of particular store types which tend towards specific locations (like commercial services generally seeking buildings with other services), most commercial variables, particularly in the centres, have even distributions between the various types of buildings and blocks, with the only particularity that they constantly tend towards the larger side of blocks. At the same time, modern stores are very rarely in buildings and neighbourhoods constructed before 1975, which may mean new stores need new buildings. Stores in these buildings are in greater number, closer together ('door to door') and more spatially organized, which increases the chances of success as commerce performs better in proximity. 'New' buildings are usually located in larger blocks (a prevailing tendency for commercial spaces), the stores therein have more esplanades comparatively – use more public space – and as they usually are farther away from the street they also condition size and type of the sidewalks. This means that commercial buildings condition blocks, sidewalks and streets.

In any case, exclusively commercial buildings also impact on the landscape. Commercial arcades, shopping centres and warehouses obviously possess the greatest areas and volumes. They can also be extremely beneficial to revitalize main street shopping, as the literature suggests, but in these case studies they are only successful if they are close to pre-existing main shopping axes, regardless of overall accessibility, and if they have a limited number of store spaces. On the contrary, in the peripheries, large shopping centres appear and survive in isolated

areas, but they quickly stimulate commercial and residential development close-by. Actually, they seem to appear more frequently in peripheries without clearly defined centralities. Considering the example of Aveiro, a city with various shopping centres in the periphery and that, over the years, has linearly expanded through edge-roads, it could be speculated whether the lack of well defined commercial and urban centres cannot influence the appearance of these spaces.

Other than the type, age and nature of 'buildings', commercial variables seem to be more affected by the form and organization of the city. This structure obviously conditions the characteristics of the segments that form the network, of which store types seem to depend. Actually, they are more affected by this positioning (centrality, through-movement, closeness to an element) than by any other morphological characteristic of that position. But, at the same time, this position also conditions the morphological characteristics of the elements, because these are likely to change from the centre to the periphery, and from the main local road to segregated neighborhoods, and it also conditions how localities are connected between themselves and how hierarchies are built, something which, again, affects commerce.

For one, 'streets' are the second greatest morphological element, especially in the periphery where most commercial clusters favour through-movement (70% of stores are in high quantiles of choice, against around 40% in high integration quantiles), and where urbanized ring roads, expansion thoroughfares, and local or regional roads passing through the centre of localities are the distributors of development, as most localities tend to develop around or facing them. Greatest connections mean more commercial strength, not only of the ribbons per se, but also of the poles these ribbons connect. Connection means continuity, and in these concentrations the number of stores reachable is proportional to the distance travelled. When continuity is broken, the development and type of the commercial poles in the extremities change. In Vila Real's centre, for example, there are no commercial ribbons connecting the older and newer commercial centres. This may be one of the reasons why the second ones have still not been able to surpass the first. A link is a natural element for change, rather than a complete and abrupt shift in position. Other non-urbanized and non-commercial connecting axes can also be prejudicial for development. Ring roads in Aveiro and Leiria, for example, decrease the accessibility of the main streets and consequently of the main commercial areas. In Vila Real and Aveiro the lack of connection points between the centre and the periphery also segregates several commercial poles inside residential neighbourhoods, and makes it more difficult to access the centre. This causes the creation of competing stronger poles outside the city centre, obviously changing the morphological landscapes and development capacity of these areas. On the other hand, in Vila Real and Leiria the thoroughfares that unite different localities become, at the extremities, main local streets. Because the axis is the same, this considerably improves both the through-movement potential and the centrality of these localities, which helps to maintain their commercial structures, at the same time as it stimulates continuous development. The same does not happen in Aveiro and Évora, where the connections between main local roads of different localities, and between these and the centre, are not direct, despite the existence of very high through-movement axis, as is depicted in Figure 5 concerning Évora. This hinders the creation of centralities, and allows for older traditional axes to be substituted by stronger commercial poles in multi-family buildings located in or around the main through-movement axes. This peripheral store necessity (to be near 'choice' axes) clearly influences the location of the building and, consequently, it influences the location of all uses in the building.

Therefore, the form of the city can also influence commercial behaviour. Leiria and Évora have shopping centres inside the urban perimeter, and central traditional commercial areas inside the centre, unlike Aveiro and Vila Real, so, naturally, they have a clearer hierarchical and commercial structure from the core to the periphery, which increases the centrality range and the local 'choice', attracting specific activities accordingly. As a result, the closest peripheral localities are more connected to the centre, which should explain why these two cities have more developed communities, overall, in the periphery. In the peripheries of Aveiro and Évora, the expansion in edge-axes (as is clearly seen in Figure 5) and the lack of closed hierarchical

communities is negative, in a sense that it produces weaker commercial centralities, but positive, in a sense that zones gain multiple hierarchical purposes, something which can influence variables like 'building height' and 'pedestrian accessibility'. Despite the similarity in the overall physical location patterns of stores in the same hierarchical zones of different cities, the morphological composition of these zones may be different due to these nuances, which are caused by residential areas, commercial buildings and accessibility. These are then three crucial elements affecting the 'emotional aspects of location'. On the other hand, symmetry, like the one found in Évora, also contributes to the creation of similar 'integration' and 'choice' patterns, i.e. stronger axes that are attractive to stores. This, in turn, influences the 'emotional aspects of stores/buildings with stores', so it is rather difficult to ascertain where the cycle begins and ends. Other physical constraints have also been proved to affect morphological characteristics of commercial blocks. Slope, for example, can affect geometry and hinder urban and commercial expansion.

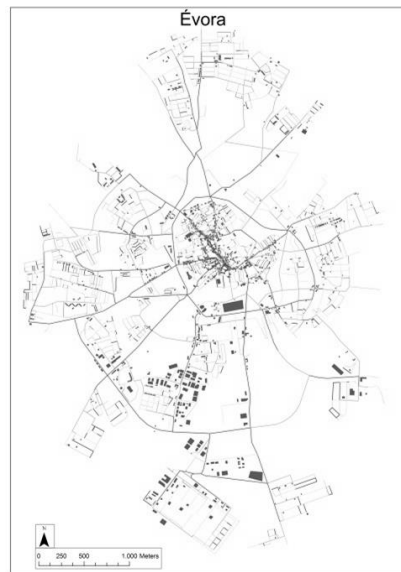


Figure 5. Évora choice map for $r=n$. Buildings are not represented, but stores are signalled with a green colour.

Consequently, these physical variables and the historical expansion of the city commercial landscape seem associated to the appearance of 'closed' and 'empty' stores. The first are generally in older areas, which have lost their vitality and, comparatively, their spatial attraction (due to changes in the network), whilst the second are usually in new neighbourhoods. The number of these is sometimes so excessive in new commercial poles in residential areas that it has to necessarily mean that these stores lack of success is not a consequence of location or competition, but simply of a lack of market need for more store space. As the centres are the greatest commercial destinations, stores therein are hardly in segregated segments, so conclusions are hard to draw. In the peripheries, however, we can see that, although stores are generally not on global centralities, if they are not even in local centralities / destinations then their chances for success are much reduced. Even so, local centrality may not necessarily be a guarantee of success, because what stores need in the periphery is to be in axes of high 'choice' potential or, at least, at the distance where they can be reached easily. For 'integration', and for $r < 2000$, more than 70% of closed and empty stores in the peripheries are in segregated segments. Furthermore, over 80% of these non-open stores are in buildings constructed after 1975, which helps to understand why older axes still withhold and why the construction of buildings containing commercial spaces cannot occur in any given location inside the urban perimeter (Figure 6). The drop to zero in Vila Real is explained by the rural nature of its

periphery, as stated before. Stores not on the ground floors are also comprehensibly unpopular and perform worse.

These findings can definitely dispute the hypothesis presented by most Space Syntax researchers that stores are preferably located in first quantile segments, and also Jingman's (2009) findings that a city's various centres correspond to various syntax centres. Indeed, these types of research are generally conducted in the centres of large cities. As Teklenburg et al (1994) had already suggested some twenty years ago, the commercial landscape in smaller cities has a different behaviour, especially outside their centres. If in the centres stores seek mid-range centrality, in the peripheries they seek through-movement, benefiting much more from global than from local 'choice'. Stores do not want (for market reasons), cannot (for financial reasons) or are unable (for structural reasons) to be in the first quantile segments, which are often longer connecting roads or service areas. Because they seek movement rich locations, but also areas closer to a larger clientele (i.e. residential areas) and corners, they stand most favourably on perpendicular roads to the main streets and on intermediate axes of the network. For radii over $r = 3.000$, over half of the stores are in the second and third quantile 'integration' lines and between 40%-50% of the stores are in the second and third quantile 'choice' lines.

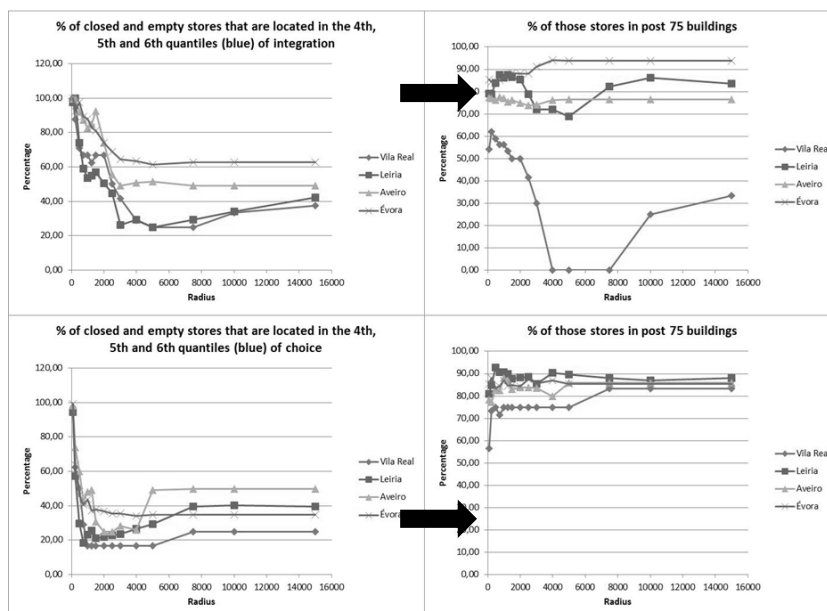


Figure 6. Percentage of closed and empty stores, in the peripheries, located in segregated lines, both for 'choice' and 'integration', and the respective percentage in post 1975 buildings.

Likewise, when Sarma (2006) reveals that MC, C and S categories (see footnote 2) do not correlate with 'choice', he grounds this statement on the analysis of a central location. In the case-study peripheries, for example, C stores are, logically, in travel-through thoroughfares and segregated out-of-the-way areas, and S stores, because they require space and have strong attraction by themselves, can locate just outside the centre in areas with limited attraction. As well, in the centres, even though M2 and MC stores have a strong affinity to first quantile segments, both of choice and integration, first necessity M1 stores obviously drift towards segregated (residential) neighbourhoods.

Concluding remarks

By combining, in four medium size cities, several morphological and commercial characteristics of stores and of the buildings, streets, blocks and neighbourhoods they are in, this research has established a link between the form and structure of cities and the commercial landscapes they possess. Actually, there is evidence that cities or city areas with more morphological (rather than statistical) similarities will have, on the micro-scale, more commercial similarities, something which strengthens the validity of what we called the 'morphological sense' of commerce. Based on the similarities between case studies, some reference-values were established and we found that the location, characteristics and performance of commercial spaces is to a significant extent connected to the following six aspects: (i) the amount, type and age of buildings and their distribution; (ii) the location of residential areas and whether they have commercial rows or not; (iii) the way urban hierarchies are structured; (iv) the configuration / form of the localities, that is, the structure of their blocks and of their street networks; (v) the relative position of the centres inside the localities; and (vi) the way localities / areas are connected through urban ribbons.

Nevertheless, the above commercial spaces features are not exclusively dependent upon these aspects. Because the store is intrinsically connected to the building it is in, it is almost impossible to state undoubtedly that the proven influence on a given area's development, residential growth or degree of centrality is caused exclusively by the store and not by, for example, any of the other uses a given building accommodates, or even by the mere existence of the building (or the street) itself. But the truth is the store is indeed there, it is open to the public and it is more directly entwined with the economic, social and morphological realm of the area it belongs than any other residential or service use the building might contain.

Therefore, the store is not only an economic motor and a wealth-generator, but also a city maker. It can produce centralities and friendly public spaces, and can command the location of new neighbourhoods and of new streets. Consequently, it can influence, among others, demographic and social indicators. In other words, commerce can indeed be an instrument of urban planning. With this in mind, the permissiveness of construction in general and of licensing of commercial establishments in particular could be substituted by a more comprehensive and demanding vision that would ultimately be much more beneficial to urban spaces. The similar thresholds found in our research can, for example, at least for cities of the same type, safeguard the construction of unnecessary store spaces (and hence avoid the scenario of empty stores), show excesses or deficiencies of a particular activity in a particular area, or regulate the construction of peripheral commercial poles, placing them close to a 'choice' thoroughfare, for example, to maximize the influence range of the stores therein. If there has not been a planning for commerce (Guy, 1994; Fernandes et al, 2000) but just a global planning that mentions commerce occasionally (Borchert, 1998), then looking at commerce from an urban morphology perspective can supply the necessary knowledge to start doing just that. Fuller (cit in Ratti, 2004) said 'reform the environment, stop trying to reform the people. They will reform themselves if the environment is right'. If, substituting the word 'people' for the word 'shop', the sentence still makes sense, then this way of thinking, as well, makes sense.

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The systemic focus on walkability and urban form

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Abstract. *This paper aims at analyzing walkability – most commonly approached in the studies of Transport Engineering – and the urban form – traditionally applied to research in the field of Architecture – in order to discuss the interdependence between both perspectives. The research is based on systemic thinking (relational) (cf. Capra (2003); Morin (2010); Bertalanffy (2012); (Vasconcellos, 2013)), in order to articulate different areas of knowledge for a more coherent reading of urban dynamics. In order to accomplish that, a thorough review and analysis of the literature about walkability and urban form was carried out, encompassing different areas of knowledge: geography, history, sociology, philosophy, literature, anthropology, architecture, engineering, medicine, etc. It was possible to verify that although each one of those fields reach the same diagnosis – there is a need for prioritizing pedestrian space –, the different fields hardly ever exchange information, which leads to fragmented interpretations. Thus, we suggest that the qualitative and quantitative approaches be merged, in order to effectively enhance the analysis, making it more sound and befitting to the reality of the object under study.*

Key Words: systemic theory, multidisciplinary, urban form, walkability, Space Syntax.

Introduction

Until the mid 20th century, the perspective of separating knowledge into specific fields implied the study of objects and phenomena in isolated approaches. Although consistent with a detailed research, the notion of fractioning in order to understand ended up masking a set of interdependence relations between objects, which compromised their interpretation. From the 1960s on, however, a new tendency arose: the trend of understanding the objects (or phenomena) from different perspectives, relying on a broader and systemic view (Capra, 2003; Morin, 2010; Bertalanffy, 2012; Vasconcellos, 2013).

It is under this paradigm that the present research explores the theme of walkability, in order to contribute methodologically to the debate, analyzing different field of knowledge to understand how the phenomena can be seen by distinct perspectives.

Walkability is approached from the standpoint of philosophy, social sciences such as anthropology, sociology and anthropology, health sciences (medicine and psychology) and engineering, thus encompassing both the qualitative and quantitative perspectives.

The emphasis in aspects of the constructed form can also be an important variable, contributing for different fields of knowledge. Hence, the facets studied by Space Syntax are relevant for both the quantitative and qualitative contexts, and provide a sound methodological contribution to the research at hand.

Theoretical background

Systemic thinking

The notions of relation and fragment lead us to consider the city as an entity or a whole, where articulations are formed and parts organize themselves, helping us to understand it as a system.

According to Cunha (1997), a system is a set of elements, materials or ideas, amongst which one can find or define some relation, method or process; and Alexander (1966) states that a system is a set of elements that belong together or work together somehow.

When viewed as a system, the city is a whole that includes relations of interdependence which cannot be perceived only by analyzing its components, and that is not consistent with an analytical perspective. Systemic thinking also implicate creating relations between different fields of knowledge, seeking connections between them. In urbanism, it corresponds to looking at the object of study – the city – from a set of perspectives that must invariably be articulated.

For Morin (2010), “there is an increasingly broader, deeper and more serious inadequacy between knowledge that is separate, fragmented and compartmentalized in disciplines and realities and problems that are increasingly more multidisciplinary, transversal, multidimensional, transnational, global, planetary”.

In fact, hyperspecialization hinders a global vision (which is fragmented in parts), as well as the essential (which becomes diluted). Essential problems can never be fragmented and the global problems are increasingly more essential. Moreover, all particular problems can only be placed in a planetary context (Morin 2010).

The relevance of a relational view gained visibility during the 20th century with the studies carried out by Bertalanffy (2012), in which he presents numerous applications of the systemic perspective in several areas of knowledge (politics, sociology, psychology, psychiatry, medicine, physics, computer science, military, biology, amongst others). The author believes that “it is a transformation in the basic categories of thinking of which the complexities of modern technology are just one – and possibly not the most important – manifestation. In one way or another, we are forced to deal with complexities, with ‘holism’ or ‘systems’ in every field of knowledge. This implies a fundamental re-orientation of scientific thinking”.

The contemporary re-orientation of science considers researching a way of articulating knowledges and disciplines, in addition to understanding the object as something related and interdependent. According to Bertalanffy (2012), “[...] the only way to study an organization is to see it as a system, once the systems analysis treats the organization as a mutually dependent system of variables”.

The trend to study systems as an entity and not as a set of parts is in line with a trend in contemporary science that no longer isolates the phenomena in strict confined contexts; instead, it is open to the study of interactions and researches increasingly broader sectors of nature (Ackoff, 1960 apud Bertalanffy, 2012, pp. 29).

From this standpoint, Medeiros (2006) “considers that there are characteristics of the whole that cannot be understood by the sum of its parts: they exist only when the parts of the whole act and arrange themselves relationally.

Thus city, mobility and walkability must be understood as parts of several articulated fields. Moreover, it is paramount to study the relations between the elements that compose the city, such as the urban form, because they contain the perspectives to explain the phenomenon.

It is important to highlight that, in order to apply systemic thinking it is necessary, first and foremost, to be ready to change the paradigm. Vasconcellos (2013) believes, for example, that “systemic thinking is the new paradigm of science”. A paradigm is the way we perceive the world and act towards it, based on our own rules. The author also warns us about the fact that “when our paradigm becomes ‘the paradigm’, the only way to view the world and act, a dysfunction called ‘paradigm paralysis’ or ‘fatal certainty disorder’ takes place” Vasconcellos (2013).

The ‘*paradigm paralysis*’ can stop us from seeing opportunities that are all around us in several situations. In order to recognize and enjoy these opportunities, we need to be flexible and willing to embrace new views, different from what we are used to. “In addition, the changes in paradigm can only occur through experience and evidence that places us face to face with the limits of our current paradigm” Vasconcellos (2013)

How is it possible to use this approach of a changing paradigm to understand walkability? The first step seems to be the need of increasing the knowledge about walkability from several angles, which would provide input to understand the city and its form.

Walkability

In Portuguese, the verb ‘walk’ is “caminhar” which derives from “caminho”, a word that means ‘path’. As well as in other Latin languages such as Italian, Spanish, and Catalan, it has the meaning of following a path, a road.

Moreover, we must take into account how often the act of walking is referred to in the non-scientific literature, which shows how present it is in the life of individuals as a symbol of human life itself. The Italian writer Ítalo Calvino explored the description of imaginary villages, in his work *Invisible Cities*, where the importance of walking to the perception of the urban space is poetically presented. For Calvino’s traveler what matters is the act of walking in itself, not the crossing of space by other vehicles: walking expresses a vigorous relation with the space.

This is the same philosophy that guides the work of authors who claim that walking is crucial for understanding the world. Canellas (2013), in a series of chronicles, translates the importance of walking for the comprehension of the urban space (something which would not be possible by car). Reading the city becomes easier when we cross its distances on foot.

People ‘feel’ the city in a different way when walking, instead of travelling in the high speed of cars. Although everyone is a pedestrian at one time or another, we choose the car in most occasions, even if the result is a distance from other people and from the city. Acceleration and swiftness matter most, because this concept is embedded in the western imaginary as a positive paradigm: there is no time to waste (Gondim, 2014).

From a philosophical standpoint, in the view of Solnit (2001), walking allows us to get to know the world with body and soul, being an important cognitive experience in a time when individuals prioritize the use of car in their displacements.

Walking the streets is what connects the reading of a map with life, the personal microcosmos with the public macrocosmos; it is what grants order to the surrounding labyrinth.

There is also a belief that walking involves a process of self awareness, and maybe even inspiration. Gros (2010), based on the text *Ecce Homo* by Nietzsche, highlights the importance of walking in the professional life of the philosopher, stating that for Nietzsche “a walk outside was an element of his work, the permanent follow up to his writing”. He adds that Jean-Jacques Rousseau, in his work *Mon Portrait*, stated that only when he walked he was able to think, compose, create and feel inspired.

In *Éloge de la marche*, published in 2000, the anthropologist and sociologist Le Breton discussed the relevance of walking for human relations, for life. He attests the relevance for urban mobility and criticizes the overdependence on the use of car in contemporary days.

Considering the excerpts presented, it is clear the interpretation that walking is also seen as a path for comprehending the city and even the individual. From a philosophical or artistic standpoint, walking is the element for understanding and decoding the outside world, somehow a counterpoint to a time that overvalues speed and swiftness. The increasing value placed on the vehicles means a devaluation of the act of walking, which becomes a symbol of something outdated. However, there are indications that say the opposite: walking is the permanence of time and the path to a clearer vision of what the city and the world around us really are.

Urban Form

After what was discussed above, it is possible to assume that the act of walking favors a coherent understanding and experience of the city, for reasons embedded in different fields of knowledge. Walking in the city can be interpreted in terms of origins and destination, or in terms of the capacity of places becoming routes or points of arrival, as discussed by Hillier

(2008). There seems to be a logic in the organization of urban spaces that affects the process of choosing paths, which expresses the preferences of individuals for a certain path or another.

Speaking about organization of space means considering the urban structure, perceived as a system of interdependences and understanding how the form of the city influences the act of walking. This component may play a more relevant role than previously imagined, actively conditioning the flow of pedestrians.

According to Cunha (1997), form encompasses “the way in which something exists or manifests itself, configuration, outer appearance”. Urban form is understood as geometric composition of the elements of a city (streets, buildings, blocks, facades, street furniture, vegetation, etc.), its dimensions and proportions (geometric scope). Moreover, it is of interest to examine how the elements of the urban space are placed and how they relate to one another, in a bidimensional or tridimensional perspective. Since these relations are relevant and result in hierarhical variations, we intend to draft a topological reading (topological scope).

In the literature, urban form has been historically dealt with in terms of its differences in layout. In his work *Wanderlust: a history of walking*, Solnit (2001) poetically and accurately portrays the distinction between the traditional urban form (cohesive) – or pre-modern (Holanda, 2013) – and contemporary (isolated) – post-modern (Holanda, 2013).

The polarization of spaces between isolated and cohesive is in line with the notion of fraction and relation that are the heart of this research. To a certain extent, the isolated spaces become the fragments of a larger space; whereas when these spaces are cohesive, they create an environment which is better articulated to the whole urban system.

Polarization is recurrent in the interpretation of patterns of urban form in cities throughout history. Here, it is a tradition to analyze the layout of the urban grid as a symbol of the city form, one of the most emblematic and long lasting features of urban structures. In the opinion of Kostof (1992); Kostof (2001), there are two main kinds of urban form: the irregular/organic and the regular/grid/orthogonal/chessboard. However, for the author, the cities are not rigidly composed: they are a mixture between regularity and irregularity. In present times, one would hardly be able to achieve a homogenous layout that spreads all throughout the city.

When discussing the issue, Medeiros (2006) emphasizes the same kinds mentioned by Kostof (1992); Kostof (2001), when analyzing a sample of cities in Brazilian and around the world. However, when analyzing the articulation between the layout and the impact they have on displacements, the author highlights that the issue is not the existence of one type or another, but how they are articulated. Aspects of seaming, connection and relations between the various axes seem to be more relevant than the layout itself. The quilt pattern urban forms are regarded as the most negative scenarios for urban mobility, even from the perspective of walking: the apparent planning seen in the regularity of the layout disappears for a lack of global intention that could foresee coherent levels of integration amongst the parts.

In order to understand form, one must simultaneously understand geometric and topological aspects, with the focus on relations, on the articulation of the elements of the city. This interpretation seems to play a substantial role in an individual's process of displacement in space.

Different views on the paradox cars vs. pedestrians

The theme of mobility is present in several fields because it is one of the most relevant aspects of the urban context, especially considering the crisis cities have been going through and the need for a better displacement in order to ensure the vitality of the settlements. As Gehl (2010) states, everybody needs to move around space in order to carry out their daily, weekly or monthly chores. In order to achieve that, everyone start their trip in a point of origin A to reach their destination B, using some mean of transportation. It may be individual public transportation (taxi) or group public transportation (busses, trains, subway etc), individual motorized transportation (car or motorcycle) or non-motorized transport (bycicle or walking).

As displacements are essential to urban life, attention to the paths taken is paramount: Jacobs (2001) defines the street and the sidewalks as the main public places in a city. The research about the structure of these paths has received an increasing number of converts, which progressively raises attention about the relationship between the quality of space and performance of displacements.

It is remarkable the protagonist role the individual motorized vehicles in the use of urban space. Although walkability has been the focus of studies both from the area of Transport Engineering and related disciplines, it has not yet gained enough visibility to convince society of its relevant and determining role in fostering more people friendly and functional spaces.

There are several studies showing that cars take precedence over pedestrians in the context of urban mobility sometimes present in more descriptive or more analytic discourses, with references to them present in several fields.

The diachronic scrutiny of the topic shows a shifting preference for either qualitative or quantitative contexts, depending on the field that is undertaking the analysis. In the first, we can verify the main presence of the discourse, many times connected to the artistic, poetic or philosophical scope. Here the incorporation of the evaluative aspect of the narratives happens, with the purpose of bringing together the philosophical scope and the empirical information obtained. In the second, the purpose is to transform what is observed in the urban practice into numeric models, bringing together statistical aspects that strengthen the analysis.

In order to foster the understanding of both aspects and their corresponding strategies of approaching the topic, we present the views of authors from several fields of knowledge that mention aspects of mobility in the city.

Qualitative context

In the field of sociology, as far back as the 60s, it is possible to see that Lefebvre (1968) already associated the image of the car to something that could compromise the good development of the city, which to a certain extent already defined a criticism to industrial society.

The idea that, in addition to its symbolic features, the car hinders interpersonal relations and thus the use of public space is also highlighted in the area of anthropology. The observation made by Caiafa (2007) is accurate in certifying that the public investment is focussed predominantly in favor of motorized vehicles, with the implementation of more roads and overpasses to accommodate the flow of cars, ignoring pedestrian traffic (Caiafa (2002).

The focus, however, should be on diversity, and not on prioritizing one mean of displacement to the detriment of the others. Caiafa (2007) adds the notion that the public space, when occupied by people, is transformed in a heterogeneous environment in which people mingle with strangers. The author concludes saying that “the urban experience is strongly supported in the creation of this collectively shared space of contact [...] In the streets of the city, when they are used by the public, we experience a great variety of stimuli, such as the great human diversity to which we are exposed” (Caiafa, 2007).

Together, the sociologic and anthropologic views take into account the individual and their relations to one another and with the world. Therefore, mobility plays a fundamental role in this interaction and here the car represents individualism and exclusion.

In the field of geography, Yázigi (2000) presents his contribution to understanding the city and its inhabitants, by studying the sidewalks. The author places the sidewalk in the diachronic context when interpreting the past, present and future, presented under a historic discursive character, highlighting its role of inclusion/exclusion in society.

Cardoso (2007) and Affonso (2012) explore the role played by transport in aspects of social inclusion/exclusion, and he observes that the automobile takes precedence over the pedestrian, even if their findings are not articulated to other areas of knowledge.

Under the perspective of history, Barros (2007) believes that the role of pedestrians in the city remains unaltered at all times, according to a research in which he gathers information from

history, sociology and urbanism. For the author, a person who walks experiences a variety of sensory information.

There is also a growing tendency of studying the theme from an interdisciplinary perspective, similar to what was developed by Yázigi (2000) and Gondim (2014), who unite historical aspects of the city and urban mobility, with the intention of identifying symbolic permanence of the paradigms of high and low velocity throughout time. The author concludes that the vehicles, even when non-motorized, take precedence over pedestrians in the urbis since time immemorial, and that the problems related to the conflict pedestrians/vehicles are not new as many tend to believe.

The research carried out by Steg (2005) – a classic from Psychology – deserves to be highlighted. It articulates qualitative and quantitative perspectives, and it proves through statistical data and the application of questionnaires, the power that the car exercises over people. It concludes that people do not drive only because it is necessary, but also because they love to. The symbolic and affective aspects contribute significantly for the positive use of driving and this may be one of the reasons why there is such a great resistance to the policies for reducing the use of cars.

Quantitative context

Similar to the research made by Steg (2005), there are research strategies that try to bring together qualitative and quantitative aspects, discourse and numbers. In architecture and in this research in particular, we pay special attention to the syntactic approach focused on walkability.

Initially, it is important to cite the research of Rodríguez (2007) that approaches displacement and mobility relations through the analysis of syntactic and social variables. The author highlights the priority given to the individual motorized vehicle. The findings suggest that the quality of spaces destined to pedestrians is below the expectations, which does not encourage walking.

Mehta (2008) produced an empirical and qualitative study about the relation between walking and the physical aspects of space, land use and the social features of the environment in microscale. In the study, people's behavior was measured through countings and the perception of people through questionnaires. As a result, it was possible to verify that the great majority prefer spaces with a variety of uses, the presence of shops, activities and people.

The research of Tenório (2012) is based on the premise established by Jacobs (2001), Whyte (2009) and Gehl (2010) about the morphological characteristics of the space and its impact to urban vitality. The author explores the excessive preference given to individual motorized transportation and, therefore, the little attention paid to non-motorized ones. The study used pedestrian countings and interviews as a research tools and in addition the author proposes a method to the evaluation of public space that is based on empirical verification (qualitative analysis) and does not focus on quantitative aspects.

The studies of Choi and Sayyar (2012) and Choi (2013), although considered simultaneously qualitative and quantitative, are based on data from the software of syntactic analysis. There are no relational statistical interpretations, therefore, the modeling of data is considered basic for the standards of Transport Engineering. The studies analyse the data of diversity of land use, population density, syntactic analysis and pedestrian behavior in three neighborhoods with different urban layouts. The results obtained show a strong correlation between morphological and syntactic typologies and the convergence with diversity of land use, which corroborates that the form fosters movement and, therefore, fosters the presence of attractive factors.

Wineman *et al.* (2012) explore the correlation between the characteristics of the built environment and the data for physical activities (here understood as walking with the purpose of displacement). From the results obtained, it was possible to verify that the people who live in more integrated neighborhoods report higher levels of physical activity if compared to the people who live in less integrated ones. Moreover, people who live in neighborhoods with high local connectivity report higher levels of physical activities, in contrast with people living in

low local connectivity areas. In general terms, the findings show that when a neighborhood is well connected locally and globally, they present high density with a heterogeneous mixture of land use and are associated to higher levels of localized physical activities.

The work of Ozer and Kubat (2013) aims at predicting walkability more precisely by comparing the spatial syntactic measures with the measures of environmental and pedestrian perception, in order to check their effects over the level of displacements on foot. They used pedestrian countings, spatial configuration data and questionnaires about the perception of urban environment. Later, they drafted a statical correlation between the number of people (counting) and the integration data (syntactic). The findings reinforce the potential of the data gathered from the syntactic analysis of space, because depending on the other variables, there may or may not be an encouragement to walkability.

It is thus important to highlight that the approaches mentioned above explore either the discourse in itself (discursive-qualitative context) (exception to the work of Steg, 2005) or the discourse aligned with the evaluative process, both related to the qualitative analysis. The evaluation, sometimes (when Space Syntax is used), is closer to the more quantitative interpretations, although it still lacks the soundness present in Transport Engineering.

Qualitative Context

When studying pedestrians, it is an essential condition to know the detailed aspects about the environment where the traffic flows. To this end, the qualitative works that focus on the characterization and evaluation of the environment of walking are presented.

In this topic we aim to examine works of two areas, Medicine and Transport Engineering, with focus on walkability, approaching aspects of the urban form. The first one focuses on (a) statistical data regarding diseases (obesity, diabetes, heart problems, etc), (b) daily physical activities (in the case of walking, referring to daily displacements), and (c) characteristics of the built environment (from physical aspects or urban layout to the different composition of street grids, disregarding those not related to the syntactic/morphologic aspects). The second research focuses on the aspects of the built environment (urban form), mixed uses, population density and data about mobility.

In the context of health, there seems to be continuity in the studies that try to find a pattern in walkability related to aspects of the built environment. There is a number of works that adopt different analytic strategies, such as: Owen *et al.* (2004) uses aesthetic and infrastructure aspects; Leslie *et al.* (2005) which is based on the study of neighborhood with different layouts; Frank *et al.* (2005) that furthers the discussion including the use of equipment to measure walking speed; Giles-Corti *et al.* (2006) who uses questionnaires as the main strategy; Leslie *et al.* (2007) who gathers the data about uses, street layout and socio-economic information in the SIG platform; and finally Grant *et al.* (2010) whose focus is on the elderly.

The works from researches Frank and Pivo (1994), Handy (1996a), Handy (1996b), Cervero and Kockelman (1997), Amâncio (2005), Reid and Cervero (2010) and Rodrigues (2013) seek to learn to what extent the aspects of urban form interfere in walkability. In order to do that, the methodology used varies, correlating data from transportation with socio-economic and activities, using questionnaires and countings, and incorporating data about the urban network (using or not the SIG platform). It is interesting to observe that although these researches study urban form, they do so mostly from the geometric perspective, and only in some cases include topologic aspects. Even in the case where the topologic perspective is taken into account this is done from a Cartesian perspective, and not from a systemic one.

Methodological contribution

As discussed previously, the systemic perspective applied to urban mobility leads to the research of the relations between the elements of the city, expressing a dynamic between the global and local scales.

In the global scope of this research, we aim to consider systemic thinking based on the analysis supported by two interpretations: (a) the qualitative context and (b) the quantitative context. The articulation between both would allow bringing together the dimension of architecture and transport engineering in order to understand walkability.

According to Van der Maren (1985 *apud* Lessard-Hébert, 2012) there are clear distinctions between the two perspectives, qualitative and quantitative. In the first, the processes have an speculative nature, whereas in the latter they are more experimental. Thus, it is possible to reach a broader view of walkability when we bring together perspectives from different areas of knowledge, such as those described above, which is the end goal of this research.

The understanding of this connection between qualitative/quantitative approaches is prioritized in the interpretation offered by Space Syntax, in which the research of the relations between the void and the constructed areas is of special interest, which encompasses configuration issues.

Hillier (2005) states that there is a great problem remaining in the studies of urban settlements, since the city is still thought as either a social entity or a physical one, with social scientists specially dedicated to the study of the first, and architects to the latter. What seems to be missing is the connection or a 'bridge' and he claims that "historically, the main goal of Space Syntax was to build a bridge between the human city and the physical city".

The approach, however, is usually criticized by those outside its traditional circles of application. Some critics point to the excess of quantifications (cf. Medeiros, 2013); and others they claim that those statistics are shallow, as stated by Maha (1997) and Alves (1999).

Nevertheless, Barros (2006) responds to such criticism by demonstrating that the analytic perspective of Space Syntax is useful for research about urban mobility. The author has found meaningful values (61%) in the correlation between real flow counted by electronic equipment in the streets of Brasilia and the so called integration indexes from Space Syntax).

Therefore, Space Syntax was chosen for the research, both in the local and global scopes, in order to establish a connection between the qualitative and quantitative aspects, enabling a broader analysis of the object under study: walkability in cities (Figure 1).

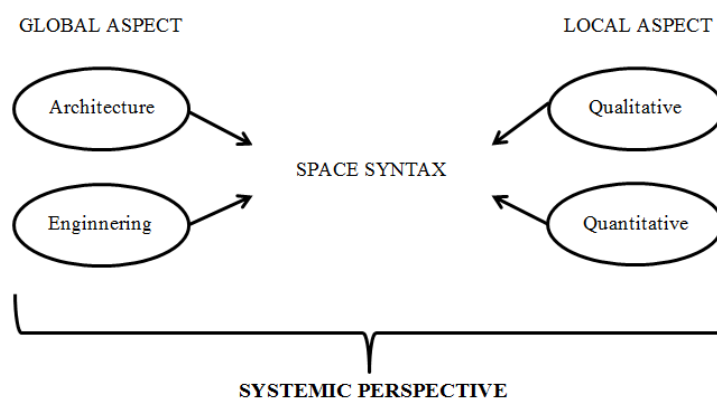


Figure 1. Relation between global vs local aspects from the standpoint of systemic thinking, portraying the role of Space Syntax.

Final Considerations

Based on the discussions presented in favor of a comprehensive analysis of the qualitative and quantitative aspects (local), it is possible to reach more detailed information about the object of study. Different perspectives about the object of study, gathered from several areas of knowledge allows a more detailed analysis, thus incorporating a broader view of a system, that is, systemic thinking.

According to what was explored in the research, by bringing together the two strategies it was possible to notice the relevance of Space Syntax, understood as a potential bridge between Architecture and Engineering.

Although there are other theories that allow this connection, in the particular case of this research – focused on urban form – this is the one that best fits the purpose, due to the configurational aspect of the theory, closely related to urban mobility and, thus, to walkability.

Therefore, it is possible to notice that this contribution to the methodology allows us to broaden our scientific horizon, by making the connection between these areas of study tighter, which can in turn contribute to the creation of policies for fostering mobility in cities.

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By São Paulo sidewalks: urban form and walkability

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Abstract. *Streets, avenues, boulevards, lanes ... innumerable are the public spaces designated to the circulations of cars and pedestrians; in fact, the opens spaces work as a system and are represented by many typologies that gave form to the city. Brazilian cities, as a rule, have being building open public spaces as if they were residual spaces of private properties. Public policies promote facilities to car owners, so pedestrian circulation was reduced to spaces with little functionality (locomotion, access conditions, shape, dimensions and other morphological attributes), that resulted in places of public life that do not guarantee the quality or safety of the users. São Paulo's mater plan has been suffering numerous amendments to promote a better mobility without the presentation of studies pertaining to pedestrian spaces sidewalks. The actions of the public authorities to the issues about urban mobility have been reduced to the deployment of public transport with a focus on buses. Issues such as quality of driveways (one-third of the trips in the city are made on foot), safety against the set of barriers (equipment, public securities and urban infrastructures) randomly distributed in space, private management (the responsibility of management of sidewalks is of the owner of the immediate area) generate the need for indicators to cooperate not only on qualification of existing spaces as well as in organizing projects guidelines to cities in expansion process.*

Key Words: urban form, urban mobility, walkability, open spaces system, landscape architecture

Introduction

This text is part of the research called planning, design and management of the the Master (professional degree) program on City Planning called Project, Production and Management of Urban Space. The master's degree enables graduates to serve areas directly linked to the world of work and future production system. Empowers and trains researchers and professionals to generate, disseminate and use scientific knowledge in their daily work.

The knowledge is collected and organized from the observation of reality that leads to reflection, analysis and review of routines and processes generating solutions to noted problems. The surveys shown are part of a research that studies urban mobility, with focus on walking journeys made in Brazilian capitals. In the text, we present the situation found on some sidewalks of the city of São Paulo.

Far more than simple pathways

Far beyond its function of making possible the movement of people between different places from urban areas, the sidewalks are places of sightseeing and "tour". From this linear space, the citizen can contemplate the open public space, the buildings that make up the landscape, the movement of people, feel the sun and the wind, and enjoy the plazas and gardens. Live the urban life.

Connected to the road network of the city, the sidewalks are conected physically to the streets. Street that play distinct functions in the circulation, transport and mobility system functions of contemporary cities.

A question arises: but how the public footpath became bound to the secondary road network route?

About the fragmentation of sidewalks and public tours: the lack of unity in the design

We assume that it is possible to qualify the level of civility of a place from the pavement morphology, maintenance, coating, location, lighting ... in other words, applied to aesthetic standards and the efficient displacement of the pedestrian into a functional city.

The sidewalks along with all the types of public open spaces accounts for up to 40% of the areas found in Brazilian cities. They are squares, parks, beaches, public gardens, streets, avenues, they are also part of the space for the citizen. In Brazil, the public space was born as a heritage of the founding of cities: either by donations, expropriation or legal obligations to the land allotment, the truth is that these spaces were born as leftovers, waste from the private sphere life.

Culturally, the way in which spaces for public life or *res publica* were created, is key to understanding the popular culture: public space is not from or to the public that attends. Therefore, it is an "unknown" whether the municipality or the owner of the establishment must ensure their construction quality and maintenance.

Despite the National Traffic Laws consider sidewalks as part of the public highway and therefore responsibilities are due to government, is up to the citizen its maintenance. This kind of "strange" culture also permeates the actions of government.

Rather than take responsibility for public space, the city of São Paulo transfers the responsibility for the construction, reform and maintenance services to homeowners and to renters who can be fined if the sidewalks do not meet Decree No. 45,904 of May 19, 2005.

The government ignores that the sidewalks integrate a system of broader circulation over the city that also incorporates streets where vehicles travel. To blame the homeowner, the city manager acts as if this system were the sum of excerpts interrupted and fragmented by steps, plants, benches and so on, without pattern coating, design and construction guides.

The quality of the public footpath is compromised and directly reflects the welfare and safety of citizens. Origin-Destination Survey taken by the São Paulo Metro in 2011 showed that 30% of the daily trips in the metropolitan region of São Paulo (which encompasses 39 counties and nearly 20 million residents) are realized on foot in approximately 23 million daily trips.

The decree defines a new architectural standard for city sidewalks. It establishes standards to ensure accessibility and the materials that can be used. It also adds that the sidewalks should be divided by service groups. They are:

1) Area destined to public services: with minimum recommended width of 0.75 m, is the closest to street "strip", for the placement of trees, access ramps for handicapped vehicles, lampposts, traffic signs, benches, planters, telephones, mailboxes and trash cans.

2) Open area strip: with a minimum width of 1.20 m, is intended exclusively for pedestrian circulation and thus should be free of any height differences.

3) Area strip of access (no width): existing only in pathways which are greater than 2 meters wide, and located right in front of the property, it can contain tables, vegetation, sunblinds, ramps or advertisement, since they do not impede access to property.

The pavement should be divided into groups differentiated by texture and / or color, according to its width:

- Sidewalks with up to 2 meters breadth: should be divided into two areas
- Sidewalks over 2 meters breadth: should be divided into three groups

What follows are some images that illustrate the situations encountered in all Brazilian cities.

Planting on sidewalks: the yard invades the street

The planting of vegetal species varying between ground covers and Flowering Trees is a cultural habit in all Brazilian houses. Fruit trees such as blueberries, mango and coffee trees are common in city streets. They are planted by citizens both, in their yards and in front of their homes. When in apartments, balconies are full of large vessels that have lemon groves, jabuticaba trees and orchards. The problem is that ordinary people plant these elements inappropriately without knowing the consequences of aggressive roots, trunks, branches and flowers can cause to the pedestrian safety and to maintenance of sidewalks.



Figure 1. Home yard and outside space planted in the same way (source: Pamela Silva, 2014).

About the widths of sidewalks: coexistence is not always possible

Since the creation of the streets was an act of donation of land or public expropriation, the movement of pedestrians and freight transport occurred spontaneously as from the absence of the state in defining a plan of action to discipline mobility. It is natural therefore that there is no hierarchy on streets, there are no appropriate width or places to for maneuvers or also not permitting a flow of pedestrians (in densely populated areas) safely.



Figure 2. Streets and narrow sidewalks (source: Pamela Silva, 2014).



Figure 3. Streets and narrow sidewalks (source: Pamela Silva, 2014).

About the differences between levels: the sidewalk as an extension of the house

To adapt the external access to domestic areas of buildings, the level difference between street, sidewalk and private property, ramps are built. Regardless of the width of the sidewalk or the height differences, instead of remedying the situation inside the property, public area is transformed into a house extension. Solved the problem of access for residents and the car in front of the house, the problem of the staircases created by ingenious solution remains to pedestrians.



Figure 4. Adequacy of public sidewalk for access of the residence (source: Pamela Silva, 2014).

Pathways: materials and finishing coats to suit all aesthetic tastes

The illustrations bellow show common situations in everyday life of the city. The use of materials for coating the pathways happen according to the aesthetic taste of the owner of the property and independent of the length of it. The maintenance, the owner's responsibility and depends on the availability of time and financial resources of the same.



Figure 5. (source: Pamela Silva 2014).



Figure 6. The sidewalk in front of a vertical condominium, although narrow to existing legislation, allows a peaceful transition without "scares" When materials are chosen and the ride is executed correctly, the maintenance is easier. (source: Pamela Silva 2014).

Urban Furniture: what is for the sidewalk?

The government also acts out of the public laws, although imposing the same law private owners. Maintenance is careless when it exists. In the research, it was found that there were about five dozen agents that intervene directly on the space of sidewalks. Among them we find companies that have a "concession" to the operation of a public service and those who have the "permission".

"Concession" means the transference to perform a public service by contract service to private owners companies for a specified period. This is a long term, beyond decades.

As "permission" means a precarious administrative act by which the Government transfers the running of public services to private owners companies. In this case, the instability is in fact that permission can be revoked at any time without the need for payment of compensation by the municipal government to that which was allowed.

The difference between both is the compensation for cancellation of public contract as well as the definition of term.

From the perspective of what has been presented in this paper, there were found in searches many inappropriate situations on dealing the public space.



Figure 7. tables, chairs, coffee and beggars. Where is sidewalk? (source: Helena Degreas, 2014).

Public facilities: fits so much?



Figure 8. Poles, newsstands, bus stops, metro access via escalators. The lack of space for pedestrian walkability leads pedestrians to use the street to walk over the city. (source: Paloma Lopes 2014).

Some thoughts on the topic: The public space can satisfy the public who goes to public space?

A comment is necessary: the definition of groups/strips of service is an excellent solution to the problem since the sidewalks of the city arose spontaneously and so alien to urban legislation. As a consequence they have no shapes, proportions, width suitable for vehicular routes system which physically connect them.

It is possible that the idealized management (generic) embedded in the legislation will solve the problem or may bear some application in order to help organize new environments created on the sidewalks?

Perhaps by analyzing each case separately the distribution, location of furniture and equipment may actually be helpful to the citizen and no longer a barrier that hinders accessibility.

There are two problems that need to be addressed by the city if the aim is to create conditions of comfort and safety to citizens:

- The width of the sidewalks in the central regions of São Paulo does not reach 1.50 m. In peripheral regions the sidewalks behave the much the lamppost. In many cases, it does not exist. Because public housing policies for centuries were not the object of interest of various municipal administrations, the city was randomly constructed and outside urban law. . This created numerous neighborhoods where urban infrastructure is precarious, public facilities for health, education, security, leisure, transportation is inadequate. As part of the infrastructure, sidewalks also suffer from the same problems.

- The different actors (licensees and concessionaires) that interfere in public space, especially on the sidewalks, are numerous. Existing legislation only refers to those who legally respond to the municipality as an example owners of bars and restaurants that want to put tables on the sidewalks, or even shopkeepers who put benches in front of the store or the citizen who intends to plant a tree in front of the his residence. Remember that agents are responsible for providing public services in different areas: municipal, state and federal. Requests for intervention in public space are also held in various "desks". The fragmentation of these departments and agencies in city is visible and materializes its interventions on the sidewalks.

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The elements of urban morphology which influence residents' leisure walking activities: case study of Shanghai

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Abstract. *With the rapid development of motorization in modern cities, urban morphology is threatened seriously which gave priority to walking transportation before. It also leads to the changes of residents' walking characteristics. Leisure activities such as stroll, fitness and walk the dog increase significantly, but the essential commuter walking activities reduce gradually. In this research, 21 neighbourhoods were taken as cases to make questionnaires survey, observation on site and multiple regression analysis. Effectively statistic model was made to seek the key variables of urban morphology which influence leisure walking activities. It was found by the research that, objective variables of urban morphology affect the frequency of leisure walking more than subjective perceptions do, while the subjective perceptions of environment affect the duration of leisure walking more than objective variables do. Six variables of urban morphology have critical influence on the frequency of leisure walking. They are penetrability of sidewalk network, mixed land use, proportion of commercial interface in the street, density of the storefronts in commercial interface, wide space with hard pavements, safe and neat community environment. In addition, residents' individuality such as societal attributes and subjective demands have intrinsic influence on choices of leisure walking activities as well.*

Key Words: *Leisure walking activity, urban morphology, built environment, neighbourhood.*

Background

In recent years, many researches have attempted to enhance the cities' livability by improving the urban forms in the field of urban design. In the field of urban planning, the ideas of low-carbon city and green travel have been proposed. In the field of transportation planning, the concept of Non-motorized Traffic (NMT) has been put forward. As to the public health field, more physical activities and exercises have been encouraged. The common intersection point of these fields advocate more walking, and promote walking activities by built environment.

Many previous studies from North America and Europe held the views that it can increase the walkability of cities by intensive construction of land use, dense sidewalk network, more commercial facilities, or other measures (Frank and Pivo, 1995; Cervero and Kockelman, 1997; Greenwald and Boarnet, 2001; Moudon et al., 2006; Alfonzo et al., 2008). But some studies got the opposite conclusion (Crane and Crepeau, 1998; Handy and Clifton, 2001). The key factors of urban morphology founded out by these researches, which focus on their respective regions, were both similar and different. Meanwhile, are these researches suitable to develop in Asian countries? Especially to the emerging Chinese cities, their population density, economic level, cultures and customs are totally different from those regions.

With the improvement of living standard, Chinese residents pay more attention to their health. Leisure walking activities which take stroll, fitness or social contact as their purpose have been increased substantially. The demands of quality and quantity of walking spaces also have been increased. But, on the other hand, in the process of rapid urbanization and motorization, the construction of Chinese cities tends to provide convenient to private cars. Such construction mode has encroached pedestrian space seriously. Many form designs of neighborhoods never take the interests of walking activities into consideration. Therefore, how is the current situation of residents' outdoor leisure walking activities? What are the residents'

main demands of pedestrian environments? What kinds of space morphology factors in the neighborhoods will influence residents' leisure walking activities? These problems all need to be pondered.

Survey

Research objects

This study tries to find out which characteristics of urban morphology will make more important influence on residents' leisure walking behaviors, by quantization the characteristics of spatial morphology of neighborhoods. Moreover, residents' personal attributes and attitudes to walking will be also taken into consideration as influencing factors.

Urban Morphological Variables:

- i) Characteristics of spatial forms: including 6 aspects, they are neighborhood attribute, spatial texture, land use, public transit service, walking facility, interfacial morphology.
- ii) Satisfaction of subjective environment: refers to the individual perception and evaluation of the pedestrian environment, including 7 aspects, they are satisfaction of whole environment, satisfaction of accessibility of public transit, satisfaction of accessibility of commercial services, satisfaction of convenience of road network, satisfaction of traffic safety, satisfaction of security and satisfaction of quality.

Residents' Leisure Walk Behaviors - outdoor leisure activities, that residents make walking as their purpose, are calculated by two ways, frequency and duration:

- i) Walking frequency refers to the times of residents' leisure walking weekly.
- ii) Walking duration refers to the amount of residents' daily leisure walking.

Selected cases

Shanghai is one of the biggest cities in China, which has the highest population density and fastest pace of economic development. This study selected 21 neighborhoods in central urban area of Shanghai as cases. Each neighborhood is about 0.5 to 1 km². They are the units which can take 8-minutes' walking distance as their radius. And there is at least one subway station in or near the units. Make the main roads or river system as their boundary. According to the times of construction and characteristics of spatial morphology, they can be divided into 5 types (Figure 1): 1) historical neighborhood; 2) workers' village; 3) old neighborhood; 4) new neighborhood; 5) international neighborhood.

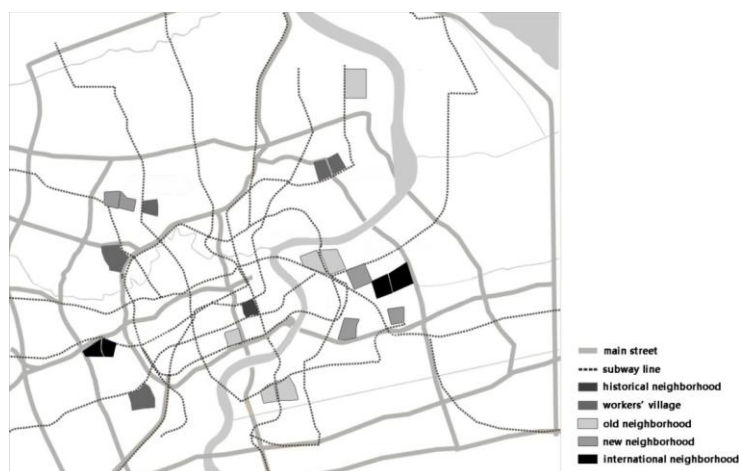


Figure 1 Distribution map of cases of neighborhoods.

Summary

During the period from December 2011 to June 2012, questionnaires were sent to those 21 neighborhoods and took back. The content involves the residents' social attributes, characteristics of outdoor walking, satisfactions about the pedestrian Environments, etc. The quantity of questionnaires for each neighborhood was determined on the basis of its population. Community service workers selected the households and made the survey at random. Totally, 3820 questionnaires were sent and 2940 questionnaires were taken back. After the evaluation of integrity and authenticity of each one, 2863 questionnaires were selected as the last samples. The rate of the useful questionnaires is 74.9%.

The results of the survey show that the average level of residents' daily leisure walking is 28 minutes. Furthermore, 41% of the residents have their daily leisure walk more than 30 minutes averagely. But, there are still 10.9% of the residents whose daily leisure walking time is almost zero. From the view of personal attributes (Figure 2): The older the resident is, the more he/she spent on leisure walking, especially for those who are tired. The aged over 70 is the group which has the most leisure walking activities. Their average level was 37 minutes. Primary and middle school students under the age of 19 is the group which has the least leisure walking activities. Their average level was 18 minutes. From the view of types of neighborhoods, average level of leisure walking is around 30 minutes in all kinds of neighborhoods. The residents in international neighborhood have the longest walking (29.6minutes), while the proportion of the residents who almost never have daily leisure walk in the workers' villages and the old neighborhoods, where blue-collar workers occupy the majority population, is highest (13%).

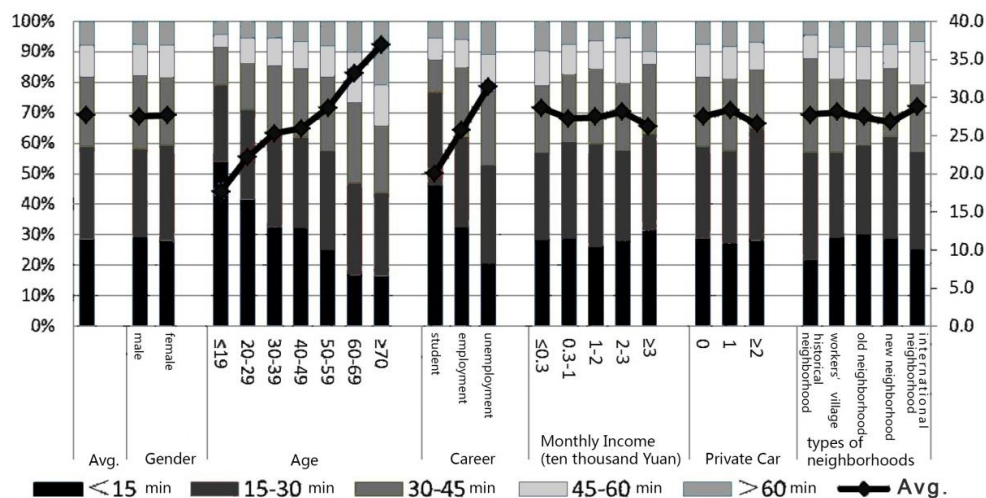


Figure 2. Leisure walking duration of different social groups.

Analysis and results

Correlation Analysis

Pearson linear correlation analyses on the data of residents' leisure walking, satisfactions of pedestrian Environment and the spatial morphology were made by SPSS statistical software to find out the variables which are related to leisure walking.

i) Residents' Satisfactions of Pedestrian Environment

Table 1 shows that the residents' satisfactions of pedestrian environment have more influence on their duration of leisure walking than on the frequency. Satisfaction of whole environment (0.079) correlates with residents' leisure walking duration most. And then, satisfaction of accessibility of public transit (0.062), satisfaction of accessibility of commercial services (0.060), satisfaction of convenience of road network (0.058). Satisfaction of traffic safety and Satisfaction of quality are the least two variables.

It can be inferred from the data that: i) residents' satisfaction of pedestrian environment will influence the duration of their outdoor leisure walking. The more they are satisfied with environment, the more they will walk; ii) satisfaction of traffic safety and satisfaction of quality have a lower correlation with walking duration than other satisfaction indexes. It shows that residents' recognitions to the traffic safety and quality of current pedestrian environment are lower than other indexes. Such situation reveals the common problems existing in neighborhoods from another aspect.

Table 1. Correlation test between 'satisfaction of walking environment' and 'leisure walking activities'

Pearson Correlation		Satisfaction						
		Whole Environment	Accessibility of Public Transit	Accessibility of Commercial Services	Convenience of Road Network	Traffic Safety	Security	Quality
Walking Frequency	Avg.							
	Historical Neighborhood							
	Workers' Village							
	Old Neighborhood							
	New Neighborhood		.091*			.117**		
	International Neighborhood							
Walking Duration	Avg.	.079**	.062**	.060**	.058**	.046*		.045*
	Historical Neighborhood							
	Workers' Village	.082*		.078*				
	Old Neighborhood	.116**				.080*	.075*	
	New Neighborhood	.117**	.141**	.078*	.102**	.091*		
	International Neighborhood				.102*			

* $P < 0.05$, ** $P < 0.01$

ii) Variables of Spatial Morphology of Neighborhoods

Table 2 shows the effect that spatial morphology of neighborhoods on residents' leisure walking frequency is greater than it on residents' leisure walking duration. All the factors of urban morphology are highly related to walking frequency except public transit service.

Table 2. Correlation test between ‘space morphology variables of neighborhood’ and ‘leisure walking activities’

Spatial Morphology Variables		Walking Frequency	Walking Duration
Neighborhood's Attributes	Land Area		
	Population Density	.131**	
Spatial Texture	Average Block Length		
	Density of Intersections		
	Section-Node-Ratio	.046*	
	Density of Neighborhood's Entrances		
Land Use	Density of Centralized Commercials		
	Density of Commercial Interfaces	.050*	
	Density of Commercial Interfaces ≥ 15 Stores (Per 100m)	.083**	
	Proportion of Commercial Interfaces ≥ 15 Stores (Per 100m)	.119**	
	Proportion of Commercial Interfaces < 5 Stores (Per 100m)	-.131**	
	Density of Educational Facilities		
	Density of Medical Facilities		
	Density of Cultural Facilities		
	Density of Office Buildings		
	Density of Community Service Facilities		
Public Transit Service	Density of Public Green Areas	-.056**	-.054**
	Complex Degree of Functions (Entropy)	.085**	
	Density of Bus Stops		
Walking Facility	Density of Bus Routes		
	Density of Subway Stations		
	Density of Walkable Area		
	Density of Walkable Length		
	Average Width of The Sidewalks		
Interfacial Morphology	Proportion of Sidewalks ≥ 10 Meters Width	.071**	.041*
	Proportion of Sidewalks < 3 Meters Width		
	Interfacial Density of Houses' Entrances	.048*	
	Density of Houses' Entrances		
	Density of Parks' Entrances	.066**	
	Interfacial Density of Buildings	.064**	
	Interfacial Density of Penetrable (Green) Interfaces	-.066**	
	Interfacial Density of Closed Interfaces		

* $P < 0.05$; ** $P < 0.01$

It can be inferred that: i) objective spatial forms of neighborhoods are more likely to affect residents' choice of leisure walking. But it is very difficult to influence the length of time that residents spent on their daily leisure walking. Walking duration may be more influenced by individual subjective perception of the environmental quality; 2) the atmosphere of commercial vitality in the street is the most important factor which can attract leisure walking. The longer and denser interfaces of the stores are, the more abundant commercial vitality and social activities of the neighborhoods will be. And the attraction to the residents to make daily leisure

activities will also be stronger. Penetrable (green) interface and closed interface which contain no commercial element cannot attract residents' leisure activities; 3) high population density mode and mixed land use are useful to make the spaces of neighborhoods compact and diversified. Thus, it will promote different social groups using the spaces and having activities. Mixed land use also means diversity of urban space. Hence, a neighborhood is no longer a simple combination of many buildings. It will show the complexity of spaces and activities. And that would attract residents' leisure activities; 4) wide space with pavement of hard material can attract leisure walking more than public green. Those sidewalks above 10 meters width can accommodate street fitness, dance and other community activities. And they also can provide outdoor seating of café and other leisure facilities. Such things will benefit for residents to make their leisure walking. However, the higher the density of public green in neighborhood, the lower frequency and duration of leisure walking residents would have. Probably, it is because the designs of many green parks paid attention to the visual image and green coverage rate only, and didn't provide sufficient places and facilities for walking activities. So, there is still a gap between the reality and the residents' demands of the leisure; 5) penetrability of sidewalk network in neighborhood can facilitate walking leisure activities. Section-node -ratio of roads reflects the penetrability of road network in neighborhood. The density of residential areas' entrances and the density of parks' entrances reflect the penetrability between inside and outside of a closed area (Park). The higher the density is, the stronger the penetrability of a neighborhood's space is. The sidewalk network in a neighborhood with strong penetrability can provide residents more choices of routes, increase diversity and complexity when experiencing the walking environment, and provide more chances for neighbors to encounter, stay and exchange as well.

Regression analysis of model

The correlation analysis merely explains the relationship between two variables. Regression equation is needed to carry on further analysis. It is helpful for quantitative study on the effect what multiple independent variables (X) influence on dependent variable (Y). It can be found by the previous correlation analyses that leisure walking frequency is influenced more by spatial morphology factors of neighborhoods. Therefore, in the multiple logistic regression analysis, walking frequency is taken as the dependent variable (Y) to be calculated.

Basic Model I

The multiple logistic regression analysis was made by taking residents' leisure walking frequency as dependent variable and taking residents' personal attributes variables as independent variable. Took the frequency = 0 time per week as a reference target, and got the Basic Model I. The Pseudo R Square (Cox and Snell) = 0.394, that means the model is valid.

Basic Model is:

$$\text{LN}(P_i/P_0) = \beta_i + \beta_{ig1}X_{g2} + \beta_{ig2}X_{g3} + \beta_{ig3}X_{g4} + \beta_{ig4}X_{g5} + \beta_{ig5}X_{g6}$$

(X_{g2} —Age; X_{g3} —Career; X_{g4} —Education; X_{g5} —Number of family members; X_{g6} —Monthly income; “i” means walking frequency per week; In 6 sub-models, “i” respectively equals to 1,2,3,4,5,6)

In order to study the level that different personal attributes influence on leisure walking, the changes of numerical value of Pseudo R Square should be observed by removing the variables which were retained by regression from Basic Model I one by one. The Pseudo R Square reflects the fitting degree of the whole model. So, if the change of numerical value of Pseudo R Square is big when removing a variable, it means this variable is significant to model fitting. The calculation results are shown in Table 3.

It can be inferred that: i) age is the key variable of personal attributes affecting residents' leisure walking frequency. And the significance of age presents a raising effect with increasing frequency; ii) the higher the monthly income of one's family, the less the possibility of all frequencies he/she choose to have leisure walking. The possibility is that people with high salary have more ways of leisure, and they don't need to always choose leisure walking activities; 3) those who are retired or don't work are more likely to choose the high frequency of leisure walking than students or office workers. The mainly reason is that they have more free time.

Table 3. Selection of the Personal Attribute Variables

Personal Attribute	Contribution of Pseudo R Square	Significance Level of Likelihood Ratio Test	B Value (When the Significance Level of Sig<0.1)					
			Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age	.110	.000		.567**	.877**	1.210**	1.803**	2.641**
Number of Family Members	.016	.033	.238*	.287**				
Education	.007	.035	.302**	.344**	.367**			
Monthly Income	.004	.000	-.651**	-.305**	-.266**	-.292**	-.368**	-.311**
Career	.003	.016					.373**	.443**

* 0.05<Sig<0.1; ** Sig<0.05

Model II

Leisure walking activities is an act of strong subjective consciousness. Residents' attitudes to walking and perceptions of environments may have significant influence on choices for leisure walking. Hence, added these variables to Basic Model I and selected the new added variables by logistic regression automatically. Finally got the Basic Model II, and its value of Pseudo R Square (Cox and Snell increased from 0.394 to 0.421). Fitting effect of model is better.

It can be inferred from the contribution of Pseudo R Square (Table 4) that "Close to nature and have relaxation" is the key variable of subjective perception affecting residents' leisure walking frequency. In a big city where the pace of life is fast, when residents realize that walking can promote physical and mental health, they would tend to make more leisure walking activities. The pedestrian environment that is clean, comfortable, spacious and safe will promote residents' choice of leisure walking activities of high frequency. Then walking may become a daily habit.

Model III

The spatial morphology variables, which were selected by correlation analysis according to the rule of P value < 0.05 with leisure walking frequency, were put into Basic Model II respectively. Influential degree of a morphology variable was ascertained by observing the change of Pseudo R Square after adding it into Basic Model II. And its effect to residents with different frequency of leisure walking was analyzed by its model parameter value (B) and significant value (Sig.) in 6 sub-models. The calculation results are shown in Table 5. Key

variables of spatial morphology are: proportion of sidewalks ≥ 10 meters width, complex degree of function (entropy), density of parks' entrances, proportion of commercial interfaces < 5 stores (per 100m), section-node ratio, proportion of commercial interfaces ≥ 15 stores (per 100m).

Table 4. Selection of Walking Attitude Variables and Perception Variables of Pedestrian Environment

Attitude and Perception Variables	Contribution of Pseudo R Square	Significance Level of Likelihood Ratio Test	B Value (When the Significance Level of Sig < 0.1)					
			Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Close to Nature and Have Relaxation	.012	.000	.671**	.721**	.921**	.839**	.834**	1.382**
Dirty and Disorderly Environment Making Walking Uncomfortable	.006	.002			.392*	.829**	.638**	.479*
Spacious Walking Space	.004	.048			.693**	.515	.860**	.897**
Satisfaction of Security	.004	.069				.500**	.502**	.575**
Be Beneficial to Physical Health	.003	.271				.531*	.426	.750**

* $0.05 < \text{Sig} < 0.1$; ** $\text{Sig} < 0.05$

It can be inferred that: i) under the influence both of personal attributes and perception variable, “proportion of sidewalk > 10 meters width” is the key spatial morphology that influence residents' leisure walking frequency. Spacious walking places (such as small squares in corners of streets, small gardens and the spaces formed by the backward parts of buildings) can accommodate the walking activities that keep pedestrians staying. Provide spacious places for residents' near there to having their outdoor leisure activities, such as chatting, dancing, doing exercise, sitting at leisure, having tea, playing chess and playing cards. Gradually, such places become the conventional sites with function of social contact in community. And that would attract people promenading there to meet each other; 2) complex degree of function in land use and commercial interfaces with high density of small stores are useful to induce residents to choose walking leisure activities in medium or high frequency. It undoubtedly verified the results of previous correlation analyses. Mixed land use can not only promote efficient and intensive use of land in a city and be helpful to realize the accessibility of walking activities in a short distance, but also create diversity and continuity of the interfaces along the streets. Dynamic and interesting interfaces of streets make pedestrian feel safe and pleasure both in visual and psychological experience. And then leisure walking activities would be promoted; 3) the penetrability of sidewalk networks in neighborhoods will also have an impact on the residents' leisure walking activities. Sidewalk networks with good connectivity increase the number of routes, offer more choices of walking routes for residents, and rich the experiences of leisure walking activities in sites. Parks are important leisure sites in neighborhood. Increasing entrances of parks can effectively improve their accessibility. It would be convenient for

residents to use and have a strong influence on attracting leisure activities with high frequency especially.

Table 5. Selection of Spatial Morphology Variables in Neighborhoods

Spatial Morphology Variables	Types	Contribution of Pseudo R Square	Significance Level of Likelihood Ratio Test	B Value (When the Significance Level of Sig < 0.1)					
				Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Proportion of Sidewalk > 10 Meters Width (%)	Walking Facility	.006	.003				.321**	.312**	.258*
Complex Degree of Functions (Entropy)	Land Use	.005	.007	.312**	.353**	.271**	.400**	.393**	.364**
Density of Parks' Entrances (per km ²)	Walking Facility	.005	.015	.357**	.447**	.387**		.420**	.407**
Proportion of Commercial Interfaces < 5 Stores (Per 100m) (%)	Land Use	.005	.019	-.303**	-.232**	-.247**	-.299**	-.397**	-.433**
Section-Node -Ratio	Spatial Texture	.004	.040			.286**	.337**	.362**	.320**
Proportion of Commercial Interfaces ≥ 15 Stores (Per 100m) (%)	Land Use	.001	.773						.237*

* 0.05 < Sig < 0.1; ** Sig < 0.05

Conclusion

Objective spatial morphology variables of neighborhoods mainly influence residents' leisure walking frequency, but have little effect on the duration. Subjective satisfactions of pedestrian environments, which are subjective evaluation formed by individual cognition to the spatial morphology, have little effect on residents' leisure walking frequency, but evidently on the duration. Frequency indicates the times of leisure walking trips, while duration indicates the quality of leisure walking activities. Therefore, improving objective environment can encourage residents to make more choices for leisure walking, while increasing the degree of subjective satisfactions of walking environments can extend the duration of walking activity.

In order to promote more residents' leisure walking, designs of spatial morphology of neighborhoods should focus on the following aspects: enhancing penetrability of sidewalk networks; improving mixed functions of land use; increasing the density of commercial interfaces along the streets; offering spacious sites paved with hard materials; optimizing designs of public greens; creating a safe and clean atmosphere of the community. In addition, the personal attributes and the subjective demands of residents will also affect whether they choose leisure walking or not. For example, the thoughts of closing to nature, having relaxation and being beneficial to physical health will promote the occurrences of leisure walking activities. That means the construction of neighborhoods' morphology should pay attention to the layout and design of natural ecology and fitness facilities of pedestrian environments.

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Comparative studies of urban form

There is a long tradition of comparative studies of urban form. In the early years of development of urban morphology as a field of knowledge, German-speaking researchers in particular were active in making both inter- and intra-urban comparisons of the physical forms of cities. Indeed comparisons over time became inherent in the concept of the morphological period, which has figured explicitly or implicitly in much morphogenetic research. In a twenty-first century environment in which the scope for international research has become so much greater, a wider compass of comparisons of many types has become increasingly realistic. Perhaps most obvious is the opportunity for cross-cultural comparisons. However, the success of both these and more local comparative studies will relate importantly to progress in research, including comparative research, relating to concepts, theories, methods and different disciplinary perspectives. In these respects the scope for shedding fresh light on urban form by comparative studies is great indeed. This is not to argue that research on individual cities and parts of cities should become of lesser importance. The key point is to ensure that research at whatever geographical scale is placed within a comparative framework. As perceptive researchers were aware long ago, research is not just about particular places. It is about the light that work on a particular place can shed on places more generally, and vice versa. To achieve this, other needs must be addressed: not least it is important to work more actively towards common definitions of the terms being employed. This is a major challenge in a field characterized by a wide range of perspectives, including those emanating from different disciplines and language areas. However, we should take strength from the fact that it was particularly to meet this challenge that ISUF was formed!

J. W. R. Whitehand

Urban Transformation in Meeting Places: The Cases of Bursa & Yazd'

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Abstract. *In the 19th century, due to modernization programs, historical cities faced powerful socio-spatial transformations. While the traditional urban structure of historical cities, which was the outcome of an incremental growth, was created over centuries, the new urban pattern system was imposed on historical urban fabrics and led to some serious damages on the body of historic urban fabrics all over the world. Islamic cities underwent the same type of modifications, as well. For example, in the city of Yazd (an Islamic Iranian city), the grid urban pattern was imposed on the organic structure which not only affected the physical form of this historic city, but also caused many social and economic changes within the traditional life of people.*

This research uses space syntax as a tool for investigating what modernization meant for Islamic cities; how the modern changes affected the traditional urban pattern especially the structure of meeting places and to find why it was necessary to preserve the old structure of historical cores in Islamic cities.

Key Words: *Islamic Cities, Urban Transformation, Space Syntax, Yazd, Bursa*

Introduction

From the past to the present, the cities in the world have faced different changes and transformations. Due to urban modernization programs, many historical fabrics of traditional cities were seriously demolished to create new open spaces for new roads and constructions. In the Middle East, the industrial and urban modernization of the Islamic cities date back to the 19th century which changed the morphological, social, and physical characteristics of The Middle Eastern Islamic cities after a short rapid growth period of urban modernization in Europe. This paper attempts to investigate what modernization meant for Islamic cities by using space syntax as a tool. The main focus of this study is to present the impact of urban modernization on the structure of meeting places in Islamic cities through an analytical investigation of the urban structure before urban modernization and at the present time. Although there are other studies, such as “Urban conservation and spatial transformations preserving the fragments or maintaining the spatial spirit” by Kayvan Karimi and “The morphological characteristics of Anatolian fortified towns” by Ayse Sema Kubat, that investigated the effect of urban change on the historic core through using space syntax tool, this research takes a unique approach to find the effect of urban modernization on the structure of meeting places in two Islamic cities being Bursa and Yazd in two different countries, Turkey and Iran, respectively.

Urban Form in Islamic Countries

A traditional (pre-industrial) Islamic city according to orientalist generally includes the following characteristics: a medieval citadel or fort, a nearby central market (bazaar) and one or more public baths (hammam) clustered around a Friday mosque, a religious school (madrasa) and caravanserai, a narrow irregular street pattern, ethnic quarters, houses with courtyard, medieval walls and gates, and a complete lack of open civic space other than the Friday mosque courtyard (Abu-Lughod 1993; Bianca 2000). In Islamic urban model "Islam" was considered an

"urban" religion, to make people live together in communities. Streets were not designed in purpose as in American and European cities, after the mid-nineteenth century, but were composed of leftover space after houses were built.

Belkacem (1982) emphasizes the importance of the enclosure of space in Islamic civilization as a symbol of the relationship between body and soul. In Islamic urban pattern public space was also enclosed if possible. These public spaces could include covered markets, caravanserais, madrasa, and mosque courtyards (Abu-Lughod 1993).

Physical Dimensions of City of Bursa, from Past to Present

The city of Bursa is located in the Northern western region of Anatolia in Turkey. It is believed that Bursa was found by Prusias in about 150 B.C. (I.Orbay, 1983). In 1326 Bursa was taken from Byzantines, and became part of the Ottoman Empire, and Ottomans started to Islamize the environment of the city for example, Byzantine church was changed to a mosque. The first core of the city of Bursa was surrounded by a fortress and Bursa was a fortified town (figure 1), after a period of strengthening, the city of Bursa started to extend out of the fortified core. The Orhan Gazi Mosque, a public bath (Hemmam), and a commercial complex (bazaar and han), were built to the east of the fortress (T.J. Heng, 1985). The development of the city continued on an area on the outside of the fortress.

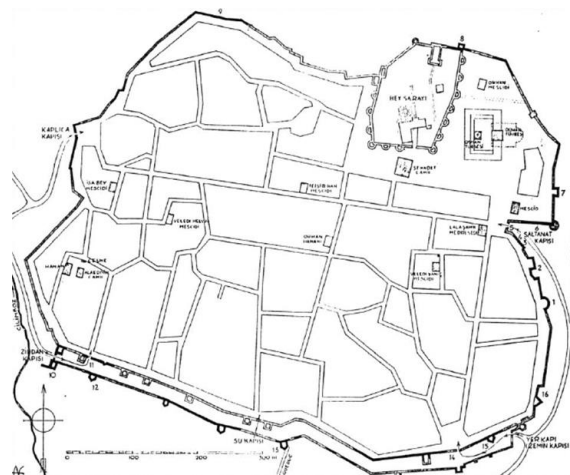


Figure 1. Plan of Hisar (Heng 1985).

New commercial buildings were built, such as bedesten, arasta bridge, bazaars, open market places and stores. In the Islamic city of Bursa the commercial square of the city was its focal point and like other Islamic cities the residential quarters (Mahalla) were located around it. These residential quarters were connected to the heart of the city (Commercial Square) by urban access roads (Figure 2).

In the 19th century, the industrial revolution in Europe had a critical impact on Bursa, and industrialization and westernization program was started by the Ottoman Empire to adjust city of Bursa to the West. After deterioration of the Ottoman Empire, new urban modernization projects were started. During these new urban modernization constructions, historic core of the city (commercial square) were surrounded by new wider streets such as: Atatürk Street on the South, İnönü Street on the East, and Cumhuriyet Street on the North, Figure 3 shows the roads at the end of the 19th century and at the beginning of the 20th. So, after new urban constructions the commercial area which was occupying a large area of the city in the 16th century was limited with mentioned streets. New wide roads were created to provide suitable traffic, but had caused demolition of many historical monuments.

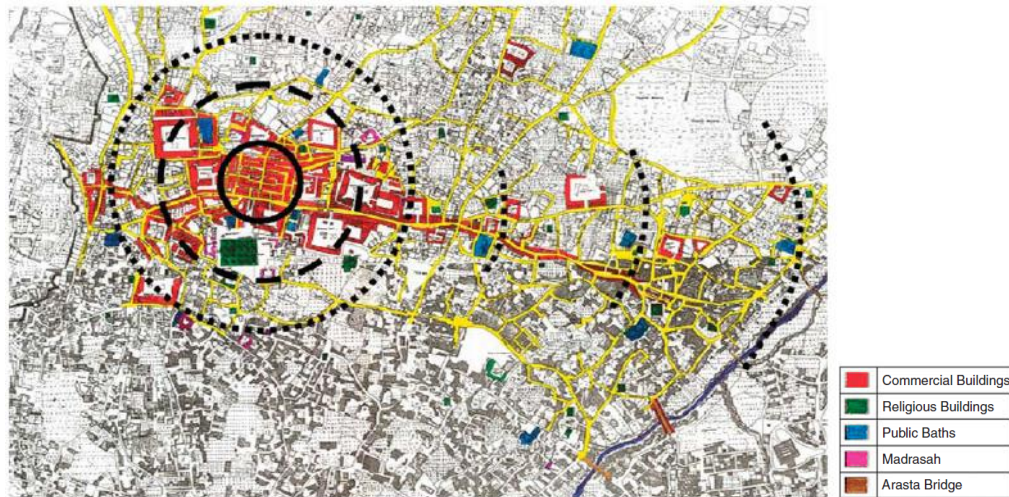


Figure 2. The historical evolution of commercial buildings in the Khans region at the end of the 16th century (Baghanci, 2010).

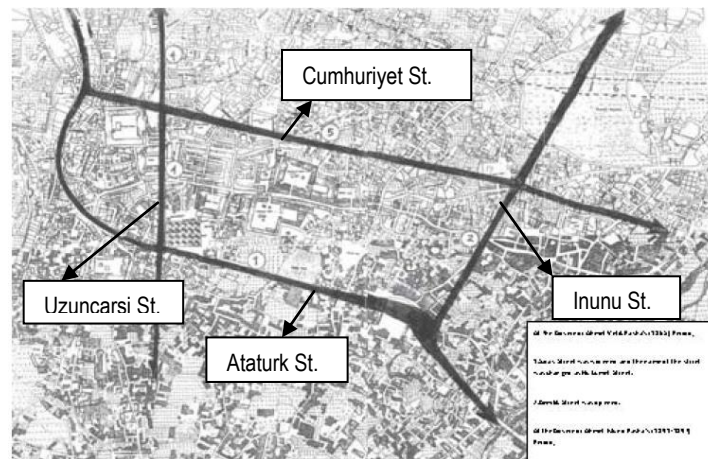


Figure 3. The roads at the end of the 19th century and at the beginning of the 20th century (Baghanci, 2010).

Physical Dimensions of the City of Yazd, from Past to Present

The city of Yazd is located in the center of Iran surrounded by two major deserts, Dasht-e-Kavir and Kavir-e-Loot. The walled city of Yazd developed in different stages from pre- Islamic era till the 14th century. In pre- Islamic era the urban pattern of the city of Yazd was the same as other Persian cities at that time, however, after the Islamization of Iran, the urban pattern of the city changed to organic urban form with the main elements of an Islamic city such as: bazaar, Friday mosque, public bath, religious school and several residential neighborhoods. In the beginning of the 15th century an urban complex consisted of a bazaar, a Friday mosque and a water reservoir was built around the city square which was located at the extreme South-East of the city. This new addition was called Amirchaqmaq Square (Afshar, 1995). The old city center, which was around the old Friday mosque (Masjid-I-Jame) was gradually merged with this square. The bazaar of the city also extended from the old Friday mosque to Amirchaqmaq square as a good link between the old city center and the new one. In 1790; in the south-West of the walled city another square surrounded by commercial and public activities was built and called "Shahtahmasb" square. Shahtahmasb square was well connected to the Amirchaqmaq

square by an axial road full of commercial functions. In the 19th century, another new complex consisting of religious school, mosque, public bath, water reservoirs was built in the middle of a commercial route between Amirchaqmaq and Shahtahmasb squares and was called "Khan" square-khan square later- became the most important city center for commercial activities (Figure 4).

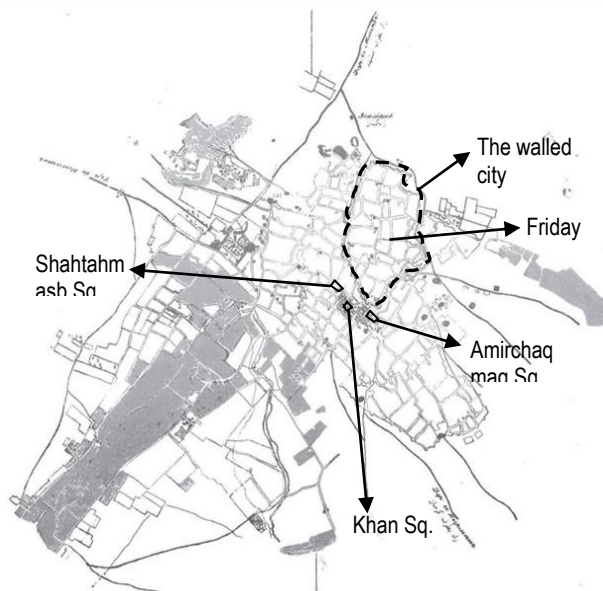


Figure 4. The city of Yazd in 1859 (Afshar, 1995).

The first and the most significant urban modernization activity was done by the order and decision of Reza Shah (1925-1941) to drive a major network of long, wide and straight streets as could be seen in most other Iranian cities (Wilber, 1981). Due to urban modernization constructions the heart of the old city of Yazd was demolished. The construction of Ghiam and Imam (Shah and Pahlavi) streets was the first sign of urban modernization and significant change in the old city of Yazd. The bazaar was divided into two parts by Ghiam Street (Figure 5).

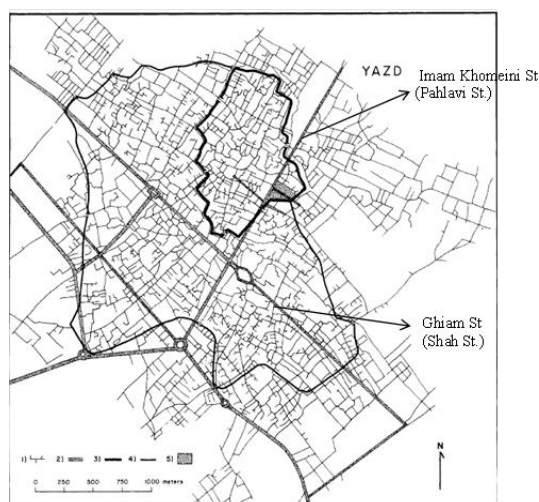


Figure 5. The first sign of urban modernization by construction of Pahlavi and Shah Streets (Afshar, 1995).

Methodology

In order to do a morphological analysis of the selected cities, a mathematical model, called space syntax technique, was applied. Space syntax was developed by Hillier and Hanson at the Department of Architectural Studies, University College of London (Hanson 1989; Hillier 1989, Hillier & Hanson 1984; Hillier et al 1983; 1992; 1993). "Space syntax is also one of the few theories which allow us to understand how culture and society are embedded in the specific relational patterns constituting architecture and urban design. The aim of the technique is to describe different aspects of relationships between the morphological structure of human-made environments and social structures and events. It is possible to give quantitative descriptions of built spaces. This methodology contributes greatly to understanding of the physical structure of the cases in this study" (Kubat, 1997). As this paper is not submitted to any Space syntax symposium, a number of analytical and technical ideas used in the paper are defined here in order to help readers.

Axial map: "The axial map is the basis of settlement layout analysis. This represents the distance up to which an observer can have an uninterrupted impression of visibility and permeability as he move about the town and look in various directions. The map is derived by drawing the fewest and the longest lines of uninterrupted permeability necessary to cover the public open space of an area. The size of a settlement system is measured in terms of the number of lines." (D. Dhima, 2006).

Connectivity: "Measure the number of the immediate neighbors that are directly connected to the spaces. In axial map connectivity of an axial line is measured by the number of lines that are directly intersecting that line" (D. Dhima, 2006).

Integration: "Integration measures how many turns one has to make from a street segment to reach all other street segments in the network, using shortest paths. If the amount of turns required for reaching all segments in the graph is analyzed, then the analysis is said to measure integration at radius 'n'. The first intersecting segment requires only one turn, the second two turns and so on. The street segments that require the least amount of turns to reach all other streets are called 'most integrate' and are usually represented by hotter colors, such as red or yellow. Integration can also be analyzed in local scale, instead of the scale of the whole network. In case of radius 4, for instance, only four turns are counted departing from each street segment. Theoretically, the integration measure shows the cognitive complexity of reaching a street, and is often argued to 'predict' the pedestrian use of a street"(D. Dhima, 2006).

Intelligibility: Hillier (1988, 1996) defined intelligibility as "the degree to which what can be seen and experienced locally in the system allows the large-scale system to be learnt without conscious effort" (Hillier, 1996, p. 215). In practice, the intelligibility value is calculated by the degree of linear correlation between connectivity and the global integration value (Hillier and Hanson, 1984).

Syntactic configurational measurements

To start the syntactic analysis of the spatial configuration, it is imperative to draw axial maps first. Then, this axial map (in DXF format) should be imported into a Depth Map software to produce a visibility graph which shows the value of Integration by ranging from red (or black) for the most integrated lines to blue (or light gray) for the most segregated ones. By the use of this map, the researchers were able to find the value of global integration and connectivity and the correlation between these values results in value of intelligibility.

Data collection and analysis

In this part, Syntactic Configurational Measurements of Bursa and Yazd will be presented, respectively. The results obtained from the gathered data will also be analyzed.

Syntactic Configurational Measurements of the City of Bursa

To start the space syntax analysis on the city core of Bursa before and after urban modernization constructions, the axial line of the city core in both conditions were drawn and imported to Depth map software in the context of connectivity (See Figure 6).

Figure 6 shows the connectivity map of the old city of Bursa in 1860 (top) and in the present time (bottom), red color lines indicating the highest value of connectivity and the blue featuring the least one. As it is clear from the connectivity map of Bursa in 1860, the most connected lines on the map are the route of bazaar which is called "Uzun Carsi" street at the present time. The axial line of this street is shown by o-Max on the map and its connectivity value is 9. It is obvious that the points with high value of connectivity are located in the center of the area and lines with low value of connectivity are located on the borders of the study area. According to the connectivity map of Bursa in present time, the maximum connectivity value is 24 at the point marked by n-Max, which is located on "Cumhuriyet" Street, one of the most important streets that surrounds the historic core.

Table 1 shows the key connectivity values of the city of Bursa in 1860 and the present time. According to this table, due to new road constructions, the mean connectivity value in the city of Bursa increased from 2.98 to 3.45 and as it was mentioned earlier, in 1860 "Uzun Carsi" street had the most connectivity value (Value of 9); however, in the present time "Cumhuriyet" Street has the most value of mean connectivity (value of 24).



Figure 6. The connectivity map of the city of Bursa in 1860 (top) and in present time (bottom).

Table 1: The Key Connectivity Values of the City Of Bursa in 1860 and Present Time

Connectivity	Value	
	Old Bursa	New Bursa
Average	2.98	3.45
Minimum	1	1
Maximum	9	24
Number of counts	461	1731

Figure 7 shows the global integration map of the city of Bursa in 1860 and in the present time. Red color lines indicate the highest value of integration (R_n) and the blue lines refer to the least value. Accordingly, in the old city of Bursa bazaar route has the most value of integration (0.95) marked as i-Max and the lowest integrated part is shown by i-Min which has 0.35 value of integration located far from the city core on the border.

In reference to global integration map of Bursa in the present time, the highest integration value marked as d-Max with a value of 1.13 is located on the "Ulu Cami" street which passes through the historic core of the city. The lowest integrated part is shown by d-Min which has 0.29 integration value and is located far from the city core on the border. So, even after urban modernization process, the most integrated part of the city is the center and around the historic core of the city. It is noteworthy that the integrated core of the old city of Bursa has been preserved after urban modernization constructions.



Figure 7. Comparison between axial line maps (integration R_n) of historical city of Bursa in 1860 (top) and at present time (bottom).

In the next step the value of intelligibility (the value of correlation between mean global Integration and mean connectivity value) for city of Bursa before and after urban modernization constructions; is calculated. According to this calculation the value of intelligibility has been decreased from 0.29 to 0.10 after urban modernization and urban growth. This reduction explains that the sense of legibility and way finding dropped after urban modernization in city core of Bursa.

In order to find the impact of urban modernization and urban growth on the structure of meeting places in the historic core of the city, the average of integration values of each type of meeting places in the city of Bursa in both conditions were measured (by measuring the average of global integration of all the entrances of each building). Table 2 shows that the hierarchy orders of mean value of global integration of historic meeting places in the city of Bursa is not disrupted after urban modernization transformation.

Table 2. Comparison between the Hierarchy of Integration Value of Meeting Places in the City of Bursa in 1860 and in Present Time.

Meeting space	Value of Integration Rn	
	Old Bursa	New Bursa
Bazaar	0.87	0.99
Mosque	0.85	0.95
Public bath	0.77	0.94
Religious school	0.76	0.92

Syntactic Configurational Measurements of the City of Yazd

Having analyzed Syntactic Configurational Measurements of the City of Bursa, the researchers repeated the same process with the second city of the study, Yazd. To start the space syntax analysis on the city core of Yazd before and after urban modernization constructions, the axial line of the city core in the two conditions were drawn and imported to Depth map software in the context of connectivity. Figure 8 shows the connectivity map of the old city of Yazd in 1928 (top) and in the present time (bottom), red color lines indicating the highest value of connectivity and the blue showing the least value. As it is clear from the connectivity map of Yazd in 1928, the most connected lines on the map are located on the rout of bazaar near the "Khan square."

The axial line of this street is shown by h-Max on the map and its connectivity value is 10. According to the connectivity map of Yazd in present time, the maximum connectivity value is 29 at the point marked by i-Max, located on "Imam Khomeini" Street which is one of the first streets constructed in 1928.

Table 3 shows the key connectivity values of the city of Yazd in 1928 and in present time. According to this Table, the mean connectivity value in the city of Yazd increased from 2.62 to 2.69 by urban modernization constructions and the most connectivity value (29) belongs to "Imam khomeini" street (at present time).

Table 3. Key connectivity values of the city of Yazd in 1928 and at present.

Connectivity	Value	
	Old Yazd	New Yazd
Average	2.62	2.69
Minimum	1	1
Maximum	10	29
Number of counts	943	2498

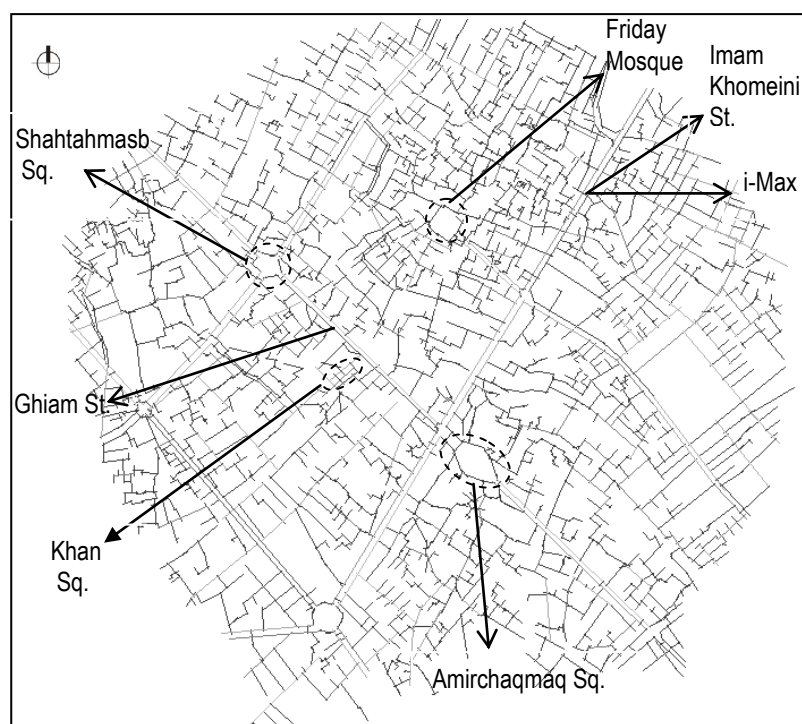
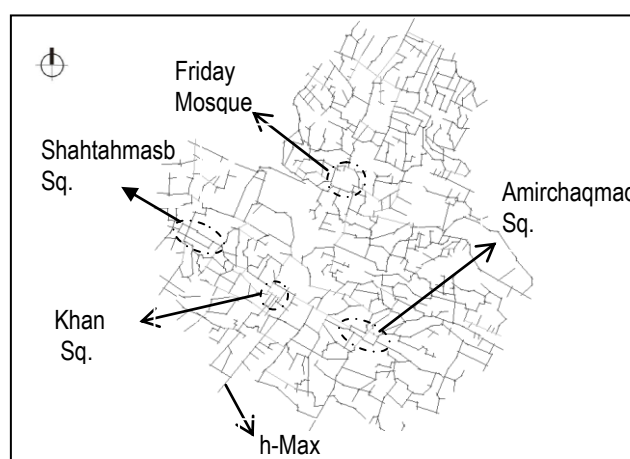
**Figure 8. The connectivity map of the city of Yazd in 1928 (top) and present time (bottom).**

Figure 9 shows the global integration map of the city of Yazd in 1928 and in the present time, red color lines indicate the highest value of integration (R_n) and the blue ones show the least.

According to Figure 9 in the old city of Yazd, the most integrated part is seen to be in the central part of the urban system indicated by red and less integrated parts are located around the borders which are far and poorly connected to the center. The highest integration value marked as a-Max with a value of 0.532 is located on the route of bazaar which is in a very central point of the system. The route of bazaar makes a good connection between two cores of the city (Friday Mosque and Amirchaqmaq squares). The lowest integrated part is shown by a-Min which is located far from the city core and on the border.

Regarding global integration map of the city of Yazd in present time, the highest integration value marked as d-Max with a value of 0.77 is located on "Ghiyam" street which passes through the historic core of the city. The lowest integrated part is shown by b-Min which has 0.28 value of integration. According to Figure 9, it is not on the border and it is near the center of the city.

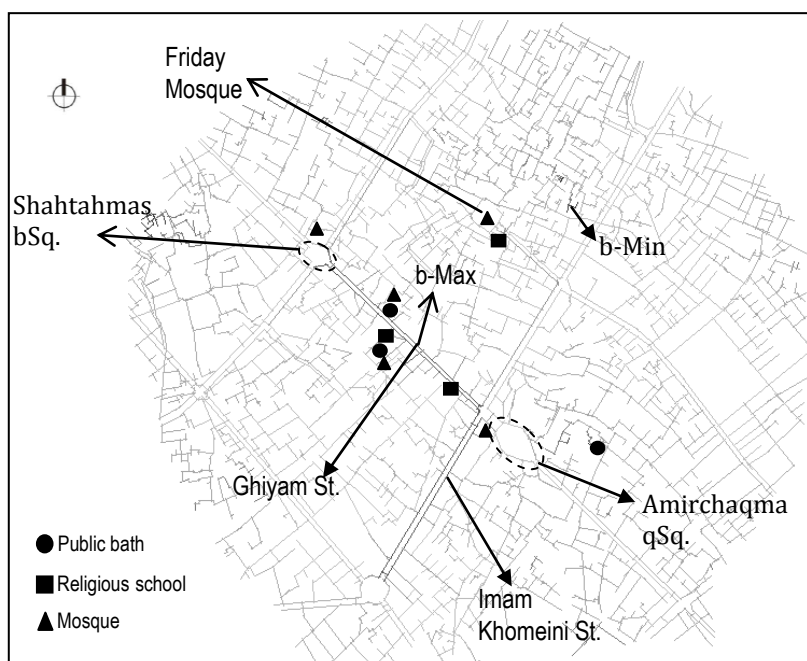
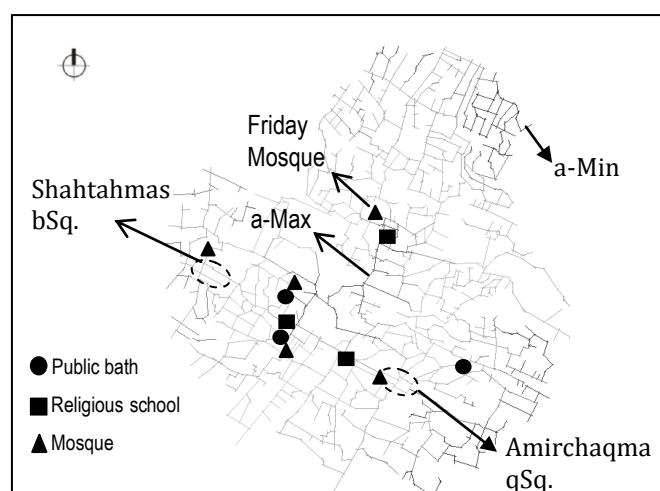


Figure 9. Comparison between axial line maps (integration R_n) of historical city of Yazd in 1928 (top) and at present time (bottom).

In the next step value of intelligibility for city of Yazd before and after urban modernization constructions is calculated. According to this calculation the value of intelligibility has been decreased from 0.09 to 0.07 after urban modernization and urban growth. This reduction explains that the sense of legibility and way finding dropped after urban modernization in city core of Bursa.

In order to find the effect of urban modernization and urban growth on the structure of meeting places in the historic core of the city, the average of integration values of each type of meeting places in the city of Yazd in both conditions is calculated (See Table 4). According to the table 4, in the old city of Yazd, bazaar has the highest global integration value and public bath has the lowest one; while at present time Religious School (Madrassa) is the most integrated urban element and Mosque has the lowest global integration value among other historical meeting places meaning that urban structure of meeting places in city of Yazd has been disturbed by urban modernization constructions.

Table 4. Comparison between the Hierarchy of Integration Value of Meeting Places in the City of Yazd in 1928 and in Present Time

Meeting space	Value of Integration Rn	
	Old Yazd	New Yazd
Bazaar	0.47	0.66
Religious school	0.45	0.68
Mosque	0.43	0.54
Public bath	0.39	0.56

Comparison and conclusion

In the present study, the urban pattern of two different Islamic cities namely Bursa and Yazd in two different countries, Turkey and Iran, has been examined comparatively from the point of view of identity, including their mathematical analysis. The main objective of this comparative study is to find the impact of urban modernization transformation on old structure of historic cores of these traditional Islamic cities. Such a study is helpful in contemporary urban studies, especially for the renovation of the historical and cultural regions of the cities that are changed and damaged by the effects of rapid urban modernization and urban growth programs.

Both of these cities had an organic urban pattern before urban modernization transformation; however, in the city of Yazd grid urban pattern was imposed on the old organic pattern of the city, thus the urban structure of the city changed dramatically. In addition, some parts of the bazaar of the city were demolished due to such urban modernization system. But in the city of Bursa, a new ring road was constructed around the historic core of the city without any dramatic changes or demolitions in historic areas.

According to the analyzed maps (Integration radius n) of the old cities of Yazd and Bursa before urban modernization transformation, in both cases the maps of global integration (radius n) create a clear structure based on a powerful and compact integration core in the centre of the organic pattern of the city. The most integrated part of the city is the city core that the mostly-used places such as bazaar, mosque, madrasa and public bath are located in this part of the city. The map of global integration (Rn) for the core of Iranian city demonstrates a total destruction of the old global configuration. The modern streets (Ghiyam and Imam Streets) are the most integrated lines of the systems. Since these streets have not been constructed in any accordance

to the older organic street patterns, the new integration core totally ignores the older centre of integration. In fact, the historic integrated core of the old city is lost after urban modernization transformation and changed to integrated streets. On the other hand, some lines which used to be segregated become integrated and vice versa. The story in the historic core of Turkish city is completely different. First of all, the historic core in the context of the whole city has not been lost through urban modernization. The pattern of global integration in core of modern city of Bursa follows the pattern of integration in the traditional city of Bursa. In other words, the most integrated streets are around the historic core of the city now and then with a seemingly more expanded new integration core. Another remarkable notion obtained from the analysis of the city of Bursa is that the segregated lines still are located in the borders and far from the city core.

Table 5 is a Comparative analysis of the cities of Bursa and Yazd in before and after urban modernization transformation. According to the table the value of global integration of the city of Bursa is more than that of the city of Yazd's in both the old and new conditions. On the other hand, the value of global integration of both of these cities has been increased after urban modernization process. Due to the construction of wide streets and highways as well as the demolition of traditional narrow streets and cul-de sacs, the urban structure of both these Islamic cities has been developed after urban modernization constructions. Value of mean connectivity in the city of Bursa is more than that of the city of Yazd's in any conditions. On the other hand, the Increase in value of mean connectivity in the city of Bursa is remarkably more than the city of Yazd meaning that new road constructions in the city of Bursa have been more than in the city of Yazd.

According to the table 5 the intelligibility of city core in city of Yazd is poor in any condition and its value decreased after urban modernization. The intelligibility of city core in city of Bursa is also reduced after urban modernization process; however the correlation between global integration and connectivity in city of Bursa is higher than intelligibility value in city of Yazd in any condition.

The major objective of this study is to examine the impact of urban modernization on urban structure of meeting places in Islamic cities of Yazd and Bursa. It is worth discussing the ways the constitution of meeting places in the city changes when its spatial structure transforms. As discussed in the previous sections, the pattern of global integration in the historic core of the city of Bursa has not changed dramatically, thus kept the original urban structure of meeting places in the core of the city. In other words, the hierarchy orders of the mean value of global integration of meeting places in the city core of traditional city of Bursa before urban modernization is similar to the modern city now. It means the most integrated meeting places before urban modernization process were "bazaar" and "mosque" and the most segregated elements were "public bath" and "religious school". This order is preserved after urban modernization process (See Table 5).

On the other hand, the global position of meeting places in the city core of the old city of Yazd has been disturbed dramatically by urban modernization process. In other words, the most integrated meeting places in the old city of Yazd were "bazaar" and "mosque" and the less integrated public places were "religious school" and "public bath". However, after urban modernization process the global position of meeting places changed dramatically. It means the most integrated meeting places after urban modernization process become "religious school" and "bazaar" and the less integrated buildings are "public bath" and "mosque". According to the above findings and also other results in the previous sections, it is apparent that in the city of Yazd, a larger entity, i.e. the configuration organization has been lost. Consequently, the Islamic identity of the city has been deteriorated drastically. In contrast, the old city of Bursa seems to have retained its traditional urban morphology features, especially from the point of view of Islamic urban elements so the Islamic identity of the city is preserved in an acceptable way.

Table 5. Comparative analysis of the cities of Bursa and Yazd in before and after urban modernization transformation.

		Bursa	Yazd	Result
Integration Rn	Old	0.61	0.36	The urban structure of city of Bursa is more integrated than city of Yazd in both old and new conditions.
	New	0.73	0.50	
Connectivity	Old	2.98	2.62	Increase in value of mean connectivity in city of Bursa is remarkably more than city of Yazd so road constructions in city of Bursa were more than city of Yazd.
	New	3.45	2.69	
Intelligibility	Old	0.29	0.09	Value of intelligibility decreased after urban modernization in both of these cities; it means legibility of the city cores has been decreased after urban
	New	0.10	0.07	
Meeting Place		Global position in the city core		The hierarchy orders of mean value of global integration of historic meeting places in the city of Bursa is not disrupted after urban growth and urban modernization, but this structure is completely disturbed by urban modernization process in the city of Yazd.
Bazaar	Old	0.87	0.47	
	New	0.99	0.66	
Mosque	Old	0.85	0.43	
	New	0.95	0.54	
Public bath	Old	0.77	0.39	
	New	0.94	0.56	
Religious School	Old	0.76	0.45	
	New	0.92	0.68	

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Environmental assessment method of urban spaces case study: south wing of the Urban Plan for Brasilia

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Abstract. *The urbanization process tends to create many problems of environmental condition in the urban space, but not in a general way. Nowadays, there are many examples of cities that have sought an organization of the urban space in order to improve habitat conditions in public spaces. Based on this, this paper seeks to develop a method of Urban Morphology Analysis with a sustainability scope in administrative regions of the DF, and thus classify these regions according to the performance of a passive urban design. A fundamental research was developed from specific concepts from aspects of urban morphology, for when examined under a certain method, define the degree of sustainability of the region analyzed. Therefore, this work seeks to develop a new implementation methodology reducing the subjectivity of the results from in situ environmental measurements, computer simulations and studies of urban forms, using as case study the Administrative Region I - South Wing of the Pilot Plan Brasília.*

Key Words: *Urban morphology, comfort, environmental evaluation, urban spaces, South Wing*

Introduction

From the understanding that cities have individual and disparate features amongst them, and that growth brings, most often, many problems of environmental aspects of the urban space, it is understood that there is a great contrast between the notions of urban and environmental, "including the reasons why this impasse apparently does not exist in current urban planning" (COSTA, 1999:2). However, several other authors, as Romero (2000, 2007, 2011), Olgyay (2008), and Alucci Monteiro (2007), among others, argue that both concepts should be addressed in an integrated manner to ensure a better quality of urban life, both for the city, as mainly for its users.

Analyzing the concepts studied by these authors, its perceived the need to integrate the conditions of the physical space to ensure a good quality of life. However, any method of valuation that is exclusively related to the quality of public spaces is not currently available. Nowadays, various methods of building assessment, be them commercial, public, residential or services, have been developed to verify levels of energy efficiency and environmental comfort. Among these, we mention LEED, HQE, AQUA and PROCEL. In most cases, the method of measuring the results is based on the score in several attributes that check individually, parts of the building . These attributes, when brought together, define the construction quality level, from a value of its end result. However, there are few evaluation methods that have attributes to verify the level of urban quality. In most cases, the urban attributes are only related to the interference of these on the building.

Given this panorama, from a basic research we present in this work a method for environmental qualification of urban spaces, using as a basis a study developed in the course Sustainable Urbanism, of the Graduate School of architecture and Urbanism of the University of Brasilia. In this work, called Sustainable Morphological Analysis of Administrative Regions of the Federal District, specific, grouped concepts were defined in a table of indicators and attributes, defining values, which when analyzed, define the degree of sustainability of a region. However, because it is a subjective method of analysis, a difference was noted in the results, varying according to each researcher.

The indicators were conceptualized according to the studies of Romero (2007), Panerai (2006), Rueda (2007) and Lynch (1997), set out from similar characteristics of the physical space of cities. In this case, adopted the indicators studied by Romero (2011) were adopted: Accessibility, Safety, Comfort, Landscape, Social/Cultural Relations and Resources. The use of these was due to several studies conducted by the author, consolidating information from several other researchers.

The review also pointed out that the questions of urban environmental quality or, the Environmental Indicator, are analyzed briefly, being necessary an improvement of this aspect, making it one of the main objectives of this work.

Therefore, this study was divided into three basic steps. The first improved the theoretical framework involving the assumptions related to environmental conditions in urban areas, identifying attributes with well-defined concepts, gathering indicators, following the same methodology as developed in the work cited above.

With their respective attributes and concepts defined, the second methodological step begins for applying these attributes in the sectors and regions to be studied. For this it was to study the best method where there is no interference from the researcher and / or user, preferably using automated mechanisms or appropriate mathematical formulas, including computational tools to facilitate, enhance or ensure the correct relationship of the results.

Among the software used, we cite the ENVI -met, which generates a three-dimensional simulation model of urban micro climate, analyzing the surface, vegetation, atmosphere, calculating the energy balance, among other variables .

Finally, the third step consisted in the " calibration " of the proposed methodology by applying to study in an urban fraction of the Federal District (DF) . The selected region has also been part of the work of Sustainable Urbanism mentioned previously, the South Wing of the Pilot Plan of Brasilia, thus obtaining a comparison of results . The end result sets a label for sustainable urban quality whose results are compared with other studies obtained in other administrative regions of the DF . This procedure is in progress and its results serve as inputs for discussion. With these three steps finalized, we conclude the work by presenting all the achievements and future proposals for continued study.

Presentation of the work on sustainable urbanism

Initially, it was necessary a literary review of theoreticians that define concepts on urban environmental quality, such as Romero (2000, 2007 and 2011), Toledo (2003), Miller and Alucci (2007 and 2008), Ghiaus and Allard (2005), Fleet and Schiffer (2003), Carmona (2007), Duany (2001), Sennett (1991) Duany (2001), Lynch (2004), Kostof (2006), among others.

With the theoretical background acquired by reading the authors, it was possible to develop a reference table identifying the main aspects related to the environmental quality of urban spaces. Later the concepts of the authors will be unified as indicators (from the similar identification of the attributes and their parameters environmental quality). This table shows how each author examines elements that even if they are similar and related to each other, they obtain as a final result independent parameters, and adopt concepts that analyze differently urban spaces.

With the definition of these concepts, it was possible to unify them into Indicators, which aim to demonstrate the level of urban quality, highlighting the need for a critical view at the current way of life in various regions of the DF . The indicators used were the same six studied by Romero (2011) : Accessibility, Safety, Comfort, Landscape, Social/Cultural Relations, and Resources .

With the indicators defined, we developed a list of Attributes, appraising and synthesizing the data acquired by reading the authors, framing them in the seven key indicators . Furthermore, it was necessary to divide some of the renowned attributes in both scales studied by Romero (2011), the City Scale, and the Sector Scale, for being independent of specific aspects, such as the perceptual quality of the great physical and organizational form,

environmental variety, the macro transportation system, the permanence and continuity of built environment (City Scale), as well as to analyze morphological relations and their respective environmental response, environmental and functional accessibility, consistency, knowledge and functionality (Sector Scale) .

With these relationships defined, it was possible to develop a table of " Contents of Urban Morphology ", separating the attributes in their respective scales and indicators, as noted in Table 01. It is divided in two study scales: City Scale and Sector Scale. First, the indicator is set, then, the sub -indicator and analysis attributes. In this case, because it is a review, only the environmental indicator was presented .

The fourth column refers to the concept of the attribute, helping to obtain analytical view / formulas / values (valuation method of the attribute set from the on-site observation, measurement, analysis and identification maps of the study area), the fifth column. This is the main column of the table, allowing to identify the quality level from each attribute, and each result has a specific weight, which in their sum generates a value that defines the level of urban environmental quality of a given region under study . These last two columns will be better exemplified in the following item .

However, it is valid to note that these last two columns (analytical vision and weight) ended up being arbitrary, often assessed from the perception of the observer in situ, which may bias the final outcome, because by not being qualitative, may create different occurrences depending on the individual analysis of each user.

Table 1. Analysis of sustainable urban morphology - environmental indicator

City Scale					
Ind.	Sub-Indicator	Attribute	Concept	Analytical View / Formula / Values	WG
Environmental	Orientation of the paths set	Solar	Orientation of tracks predominance	I. North / South	1
				II. East / West	4
				III. Northeast / Southwest	3
				IV. Northwest / Southeast	3
	Form		Thin, open, sparse, dense, large pantry, high	I. None	1
				II. Rala, Open, Sparse	2
				III. intermediate	3
				IV. Dense Wide Cup	4
	Porosity		Visual perception of empty and full (afforestation): analysis of the vertical plane - groupings of trees	I. No porosity	1
				II. porosity secreted	2
				III. partial porosity	4
				IV. total porosity	3
	Green urban			I. No green areas (0% to 25%)	1
				II. Secreted green areas (26% and 60%)	2
				III. Green areas partial (61% to 80%)	3
				IV. Total green areas (81% to 100%)	4
	Preservation	Fields preservation	APAS, APPS, etc. Good as a territory and sustainability	I. There	1
				II. Exists, but do not preserve the fields	2
				III. There, preserve, but there is a limit of fields	3

IV. There is no limit and preserve the fields					4
Sector Scale					
Ind.	Sub-Indicator	Attribute	Concept	Analytical View / Formula / Values	Wg
Environmental	Orientation Of Dwellings	Solar	Predominant Orientation Of Facades	I. North / South	4
				Ii. East / West	1
				Iii. Northeast / Southwest	3
				Iv. Northwest / Southeast	2
	Ventilation	Permeability	Existence Of Obstacles To Ventilation	There Permeability I.	1
				Ii. Inadequate Permeability	2
				Iii. Partial Permeability	3
				Iv. Adequate Permeability	4
		Windchill	Qualification Under Relation Between The Lane Width And Height Of Buildings	I. Variable Ratio (Priceless)	1
				Ii. Claustrophobic Spaces (W / H <1)	2
				Iii. Collecting Spaces (W / H = 1, 2 And 3)	4
				Iv. Expansive Spaces (W / H > 4)	2
	Relief	Topography	Accommodation Pathways To The Contours	I. There Is No Accommodation Pathways To The Contours (0% To 25%)	1
				Ii. Favorable To The Contour Lines (26% To 60%)	2
				Iii. Favorable To The Contour Lines (62% To 80%)	3
				Iv. Favorable To The Contour Lines (81% To 100%)	4
	Acoustic Comfort	Noise Level	Noise Nuisance By Sensory Perception	I Dont Bother	4
				Ii. Intermittent Low Noise	3
				Iii. Constant Noise	2
				Iv. Loud Noise (Deafening)	1

After defining all the weights in each attribute, it was determined using an evaluation criterion based on existing certification systems. In this case, the method used for evaluation of urban areas was the criterion of points. Thus, it is possible to distinguish the difference between the assessed regions, and examine whether the region has a "low" rating, allowing you to work on specific attributes to thereby improve their grades.

Based on this, it is possible to compare the urban regions analyzed by checking the degree of sustainability of each region and its result on the Labeling Scale, thus noting which regions have better qualities for its users.

Urban environmental quality analysis

The new work methodology consisted initially in a new literature review of the main authors that deal with concepts related to environmental urban morphology. After analyzing all these concepts presented, and evaluated previously explained work and on the sum of factors that interfere with the way on how to define appropriate living conditions, it was possible to consolidate all information acquired by extracting aspects of environmental quality of each author studied. With that, we present in Table 2 the similarities and the coherence of the information, also identifying concepts that fit directly in the Environmental indicator which was reassessed.

In addition, this table 2 was the basis for recognizing which aspects are necessary to guarantee good environmental condition in urban spaces, a complement to the information already acquired in research for the course of Sustainable Urbanism.

Table 2. Synthesis

Autor	Atributos
Machado (1997)	Tastes, preferences, perceptions, values
Norberg-Schulz (1984)	Orientation, identification
Sennet (1991)	Hierarchy, identity, centrality, heterogeneity
Lynch (1997)	Legibility, imageability, paths, boundaries, districts, nodes, landmarks, shape, color, arrangement, identity, structure, meaning
Romero (2000, 2007, 2011)	Scales ratio W / H topography, vegetation, floor covering, natural and / or artificial elements that interfere with radiation and / or ventilating
Ferrari (1991)	Units Neighbourhood, size, boundaries, public areas, institutional areas, local trade, internal street system, use and occupation of land, diversity of uses
Vargas (1999)	Diversity of uses, use and occupation of land, boundaries
Panerai (2006)	Hierarchy
Rueda (2000, 2007)	Density, use and occupancy, permeable areas, mobility, accessibility, urban organization, orientability, diversity of uses, institutions, flows of energy, water, materials, comfort, degradation, automotive mobility
McHarg (1967)	Integration milestones, road connections, hierarchy of roads, cycling infrastructure, accessibility to public transportation, mixed-use pathways, equity
Rau (2003)	Public lighting, indoor-outdoor visibility (public buildings - space), environmental degradation
Jacobs (2009)	Indoor-outdoor visibility
Newman (1996)	Evaluation of the physical characteristics of the site and the natural environment, analysis of users and their needs, relationship between user needs and features of the site, pedestrian movements, boundaries between public and private ownership of space, time occupation of public spaces busy, spatial design, scale and proportion, movement, structure, artificial lighting, spatial degradation

Table 2 presents a consolidation of all information acquired during the studies on the development of this work. Seeking to improve these concepts in major groups, the six basic indicators studied by Romero (2011) were adopted: accessibility, safety, comfort, landscape, social / cultural relations, and resources.

Each indicator has specific characteristics. According to Romero (2011:42), the "nature and natural forms of the land are the basis of sustainable urban design ." She further states that "conservation allows the existence of a sense of place, their identity, sensitizing the user to the context and making more complex and continuous the perceived scale." Community social relationships create a sense of belonging and expectations of development where strategies such as social interaction, learning, continued education, magnify these concepts. Furthermore, the resources refer to "aspects of recycling solid and liquid waste in integrated systems, eliminating waste and making use of the heat generated". For this, we look for alternative energy sources, rational use, as well as solutions to environmental air quality (Romero, 2011:42) .

With these key indicators set, and separating each authors' guideline in their respective indicator, we find: Accessibility Indicator (11 attributes) ; Landscape Indicator (14 attributes); Comfort Indicator (9 attributes); Social/Cultural Relations Indicator (12 attributes); Security Indicator (4 attributes), and; Resources Indicator(4 attributes), for a total of fifty-four (54) attributes .

New method application

This step of the work consists, initially, on the understanding of the classification criteria adopted by the study conducted in the course of Sustainable Urbanism, of the Urban Environmental Quality table. These classification criteria stipulate optimal parameters acquired from the reading of the theoretical framework, and this way ensuring a degree of comparability between the areas to be studied, in this case, a review of the South Wing of the Pilot Plan of the Federal District.

Based on existing certification systems, the method used for evaluation of urban areas was the points criteria. Each item measured has a specific value ranging from 1 to 4, wherein those having a greater assessment of weight 4 are more sustainable than those with weight 1. Thus, it is possible to distinguish the difference between the evaluated areas, as well as examine whether a region is on a low note, allowing work on specific attributes to thereby improve their grades.

In addition, it was adopted in the work a reference level between administrative regions studied (in this case it was just presented the South Wing of the Pilot Plan of Brasilia). This reference level, called here "Labeling Scale" was defined as the sum of the weighted averages based on the number of attributes and their grades. The Seal B is acquired from the sum of all attributes being considered Weight 3, thus ensuring a minimum level for a Sustainable Urbanism. Have the Seal D, was given from the sum of the attributes with weight 2, and their ranges were established as Seals A, C and E.

This way it was possible to compare the urban regions analyzed by checking the degree of sustainability of each region and its result on the labeling scale, therefore verifying the urban areas that have better qualities for its users.

After the development of the labeling scale, a method was developed for the application of the table parameters, in this case only the comfort indicator. Because it is one of the more subjective indicators of work previously mentioned, this analysis sought to study this unique indicator to ensure an assessment where there is no interference from the researcher in the final result.

For this, it was necessary to continue the procedure already set, dividing each attribute into four (4) evaluation indexes, each possessing its respective weight ratio. For these indices to be agreed upon, it was necessary to discriminate all the attributes by checking the form of analysis of each attribute, thereby locking the feasibility assessment.

Among the attributes found in the Comfort Indicator, we have: acoustic, porosity, temperature, ventilation, humidity, environmental W/H ratio, topography, shading/vegetation and soil permeability. Therefore, it is observed in Table 3, the Comfort Indicator, two examples of the attribute containing the conceptualization, his method of analysis, evaluation indices with their respective weights

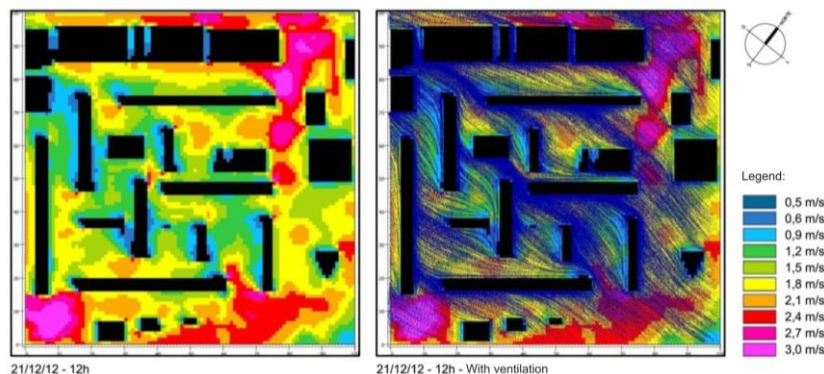
Tabela 3. Confort

Attribute: Ventilation	Indices:	WG:
	I. Ideal (0-30%)	1
Assessment Method: Check the result of computer simulation, the percentage of adequate ventilation in the pedestrian level.	II. Ideal (31-60%)	2
(Adopted value between 1.2-1.7 m / s)	III. Ideal (61-80%)	3
Analysis: Computer Simulation - ENVI-met.	IV. Ideal (81-100%)	4
Attribute: Permeability of Soil	Indices:	WG:
	I. Permeable (0-20%)	1
Assessment Method: Ratio of paved area and constructed with permeable area in percentage (%).	II. Permeable (21-50%)	3
Analysis: Study of Soil Permeability.	III. Perm. (51-80%)	4
	IV. Perm. (81-100%)	2

The analysis of each attribute was defined from the use of scales, studies and computer simulation. These choices seek to reduce the chances of interference from the researcher's personal assessment of the results and so may be possible to maintain a standard of comparability across sectors analyzed.

Initially, it was necessary to understand at what scale (City or Sector) to apply the study. For this, it is necessary to understand the space as a whole, observing all its features, identities, similarities and singularities .

It is noticed initially in the South Wing of the Pilot Plan of Brasilia (the case of this study), a standardization of these areas, from the routes, buildings and vegetation in almost 90 % of its area. Moreover, it is observed that urbanism adopted follows the features proposed as Neighbourhood Units (Ferrari, 1991), with residential, commercial and service buildings in an area of approximately 500m each as defined in the Pilot Plan of Brasilia as Superquadras.

**Figure 1. Simulation study of ventilation in Envi-MET software.**

Regarding the evaluation of the Soil Permeability attribute, it took place initially from the withdrawal of buildable area with paved area. Of the spare area, 70% was defined as pervious area, with the remaining 30% used as a public footpath concrete, non-permeable. Therefore, the result obtained 41.10% of permeable area (Figure 57), obtaining weight 3 as evaluation indices defined from the theoretical reading (Figure 2). It is known that the more permeable the region, the better for rainwater drainage, biodiversity, among others. However, because it is an urban area, seeking appropriate paths for all users, including individuals with special needs, excess

permeable area decreases the quality of urban space. It is noteworthy that soil type was evaluated, only the amount of possible permeable areas.

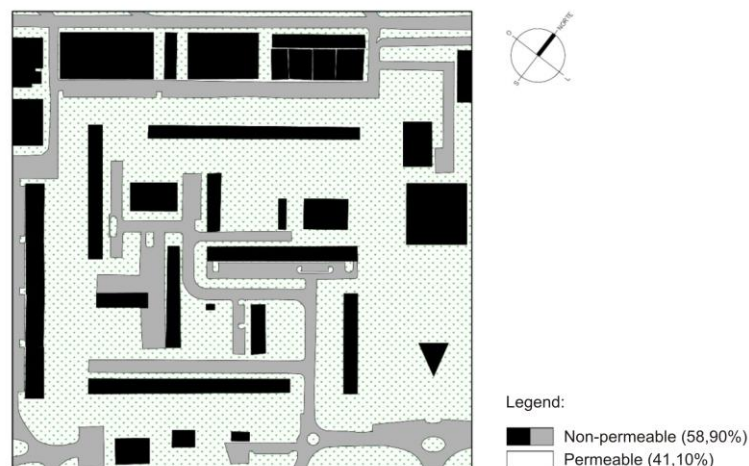


Figure 2. Soil Permeability Study.

After analyzing all the attributes, the sum of the weighted average of all weights is found, checking the degree of urban environmental quality of the region according to the labeling scale. It was noted that for the Comfort indicator, the end result was little different than previously found. However, we understand now that the new review process became independent of the perception of the researcher, applicable by any user.

Briefly, of the final table with 54 attributes defined in the 6 indicators, only 49 have a defined method of analysis. In this sense, the attributes that do not have a method of analysis set were taken from the sum of weighted average weights because their definitions are not part of the objectives of this work .

With that, and analyzing the old review of the case study with the new results obtained with the Comfort Indicator (this work), the Analysis of Sustainable Urban Morphology in the South Wing, received the Label A.

Final Considerations

The present study sought to enhance the work developed in the course Sustainable Urbanism, of the Graduate School of Architecture and Urbanism of the University of Brasilia, on sustainable morphological analysis of administrative regions of the Federal District .

Based initially on literature review on urban environmental quality, through authors such as Romero (2000, 2007 and 2011), Toledo (2003), Miller and Alucci (2007 and 2008), Ghiaus and Allard (2005), Fleet and Schiffer (2003), Carmona (2007), Duany (200), Sennett (1991), Lynch (2004), Kostof (2006), among others . From this, we sought to systematize the acquired concepts, defined here as attributes, grouping them into indicators, later to establish valuation parameters that would be used in some administrative areas of the Federal District .

With regards to the reading, it was possible to synthesize the concepts of fifty- four (54) attributes, divided into six (06) indicators adopted from studies of Romero (2007), Panerai (2006) and Rueda (2007). They are: Accessibility, Landscape, Comfort, Social / Cultural Relations, Security, and Resources.

Furthermore, it was established a method of classification, defined as Labeling Scale, where each attribute independently analyzed receives a weight, and the weighted sum so would set a

rating of " A" to " E", being "A" the label adopted for the regions with better urban environmental quality .

With this, it was sought to develop a new evaluation methodology, trying to reduce the subjectivity of the results and to be applied by any researcher. For the case study, the Comfort indicator was revised. All attributes of this indicator were studied individually, conceptualized and implemented in a new methodology for analysis from in situ measurements, computer simulations and study of maps and forms .

It was noted however that even after the new procedure, there weren't so many differences in results from the previous study, receiving in the end, the same level of labeling (Label A) .

However, it is noticed that despite the similarity of the results obtained in both studies, there was an evolution in its application methodology. Even though much of the assessment method still presenting subjectivity, this study will help other researchers to develop new methodologies for analysis and application, increasingly looking to minimize any user interference in their results.

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Comparing urban rules for urbanizing villages in Hong Kong, Macau and Shenzhen

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Abstract. *Since the introduction of China's Open Door Policy (1979), scholars were attracted to study Chinese urbanism in general and conduct individual case studies. The methodological approach of urban morphology has been extended to Chinese cities, and comparative studies of Chinese and Western cities were published. This paper adds another comparative study focusing on three cities in the Pearl River Delta (PRD): Hong Kong, Macau, and Shenzhen, all belonging to the People's Republic of China, but presenting significantly different urban forms. The cities lend themselves for comparative studies, as they share the location in a river delta, subtropical marine climate, Cantonese culture, and high-density, but differ significantly based on their individual histories and British, Portuguese, and Chinese planning rules. Due to China's One Country, Two Systems policy their differences persist, despite the integration process currently pushed forward by large-scale infrastructure projects. With this focus the authors' intend to link urban morphological research closer to urban design and planning practice. This paper, in particular focuses on rules, which were implemented to address issues arising from the urban expansion onto rural land. The research is supported by a General Research Fund (GRF4440740), awarded by the Hong Kong University Grants Committee.*

Key Words: *Chinese urbanism, comparative studies of urban forms, urban rules, and urban villages.*

Introduction

Based on the economic and political significance of Hong Kong and Macau's integration process into mainland China, comparative studies on the different planning cultures in the PRD have been made (for instance Ng, 2005). Also the governments of these cities made initial steps to plan an integrated "Pearl River Bay Region". These studies concentrated until now mainly on the regional scale. Detailed comparative studies highlighting the local characteristics of the different urban forms and planning experiences are still missing.

For our research project we assume that the three selected cities (like many other cities) had to address similar key urban issues such as public health, economic development, housing, informal development.²⁰⁸ For this paper, we concentrate on those rules implemented by Hong Kong, Macau and Shenzhen, to address issues arising from the cities' expansions onto rural land. Such rules had to address various issues related to different local histories, land management and ownership, compensation, housing eligibility, and redevelopment opportunities. In the discussion of the case studies these issues are used to organize and compare the different rules. The selected case study sites are: Hung Shui Kiu (HSK) (Hong Kong), Baishizhou (Shenzhen) and Taipa (Macau). These sites were selected, due to currently ongoing projects in these areas which likely will transform them very soon. These sites were also

²⁰⁸ In general, we identified the following key issues and planning goals, as reasons to implement, revise or repeal specific urban rules and guidelines in the four cities: public health and order concerns, increase of industrial, productivity and employment, response to mass migration, attraction of foreign direct investments, coping with overdevelopment, transformation from manufacturing to service and financial industry, attraction of tourists and talents, ensuring environmental and heritage protection and quality of life, encouraging creative industries, responding to citizen concerns and aspirations.

selected as studio sites for the M.Sc. in Urban Design Programme at the Chinese University of Hong Kong.²⁰⁹ Findings of the case studies are discussed in the final part of the paper.

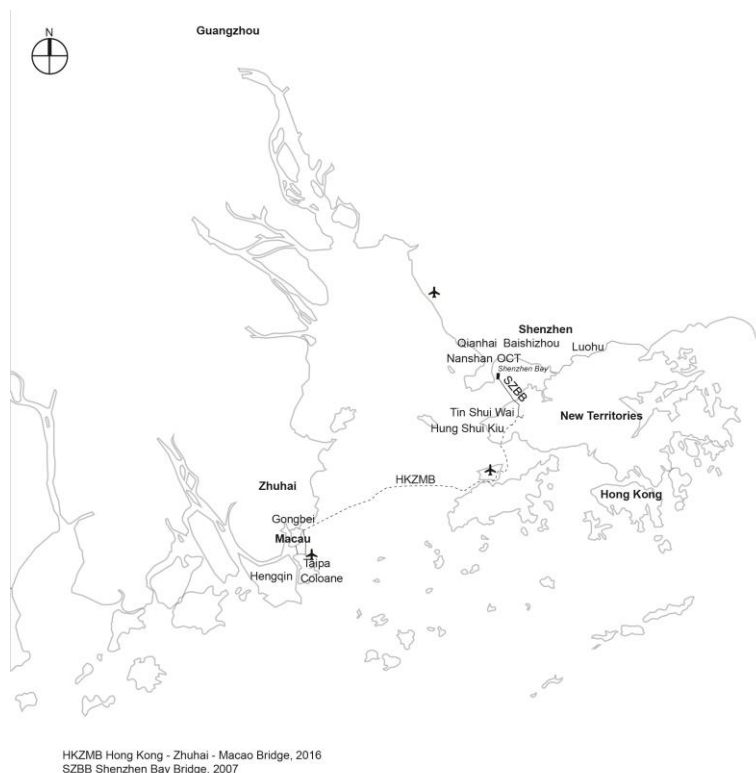


Figure 1. PRD Map with case study sites.

Cases and rules

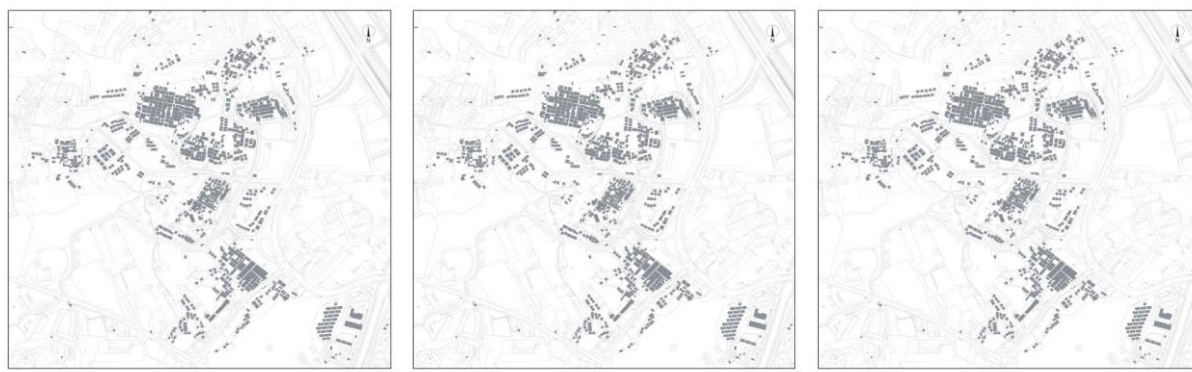


Figure 2. Case Study Sites: 1) Hung Shui Kiu (Hong Kong); 2) Taipa (Macau); and 3) Baishizhou (Shenzhen).

²⁰⁹ The parallel studios were taught by Travis Bunt, Colin Fournier, Chris Gee, Tat Lam, Nuno Soares and Hendrik Tieben. With their inputs in the studio discussions they all contributed to the idea and content of this paper. Students visited all three sites and presented their research and design projects at different stages to all classmates and teachers.



Figure 3. Urban Villages in Hung Shui Kiu (Hong Kong), Taipa (Macau), and Baishizhou (Shenzhen).

The urban rules for urbanizing villages are organized according to the following four categories: history; land management and ownership; *Compensation for Eminent Domain* redevelopment of villages.

History

The first category of rules is related to the specific backgrounds of the three villages.

The villages in Baishizhou and HSK are located in close vicinity in the north and south of Shenzhen Bay, respectively. The boundary between the north and south side of the bay, created in 1898 after the “New Territories” were leased to Hong Kong, still exists. Most villages in HSK were built by Punti which had developed into complex wealthy lineages, settling in separate villages about ½ mile from each other, and became known as “the Great Clans” during the 15-19th century. The Tang clan settled first at Kam Tin in the mid-11th century and established their settlements in Ping Shan, Ha Tsuen, Lung Yeuk Tow, and Loi Tung, which still exists today. The Tangs were the most powerful of the “Five Great Clans” in the New Territories, with Ha Tsuen, Kam Tin and Ping Shan, as their most important settlements. It is known that Ping Shan and Ha Tsuen villages fiercely competed over the ownership of the ferry over the HSK River (Hase & Sinn 1995). Originally this river arrived at Ha Tsuen, which was the most important village of the area, and is the location of the Tang clan ancestor hall. Later the river was relocated towards north-east dividing today’s HSK from the new town Tin Shui Wai (TSW). Before becoming part of the British colony, HSK was well connected via the Shenzhen Bay to the Nantou peninsula and the provincial capital Guangzhou further north. After the construction of the border this north-western part of the New Territories lost its importance and became the backyard of Hong Kong. Today its landscape is shaped by three storey “village homes”, open container storages and patches of remaining agricultural land. This landscape contrasts to the adjacent new town TSW, with its 32-38 storey residential towers, multistorey school buildings and shopping centers. TSW new town was built in 1987 over an area of abandoned fish ponds and rice paddies.²¹⁰

Based on the current housing demands and as part of Hong Kong’s regional strategy, the government plans to build in HSK one of its biggest New Development Areas (NDA) for around 160.000 inhabitants. 826 hectares are earmarked for 60.000 new homes and a logistic hub. 40 storey towers are planned around the newly planned MTR West Rail Station. The first part of the HSK NDA should be completed in 2024 (Ng, 2013). The 20 existing indigenous

²¹⁰ Around 488 hectares of land for the new town were reclaimed. A consortium Mightycity Ltd. (including investors from Hong Kong, UK and China) bought the land from the local Chan clan, and a first public-private-partnership development proposal was made in 1980. However, due to a property slump in 1982, the government declined the proposal and decided to buy the land from the developer, but re-granted 38.8 hectares of land to the developer in 1989 for a private housing and commercial development scheme (Bristow, 1989 p.220). In 1982, the government commissioned consultants to prepare a master plan for the Tin Shui Wai south development zone, and started the Tin Shui Wai New Town Development. (Law et al., 2009).

villages in HSK would not be directly affected; but, 5 of the 9 non-indigenous villages, including 1,400 squatter huts, are planned to be cleared (Ng, 2013). In addition some of the land of the indigenous villagers, currently used as container storages, will be used for the new housing areas. Thus the villagers have already compensations for these areas. A similar NDA project in the north-eastern New Territories has created vehement protests of villagers and similar resistance is to be expected in HSK.



Figure 4. Shahe Farm in 1982 (in Xia Baishi).



Figure 5. Shennan avenue in 1980s (Shennan avenue divides Baishizhou into Shang baishi and Xia baishi).

Baishizhou is located in Shenzhen, north of Shenzhen Bay between Nantou and Louhu. Most of the land next to Baishizhou is owned by the Overseas Chinese Town (OCT) Holding, which developed here China's first theme parks, luxury residential areas and "OCT Loft" (Shenzhen's main creative industries cluster). Baishizhou encompasses an area of 7.4sqkm with an estimated population of 140,000 people, of which only 7,500 residents have the Shenzhen *hukou* and only 1,880 are locals. The area is serving as residential place to those employed in the OCT theme parks and creative industries. Density reaches 18,900 p/sq.km (O'Donnell, M.A. 2013). In the same super-block, there are industrial buildings and gated communities next to the village. The Baishizhou area includes 5 smaller villages - Baishizhou, Shangbaishi, Xiabaishi, Xintang and Tangtou, which date back to the state-owned agricultural collective, Shahe Farm, established in the 1950s, when agricultural land and production was reorganized by the communist government (O'Donnell, M.A. 2013). Houses in the urban villages reach up to 15 storeys and are surrounded along the perimeter roads by new commercial and residential towers. Industrial buildings and dormitories in Baishizhou are south orientated, multi-storey slab-blocks, similar to those found in many parts of China. Currently there are discussions between OCT Holding, the village corporation and further private developers how to regenerate or redevelop the urban villages of Baishizhou.

As part of the 2003 signed Closer Economic Partnership Arrangement (CEPA) between the PRD cities, several ambitious infrastructure projects were launched (which also affect the three

case study sites). Since 2007, Shenzhen Bay Bridge has connected the western part of Shenzhen (incl. OCT, Baishizhou, Shenzhen Airport, and the new Qianhai Special Development Zone) with Hong Kong and Hung Shui Kiu. The bridge is part of a new Hong Kong-Shenzhen Western Corridor which will reach Hong Kong International Airport in the south and via the *Hong Kong–Zhuhai–Macau Bridge* the western side of the Pearl River Delta. In Macau and Zhuhai, another New Development Zone is planned on the Island Hengqin (similar to the Qianhai New Development Zone in Shenzhen). This area on Hengqin is located across the boundary of Macau's COTAI Strip and near the third case study site: Taipa Village (see map). When the *Hong Kong–Zhuhai–Macau Bridge* opens in 2016, traveling time from Shenzhen and Hong Kong to Macau and Zhuhai will be decreased significantly so that daily commuting by car would be possible. Today, new apartments in Macau are sold at comparable prices to Hong Kong, as property prices tripled since 2009. Since Taipa Island has a lower population density than Macau peninsula, and vicinity to the new casinos, Macau Airport, University of Macau and Hengqin, it is particularly targeted for upper-market real estate projects.

Like HSK, Taipa Village has always been located at the periphery (with some typical fringe-belt land-uses in its neighborhood). Taipa always had few developments for most of its history. However, due to Macau's casino boom and the ongoing integration process of Hong Kong and Macau into mainland China, this is quickly changing. According to the Macau census of 1991, the population of Taipa Island then was 7,037. This number increased to 41,786 in 2001 and to 78,497 in 2011 due to the intensive building activity taking place on the Island for the past decade.

In Taipa, we find a similar contrast in building scales like those found between HSK and TSW new town: houses in Taipa Village are still only 2-4 storeys high, while the towers of the adjacent New Taipa area reach 40 storeys.

Taipa began to be developed more intensively after the inauguration of the first Macau-Taipa bridge in 1974 (Ponte Governador Nobre Carvalho). Differently from Macau peninsula, the Portuguese presence on the island dates back only to 1847. This happened under the Governor Ferreira do Amaral, who was later killed by Chinese in response to the extension of Portuguese rule over a territory that so far had been administered by the Chinese. Amaral had pushed for a transformation of Macau into a colony similar to Hong Kong, which had been established as colony only five years earlier and quickly took-over most of Macau's trading business.

Before 1847, Taipa, originally two separate islands, was inhabited by Chinese fishermen and a few farmers and traders who lived in villages spread on the west coast of the larger island (Pedro Dias, 2005). Little is known about these villages, however, the presence of a temple dedicated to the God of War – Kuan Tai Miu – constructed during the Ming Dynasty, points to the first settlements dating of the 15th century. These villages expanded into becoming one during the 18th century, due in large part to an order issued in 1717 by the Chinese emperor by which all foreign vessels travelling towards Guangzhou should dock here before continuing towards China. The presence of foreign traders attracted new people who settled on the island taking advantage of the commercial opportunities emerging with the mandatory anchorage.

The occasion of a series of devastating fires (1853, 1858, 1878) and typhoons (1874) that affected Taipa Village during the second half of the 19th century eventually led to changes of its urban fabric. In 1867, a special administrative body was put in charge of carrying out public works on the island, such as installing electric lighting, widening and paving roads, lining them with trees, constructing small land reclamations, etc. A few public buildings also date from this period such as a market, a church and a hospital (Pedro Dias, 2005; Rodrigues Costa, 2001).

In 1869, a Town Council for the island was established and it received its civil district administration in 1879 (Rodrigues Costa, 2001). Thus the name "Taipa Village" is misleading, as its status already was that of a small town.

Following the public works mentioned above, besides the five villas that were built in 1921 as summer residences for Macanese on the southern shore of Taipa; there were little changes on the island for a few decades. From 1926 to 1974, Portugal went under the rule of the authoritarian and highly bureaucratic regime *Estado Novo* (lit. New State), which centralized

colonial administrative bodies and policy making in Lisbon, causing most urban development in Macau to be put on hold (Proença, 2007).

This changed in 1971, with the completion of the preliminary stage of Macau's first Master Plan to include the islands (*Plano Director de Macau*, developed by *Grupo de Trabalho de Planeamento de Macau*). Even though this plan was never carried on to further design stages, nor was it officially published but many of its strategic principles were adopted in the following decades. The plan previewed distinct roles for each of the three territorial units: while Macau was in urgent need of expansion in the short run, Taipa was envisioned as a long-term expansion area and Coloane was regarded as a touristic destination only. The plan established large land reclamation areas both for the Peninsula and for Taipa, meant to accommodate the high demographic growth that was taking place since the 1950s. It also established strategic lines for the development of a transport and infrastructural network; including the Macau-Taipa bridges and the International Airport in Taipa (Proença, 2007).

In 1987, the Sino-Portuguese Joint Declaration determined the conditions of the handover of Macau's sovereignty from Portugal to China (three years after the Sino-British Joint Declaration for the handover of Hong Kong's sovereignty to China). The signing of this agreement resulted in an acceleration of public works for Macau as a whole. At this time the project for University of Macau was established in Taipa, acting as an important catalyst for its development. 1987 was also the year when the first plans for the new town project "New Taipa" were presented. Thus the planning of this new town came after the first ideas for Hong Kong's new town TSW (see above). One year later, in 1988, the firm Asia Consult prepared the "General Plan of Taipa" (Rodrigues Costa, 2001).

The opening of two new Macau-Taipa bridges - Ponte da Amizade (1994) and Ponte Sai Van (2004) -, the inauguration of the international Airport in 1995, and the construction of the COTAI strip around the Taipa-Coloane Isthmus (first opened in 1963) in the early 2000s, set the ground for Taipa's most recent accelerated development. It was in COTAI that, following the opening of Macau's gaming monopoly in 2002, several of the world's largest casino resorts were constructed. If we compare Taipa Village with Baishizhou, it is remarkable that next to the 40 storey towers of New Taipa and the 980,000 sm Venetian Macau Casino Resort, yet the small fabric of Taipa Village remained unaltered.

Land management and ownership

The different organization of land ownership is another key factor influencing the different urban forms of the three villages. The indigenous villages in HSK were constructed on land belonging to clans. Basically two types of land ownership in the New Territories existed, one privately owned and the other collectively owned under the name of a T'so (祖) or a T'ong (堂)²¹¹. It is a Chinese customary trust over land to maintain and preserve the clan's properties in the village, for various purposes. It is estimated that there are about 7,000 T'so/T'ong established in the New Territories. They are governed by the New Territories Ordinance (Cap. 97) stating that an appointed manager of the T'so/T'ong shall be registered. For example, in the HSK case, it was reported that there were 100 ha T'so/T'ong land out of the 826 ha of acquired land from the villages, while the privately owned land was about 511 ha.

Over the years, rural land surrounding the original villages was transformed in various stages: Villagers sold their rights to build small houses to developers, which then developed larger units with up to nine houses (Cody & Richardson, 1997). These developments can be recognized as loosely grouped clusters outside of the tightly organized village cores (Figure 5b). Other houses were sold individually and can be recognized by individually fenced-in gardens

²¹¹ A t'so normally originates from an ancestor who did not want his land to be divided among his descendants, but to be preserved perpetually and collectively for various uses. A t'ong is similar but not originated from an ancestor. It can be a collective decision to form a t'ong to preserve the land for various purposes such as education, business or religious purposes.

(Figure 5c). Over the years, much of the village land in the New Territories was bought-up by Hong Kong's powerful property tycoons, who hold here large land banks as to control land supply and invest in future developments. But their land ownership in the area remains hidden and is not represented by plot boundaries and building footprints.

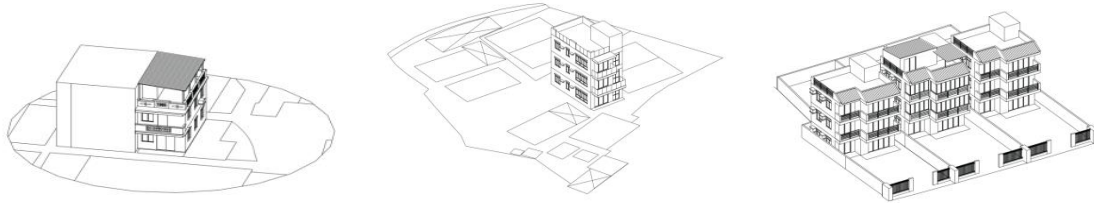


Figure 6. Village houses in Hung Shui Kiu with changing land ownership relationships.

Land in Baishizhou, as in other parts of China, is generally subdivided into two categories: 1) Land owned by the government and state owned enterprises and 2) Village land managed collectively by village corporations. In the 1950s under the new communist government, the state-owned agricultural collective, Shahe Farm, was created. After establishment of the Shenzhen Special Economic Zone, it was transformed into the different villages of Baishizhou.

In 1987, Shenzhen started to experiment with a land-lease system inspired by Hong Kong, however with the difference, that in Shenzhen (and China) only land-use rights could be acquired, while land-ownership remained unchanged. This option was confirmed in 1988 by a revision of the Chinese constitution. In only a few years, a vibrant real-estate industry developed in Shenzhen (Lü et al., 2001). Today, in Baishizhou the most important stakeholders are the village corporations, OCT Holding and further private developers, who are responsible for different parts of land within the super-block.

An essential difference, between the villages of HSK and Baishizhou, with their collective land ownerships and Taipa Village in Macau is, that after its repeated destruction through fire and typhoons in the late 19th century, it was reconstructed with a network of public streets, street blocks, and individual plots. Thus, although it has similarly small alleys and houses like the other two villages, it has clearly defined boundaries between public spaces and private plots (Figure 7).

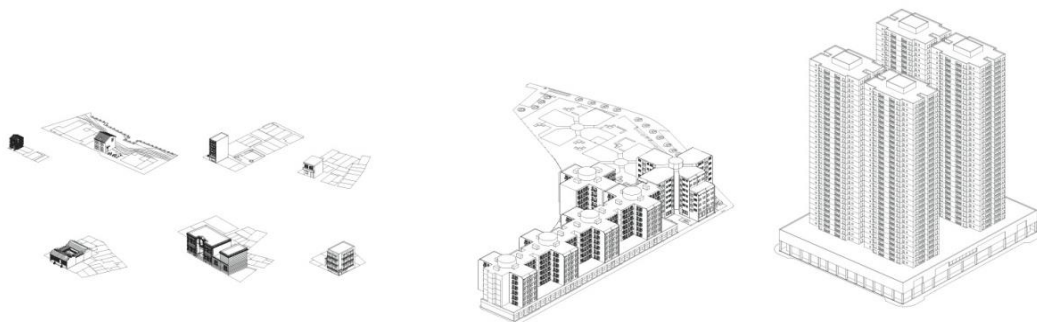


Figure 7. Selection of street blocks and building types of Taipa Village (left) and the surrounding public and private housing developments in its direct surrounding (right).

With Macau's growing role in tourism, Macau's municipal office conducted several projects to regenerate these public spaces. In contrast, the open spaces of the villages in HSK and Baishizhou are collectively owned and have ambiguous boundaries between the collective and private spaces. This contributes to various issues related to public safety, sanitary conditions, and illegal constructions. The different conditions of Taipa Village, were likely related to the

adjustments made after the destructions. However, despite these changes, the intimate scale of the village was kept.

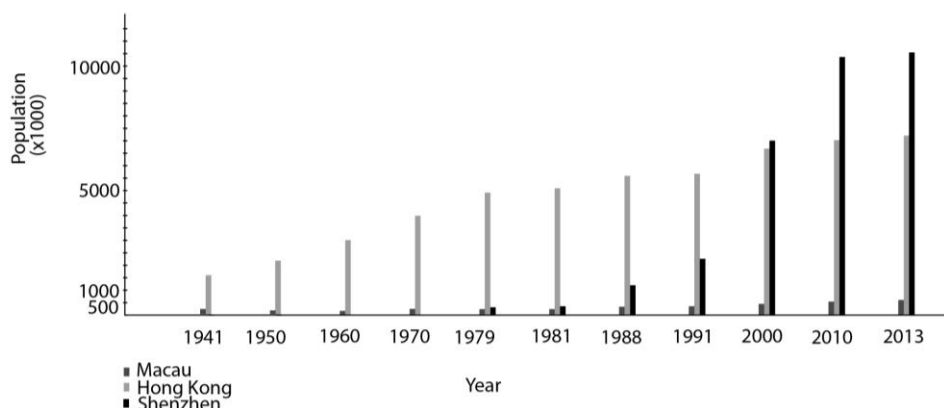


Figure 8. Population Growth Comparison.

Compensation for Eminent Domain

A major issue in the urbanization process of rural villages is arrangements of compensation for the loss of rural land.

In the first years after the establishment of the Shenzhen Special Economic Zone (1980), the government could easily expropriate rural land for new developments. At that time villagers were not compensated for the loss of rural land, but could usually continue to live in the area. The 1982 *Interim Regulations of Building Land of Villages in Cooperative in Shenzhen SEZ* allowed each household to build a residential dwelling of max 80sqm with a max floor area of 150sqm on 2-3 floors. At that time, villagers built the houses as their own homes. This changed soon with Shenzhen's rapid economic growth. From 1984 onwards, villagers increased the building heights to 3-5 floors, using only one unit for themselves and renting out the other units to migrant workers (Wang, 2013).

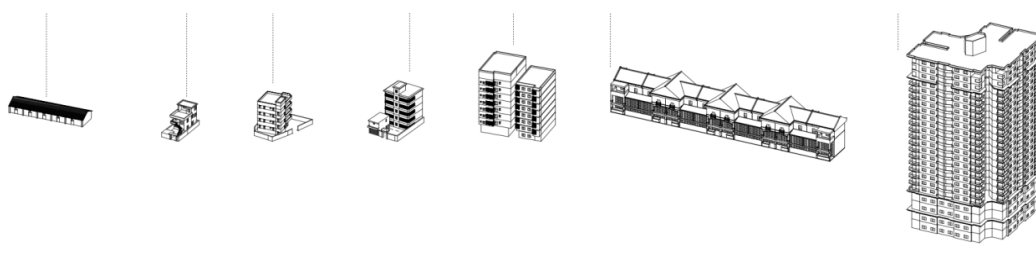


Figure 9. Selection of building types in Baishizhou arranged according to building age.

In 1989, the *Provisions of Land Expropriation in the Shenzhen Special Economic Zone* was implemented to protect parts of the rural land for “law-protected villagers” residential lots, as *Housing Based Land (HBL)*. In addition, parts of the expropriated land were returned to the villagers as compensation for their lost agricultural land. This land could be used for commercial and industrial developments, as *Land for Collective Development (LCD)* and would be managed by the newly established collective village corporations (Wang, 2013).

Villagers could now gain profits in two ways: rental-income and collectively managed commercial and industrial developments. According to the regulations for *Housing Based Land*, new plots were organized in a grid of 10m x 10m with narrow alleys (Figure 10).

In Baishizhou, we can find such houses built after 1989, however the grid layout and building dimensions are more irregular, creating labyrinthine spaces. In addition we find industrial

developments in the middle of the block, which according to the new rule of 1989 could be collectively planned by the village corporations. Based on the farmers' dwelling policy restriction, villagers in Shenzhen could not sell properties. Thus their main way to raise their income was to increase building heights and build more houses. Also as unbuilt areas in the villages were more likely to be expropriated by the government, villagers had an interest to cover the entire area with buildings. This resulted in the extremely narrow, dark and dense spaces in Baishizhou and other urbanised villages in Shenzhen.

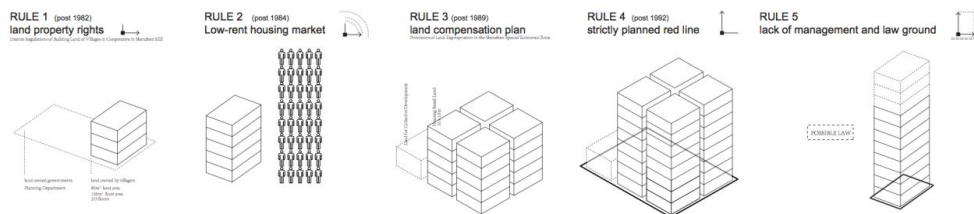


Figure 10. Compensation rules for villagers of urban villages in Shenzhen.

Reflecting upon the rules Hong Kong government implemented to address the high demand for land for the accommodation of migrants and the construction of factories in the decades following World War II, we can identify different rules from those in Shenzhen. The first migrants who arrived either were absorbed by the urban areas, where in the 1950s height restrictions were loosened, and buildings quickly grew taller; or they settled in improvised squatter areas along the hills, which the government demarcated. With the decision to extend urban development with new towns into the New Territories, as suggested by Abercrombie in 1948, landowners in the villages (elders or their sons) became interested in selling or leasing some of their property to private developers. In 1960, the government devised a way of acquiring rural land in the New Territories and responded to the interests of villagers and developers by implementing a program of transferable development rights: for every 5sqft of agricultural land surrendered 2sqft of building land were allocated (in the form of a certificate for future redemption). In contrast to Shenzhen, villagers in Hong Kong's New Territories could sell the new development rights on the open market, much of which were bought by developers. A new policy, known as Letter A/B system, provided villagers with a marketable certificate tied to specific development parcels in the new towns.²¹² The rule was especially used in centrally located and earlier developed parts of the New Territories such as Shatin in the 1960-70s. Today, this option is no longer used in HSK. The rule which instead shapes the urban landscape here is the Small House Policy (Cody & Richardson, 1997).

This policy was launched in November 1972. Under it, indigenous male villagers, who are over 18 years old and are descended through the male line from a resident in 1898 of a recognized village, are entitled to one concessionary grant during his lifetime to build one small house. The policy allows indigenous villagers to build small houses, no matter if they own land or not²¹³, provided that they are built in existing village areas within 91.44 metres (300 feet) from the edge of the last house built before December 1972, or within village type development

²¹² Each new town had several parcels of urban development land for redeemed Letters A or B certificates, developers bid to develop Letters A/B parcels by purchasing required number of certificates in the open market. Under the conditions of the 1984 Basic Law Agreement between Great Britain and China, after July 1 1997, the Letters A/B certificates were no longer operative (Cody & Richardson, 1997).

²¹³ (a) For an indigenous villager who owns private agricultural land, he can apply for a building licence at nil premium, or a land exchange to build a small house on his own agricultural land; or (b) For an indigenous villager who does not own land, he can apply for the grant of a site on government land at a concessionary premium of two-thirds of the full market value.

zones in Development Permission Areas or Outline Zoning Plans. The small house is regulated by a height limit of 3 storeys or 8.23 metres (27 feet) and 65.03 sqm (700 square feet) in the roofed-over area (Figure 11).

Height and Roof Area (post 1905)

Height means the perpendicular height measured from the lowest point at ground level to the highest point of the roof. In determining the highest point of the roof, no account should be taken:



Height and Roof Area (post 1972)

Height means the perpendicular height measured from the lowest point at ground level to the highest point of the roof. In determining the highest point of the roof, no account should be taken:

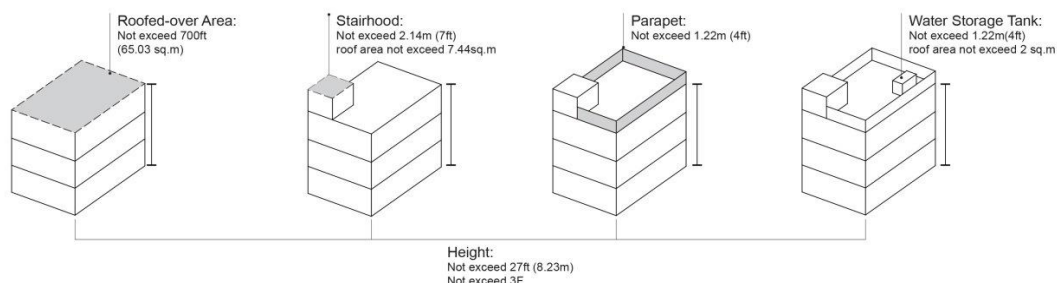


Figure 11. Urban rules in Hong Kong's New Territories including the 1972 Small House Policy.

Since then, a process of suburbanization started in the New Territories. All new private buildings had the same small dimensions and were scattered on the village land without an overall planning process.

In Hong Kong, this rule was a welcomed entitlement for those who qualified, and was generally followed. However, in Baishizhou, the rules implemented by the government to compensate villagers and restrict illegal constructions were usually soon ignored after implementation. According to V. Wang, the inability to provide enough land for development, pay the full compensations promised to the villagers and provide enough accommodation for migrants, made it difficult for the government to enforce their own rules. Villager used this weakness to extend their houses to 7-8 storeys since the 1990s, as demand for rental spaces continued to grow. Later, implemented rules such as the *Bylaws of Housing Rental in the Shenzhen Special Economic Zone* and *Bylaws of Registration of Real Estate in the Shenzhen Special Economic Zone* remained without effect (Wang, 2013). In Baishizhou, some of the village buildings reach up to 15 storeys.



Figure 12. Development units of Taipa Village and its surroundings

In Taipa Village, the situation is very different from the other cases. Most inhabitants here were fishermen or tradesmen and didn't own significant amount of farmland, for which there was also little space given that the village was surrounded by hills and water. New constructions for public and private housing were built on reclaimed land, and thus needed no costly and long negotiations. This also benefited the government, which like Hong Kong uses a land-lease system and benefits from the production of new land, if the building density is high enough to recover the reclamation costs. In contrast to HSK and Baishizhou, villagers in Taipa had no basis to bargain for compensation. On the other hand, they were not driven out from their private properties either.

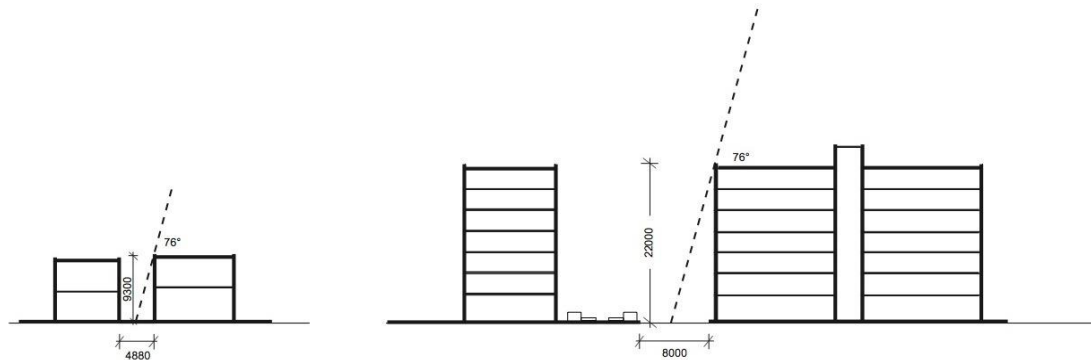


Figure 13. Shadow rule, Taipa village.

Although Macau experienced several waves of immigration, Taipa Island wasn't affected for a long time. Until 1974, the only way from Macau to Taipa was by ferries. After the construction of the bridge connection, new constructions remained limited to middle to upper class housing, except a smaller public housing project built adjacent to Taipa Village in 1992. This project was part of a larger social housing programme that took place in Macau as a whole, between 1985 and 1992, to house low-income residents of the territory. However, generally job opportunities for low-skilled workers remained on Macau peninsula. This only changed with the construction of the new casinos after 2002. The small dimensions of houses in Taipa Village remained determined by the small plot sizes and the Shadow Rule, established in 1985 by the General Regulation of Urban Construction, which defined building heights by a 76 degree angle measured from the middle of the street (Figure 10). As streets and alleys in the village remained narrow, the building height also remained low. The same rule, however, allowed in New Taipa high walls of towers based on the wider roads and open spaces in this area.

Redevelopment

The HSK NDA, will not directly affect the settlements of the indigenous villages, but residents are afraid of unemployment and loss of income in form of rent, if the surrounding container storages would disappear to make space for the new housing development. In addition there are concerns of the indigenous villagers eligible to small houses, if they still will be able to find spaces to build them. Also there is some frustration on their side that it is not allowed to build larger buildings.

On the other hand there are also those concerns of people in Hong Kong, which cannot find affordable living space and have to live under very congested conditions. The Small House Policy continues to make efficient land use in the New Territories difficult, resulting in the paradox condition to have large areas with scattered settlements of three storey "village homes" and next to them, high density new towns, like TSW, with over 30 storey towers.

Table 1. Rules Comparison

	Hong Kong	Macau	Shenzhen
History	<i>The Great Evacuation</i> 1662-1669	<i>Macau leased to Portuguese</i> (establishment of a trade and catholic missionary city) 1557	<p>Collectivisation of private property Early 1950s</p> <p>Shenzhen Special Economic Zone established 1980</p>
	<i>Hong Kong Island: British Colony (started town developments)</i> 1842	<i>Macau: Portuguese Colony (first comprehensive urban plans)</i> 1846/1887	
	<i>Kowloon Peninsula also ceded to British (more new towns)</i> 1860	<i>Plan for the Amelioration of the Cities and Villages of the Kingdom</i> 1864 – 1956	
	<i>New Territories leased to British, reclamation for more new towns</i> 1898	<i>Portuguese Administration extends to <u>Tai</u> Islands</i> 1847	
	<i>Abercrombie Report 1948</i>	<i>Macau Master Plan -Preliminary design (includes large areas for land reclamation both in the peninsula and <u>Tai</u>, as well as a comprehensive road network. Although it was never officially published it was put in practice)</i> 1971	
	<i>Planning and Development Study on North West New Territories 1997 - 2003</i>	<i>General Regulation for Urban Construction (establishes the 76° shadow law)</i> 1985	
		<i>Urban Planning Law</i> 2013	
		<i>New Land Reclamation Master Plan (on-going)</i>	
Land Management & Ownership	<i>Convention for the Extension of Hong Kong Territory 1898</i>	<i>Land Law</i> 1980	<i>Housing Based Land</i> 1989
	<i>Old Schedule Lots, Block Crown Lease 1899-1903</i>		
	<i>Cap. 97 (S.15) New Territories Ordinance (Registration of manager of "ong", etc.)</i> 1911		
Compensation	<i>Housing Ordinance (after Shek Kip Mei fire)</i> 1954	<i>Regulating Decree declares in force for all Portuguese Provinces the Letters of Law of 23 July 1850, 17 Sept. 1857 and 8 July 1859 in what regards expropriation for public use</i> 1864	<p><i>Interim Regulations of Building Land of Villages in Cooperative in Shenzhen SEZ</i> 1982</p> <p><i>Provisions of Land Expropriation in the Shenzhen Special Economic Zone</i> 1989</p>
	<i>New Territories Land Exchange Entitlements (commonly known as Letter A and Letter B)</i> 1960		
	<i>Small House Policy</i> 1972		
	<i>Village Expansion Scheme</i> 1981		
Eligibility for housing	<i>Public Resettlement Housing</i> 1954	<i>Economic Housing Law</i> 1980	<i>Implementation of Hukou system</i> 1950s
	<i>Public Housing Programme</i>	<i>Economic Housing Law</i> 2011	
Redevelopment	<i>Land Premium System</i> 1984	<i>Regulation Regarding Building Heights and Plot Ratio</i> 2009	<i>Comprehensive Planning Guidelines for Urban Villages Redevelopment 2005-2010</i> 2005

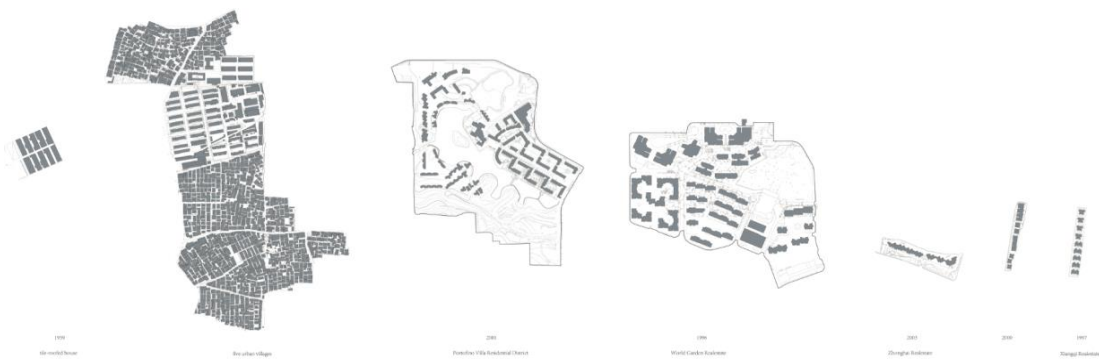


Figure 14. Development units of Baishizhou.

In Baishizhou, the villages are already surrounded by new developments, which tend to be gated up-market residential estates. In 2005, the government implemented the *Comprehensive Planning Guidelines for Urban Villages Redevelopment 2005–2010* as another attempt to show its determination to solve what they identified as the fundamental problems of urban villages and free up land for development. Villages in Shenzhen which have been redeveloped, usually had a significantly higher density than before, as to make-up for the much higher compensation claims of the villagers. In Baishizhou, the low rental prices in the villages allows workers and young university graduates to remain in the central areas nearby the employment provided in the Overseas Chinese Town.

In Taipa, the municipal government has implemented several improvements to these public spaces in the recent years, treating them in a similar fashion to those heritage urban ensembles of the Historic Centre of Macau (UNESCO 2005). This has contributed to the inclusion of Taipa Village in Macau's tourist routes, which is now emphasized by the recent construction of a footbridge connecting Taipa Village to the COTAI, particularly, to The Venetian Casino Resort. As a consequence, shop rent in Taipa Village are increasingly high, which is contributing to a gentrification process. In addition, the improved public spaces are taken over by tourist groups.

Conclusions

Major differences in the urban forms between the three cities are found to be related to historical conditions and urban rules: In Shenzhen, and generally mainland China, the essential difference between inhabitants with local and non-local registered households (“*hukou*”) was a key factor for the growth of urban villages as most incoming migrants were excluded from the housing produced by the government and state-owned enterprises and there was no formal private housing market. As the government had difficulties to provide promised compensations to villagers and couldn't address the housing needs of migrants, they accepted a twist of the rules by the villagers to build more and taller buildings, resulting in a further increasing density and potentially higher compensation claims of the villagers. On the other hand, when compared with squatter settlements in other fast growing parts of the world, Shenzhen's urban villages also have substantial advantages: they are centrally located and offer access to jobs, public transport, electricity, commercial facilities and to certain degree, clean water. In a region with frequent typhoons and flooding, they also provide a relatively safe environment, when compared to Hong Kong's early squatter settlements, which were often destroyed by natural hazards and fire.

Hong Kong's Letter A/B schemes since 1960 and the Small House Policy for indigenous villagers since 1972 have resulted in a clear separation between villages and new towns, and have shaped the uniformity of village houses in the New Territories. The Letter A/B schemes helped to shift development rights to new town areas and ensure more comprehensive new town

planning. In the meantime, despite the achievements of Hong Kong's resettlement and public housing programmes, urban poor and migrants, who don't qualify for the public housing, continue to live under appalling conditions in cagehouses and "coffin homes" (subdivided flats). Taipa Village, despite having kept its original urban fabric, serves mainly as tourist spot today, and ironically, the height limitation rule that managed to keep its original form limits its potential as for further growth as a place for living.

Acknowledgements

This paper is part of a two-year (2013-2014) General Research Grant project "Investigating the Urban Design Guidelines of the PRD cities Guangzhou, Hong Kong, Macau and Shenzhen" (GRF453312) awarded by the Hong Kong SAR Research Grant Council. The authors would like to thank Doreen Liu, Natalie Xing, Vivienne Wang, the urban design students KANG Ningda, SUN, Qi, and ZHANG Chi, as well as the studio teachers Nuno Soares, Tat Lam, Colin Fournier, Travis Bunt, and Chris Gee for their contributions.

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A study of urban space form in areas with different economic development level: a case study of Jiangsu province

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Abstract. *The unbalance in provincial economy is a common phenomenon in China. It is an urgent task to take different urban development measures according to different areas' economic levels to achieve an integrated provincial development. With south, central and north Jiangsu areas of Jiangsu Province as an example, this article studies the urban space forms in different economic development level area, and points out that north Jiangsu area takes a point-like cluster dominated by Xuzhou, Huaian, Yancheng and Lianyungang; central Jiangsu area takes a belt-like cluster dominated by Nanjing-Nantong traffic axis; and south Jiangsu area takes a net-like cluster with Nanjing region and Suzhou-Wuxi-Changzhou region as the dominant. The evolution dynamic mechanisms vary greatly in the areas with different economic development levels. The industry structure dominates the traffic corridor pilots and the science and technology guide urban space form. For the areas with different economic development levels, different measures should be taken to optimize urban space form. South Jiangsu area should stress giant city construction and promote regional integration; central Jiangsu area should mainly construct riverside and seaside urban development belt to realize integration of south and central Jiangsu areas; and north Jiangsu area should focus on the construction of urban groups with some central cities as the core to achieve regional development.*

Key Words: region; urban space form; economic development level

Foreword

In China, it is a general situation that there exists an unbalanced provincial economic development. Since the 1980s, due to the shortage of finance, technology and market resources, each province has centered its resources for the development of areas with favorable conditions, leading to the aggravation of unbalanced urban economy. In 2014, the ratio between the first place and last place of urban GDP per capita in Anhui, Fujian, Jiangsu, Shandong and Zhejiang is respectively 2.8, 2.0, 3.5, 6.4 and 2.2. The unbalance in provincial economy has become an increasingly obvious issue, as proved by the contrast between Zhujiang Delta Region and north Guangdong area, Jiaodong Peninsula and southwest Shandong area, and the difference between south, central and north Jiangsu Province. The issue of income disparity, social conflicts and provincial infrastructure and resource overall planning difficulty and the deterioration of the ecological environment brought by the unbalance in provincial economy have posed a threat to the sustainable provincial economy development. As the need of a coordinated provincial development is becoming more and more urgent, different development policies should be acted for areas with different economic development levels. For instance, Jiangsu Province has proposed a joint development and cooperation between south Jiangsu area and north Jiangsu area, and Guangdong Province has advocated the integration of Zhujiang Delta Region and the mountain area as well as the flank areas. With Jiangsu Province as a case study, this study is to explore the inherent link between economic development level and urban space form and propose some measures to optimize the provincial urban space structure so as to promote a coordinated and orderly development of provincial economy.

Literary Review

In terms of the urban space form features of areas with different economic development levels, some scholars think that for the under-developed area, it is lacking in regional big cities, the cities and towns are far away from each other without organic connection, the cities are in point-like dispersion, and this kind of area is in the early period of regional development. For the moderately developed area, it bears more advanced regional transportation. The towns are in a belt-like spreading along the axis with help of communication axis and the exterior space of the towns takes an olive shape. The major axis of the olive goes along the polymerization axis, presenting a homogeneous belt shape (Haggett and Cliff, 1997). For the developed area, the balanced development of cities and towns accelerates the growth of central cities and secondary cities within this area. This area bears a multi-core space structure, the cities and towns form a continuous belt-shape polymerization axis with close interconnection, the polymerization axis connect each other, and displays a continuous network structure (John Friedmann, 1986; Sassen, 1991).

As to the evolution dynamic mechanism for the urban space form of areas with different development levels, some scholars point out that the under-developed urban form is under heavy influence of the natural resources distribution and the point-like dispersion of these cities are essentially coincident with the regions bearing advantageous land conditions or rich resources (Boume and Simmons, 1978); in the middle stage of industrialization, the point-like dispersing cities will be connected by traffic lines and develop gradually along the main traffic axis to form a polymerization axis; the economic development will promote the construction of new traffic lines, the increase of which will strengthen the relation between the cities, thus there will be an interactive development between cities and traffic axis (Che Qianjin, 2011). Based on the study of Europe, some other scholars find that by the time of post-industrialization, with the growing influence of technology, information network, ecological environment as well as the strengthening of relation among the cities, cities and regions, the concept of city will gradually evolve into urban agglomeration (Wegener, 1991; Castells, 1989).

As for the optimization of the urban space form in areas with different economic development level, scholars have put forward different ways. The economically underdeveloped areas should actively cultivate central cities and create regional growth poles (Boudeville, 1972; Lasuen, 1973). The moderately developed areas should strengthen the role of traffic axis, and takes the linear development mode of connecting several metropolises through the highly developed modern transportation line (Ginsburg, 1961; Whebell, 1969). The economically developed areas should take the development of track communication and large capacity public transportation as the leading force, and construct a multi-center and intensified urban-rural integrated development of regional space structure (Zhang Jiarui, 2012).

The existing research is mainly focusing on the regional development of the developed countries, while little attention is paid to the fact that the developing countries are undergoing a rapid urbanization and the regional disparity is widening unceasingly. There has been rare research on the maintenance of balance during development. This article will study the urban space form of the areas in Jiangsu Province with different economic development levels.

Theoretical Method

Jiangsu Province lies in the east coast of China covering a land area of 102,600 square kilometers. It governs 61 counties (districts). In 2013, its residential population was 78.6 million and the per capita GDP was 12,047 US dollars.



Figure 1. Location of Jiangsu Province.

Methods to classify areas with different economic levels

This research selects six indicators including the GDP non-agricultural rate, per capita revenue, per capita social retail goods, per capita GDP, rural residents per capita net income, labor force non-agricultural level, conducts a Q cluster analysis, and classified the whole counties (districts) into three layers according to their economic development levels. Based on this, the data of every group is transferred into ArcGIS to obtain the spatial distribution of each group and categorize Jiangsu Province into the developed area, moderately developed area and under-developed area.

Methods to extract urban space form

The unsupervised classification is conducted after the strengthening of the satellite photo map image of Jiangsu Province, and the results are re-categorized into buildings, roads, water body, forest, lawn, farmland and open land. Then the hot pixel suppression measures are taken for urban built-up area which is transformed into ArcGIS. Systematic samplings are collected with 1kmX1km grid to determine that the urban land area within the grid bigger than the average 1 standard value is used for urban construction, and the others are for the non-urban construction. In so doing, the image of provincial urban space structure is obtained.

Data sources

In this research, the indicator data like the per capita GDP, per capita revenue, per capita volume of domestic retail sales of commodities, rural residents per capita net income, non-agricultural rate of GDP, and labor force non-agricultural level originates from Jiangsu Statistical Annual 2013. The statistical standard is consistent and has the comparability. And the remote sensing data extracted for the urban space form is based on NASA's landsat8 remote sensing data, the image photography time is set in April, 2014, and the data is downloaded from US USUG Website (<http://www.usgs.gov/>).

Result

Obvious gradient of provincial economic development

Three groups of clusters can be obtained after the indicator data like per capita GDP, per capita revenue, per capita social retail goods, rural residents per capita net income, non-agricultural

rate of GDP, and labor force non-agricultural level of the 61 counties (districts) of Jiangsu Province are introduced into SPSS and a Q cluster analysis is made. The per capita GDP of each group of counties (districts) is 14,675, 8,048, 5,159 US dollars respectively, corresponding to the developed area, moderately developed area and under-developed area (Table 1).

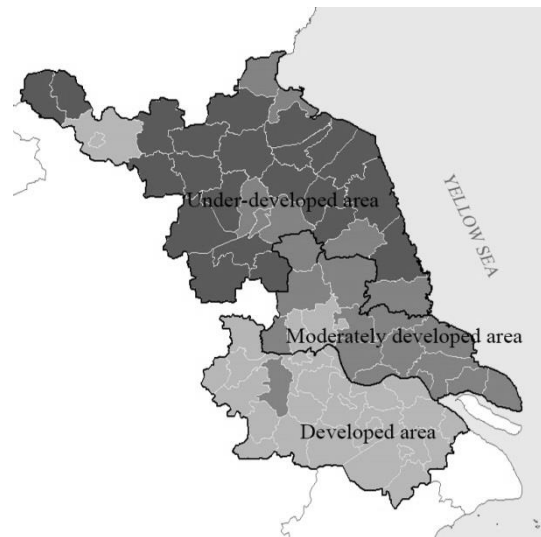


Figure 2. classify areas with different economic levels.

Table 1. Stratification of County (District) Clusters.

Type	Name of County (District)
Developed Area	Wuxi, Jiangyin, Changzhou, Suzhou, Changsu, Zhangjiagang, Kuanshan, Taichang, Nanjing, Lishu, Gaochun, Yixing, Xuzhou, Liyang, Jintan, Yangzhou, Zhenjiang and Danyang
Moderately Developed Area	Nantong, Lianyungang, Jingjiang, Haian, Rudong, Qidong, Rugao, Haimen, Ganyu, Huaian, Hongze, Jintan, Yancheng, Dongtai, Baoying, Yizheng, Gaoyou, Jurong, Taixing, Jiangyan, Suqian, Taizhou, Yangzhong, and Xinghua
Under-developed Area	Feng County, Pei County, Suining, Xinyi, Pizhou, Donghai, Guanyun, Guannan, Lianshui, Xuyi, Xiangshui, Binhai, Funing, Sheyang, Shuyang, Siyang, Sihong County, Jianhu and Dafeng

Displaying the space distribution of the three groups of counties (districts) on the map through ArcGIS, it can be found that the economic development level of the counties (districts) of Jiangsu Province indicates a gradual decrease of economic development from south to north with a spatial concentration characteristic. The developed counties (districts) concentrate in south Jiangsu area cities like Suzhou, Wuxi, Changzhou, Zhenjiang and Nanjing; the moderately developed districts (counties) concentrate in central Jiangsu area like Nantong, Taizhou and Yangzhou; and the less developed counties (districts) concentrate in north Jiangsu cities like Lianyungang, Xuzhou, Suqian, Huaian and Yancheng. The disparity between different areas manifests greatly in three indicators, i.e. per capita GDP, per capita revenue, and per capita social retail goods. The ratio between the developed and moderately developed areas is 1.93, 1.92 and 1.67, while the ratio between the moderately developed and under-developed areas is 1.55, 1.51 and 1.92. That is to say, the entire ratio is bigger than 1.5, which shows that the economic development level displays a gradient feature.

Table 2. Economic Data Comparison between Different Areas

Area	GDP Per capita (\$)	Revenue Per capita(\$)	Social retail goods Per capita(\$)	Rural residents net income Per capita (\$)	GDP non-agricultural rate (%)	Labor force non-agricultural level (%)
Developed area	14,675.2*	1,357.8	15,536.4	2,569.2	96.4	89.8
Moderately developed area	8,048.5	707.8	8,048.5	1,928.6	88.5	73.3
Under-developed area	5,159.5	470.2	5,195.1	1,607.8	81.1	59.5

* According to WB, per capita 12616 US dollar is of developed country level

Table 3. Economic Data Comparison between Different Areas (Standardized)

Area	GDP Per capita (\$)	Revenue Per capita (\$)	Social retail goods Per capita(\$)	Rural residents net income Per capita (\$)	GDP non-agricultural rate (%)	Labor force non-agricultural level (%)
Developed area	1.62	1.61	1.57	1.26	1.08	1.21
Moderately developed area	0.84	0.84	0.94	0.95	0.99	0.99
Under-developed area	0.54	0.56	0.49	0.79	0.92	0.80

Striking difference of urban space form in areas with different economic level

Net-like cluster in south Jiangsu dominated by Nanjing, Suzhou, Wuxi and Changzhou

South Jiangsu area has formed a continuous net-like space structure led by two city regions, Nanjing City region and Suzhou-Wuxi-Changzhou region. It is at the mature stage of urban space development. Within the Nanjing City region, the core city status is obvious, the core city establishes a close link with the peripheral cities, there is a clear tendency of inter-city public transportation, and a high level highway network is basically formed with Nanjing as its core. The main cities lie on the radiation channels, and a net-like cluster based on transportation network has almost been formed. The Suzhou-Wuxi-Changzhou region has evolved from its early axial development to the current network development; the cities group has displayed a balanced development trend. In the suburbs of these cities, there have appeared some districts, which become the new space for the city expansion, and the city space has presented a multi-core and homogeneous network structure.

**Figure 3. Urban Space Form of the Developed Area in Jiangsu Province.**

Belt-like cluster in central Jiangsu dominated by Nanjing-Nantong traffic axis

The cities and towns on north side of Yangtze River in central Jiangsu area appear a belt-like cluster along the Nanjing-Nantong traffic axis and Yangtze River. With the completion of several Yangtze River channels, the cities and towns along the Nanjing-Nantong transportation axis will be affected by the radiation from the cities and towns on south riverside, especially those cities near the cross-river channels. As the development of lateral axis belt accelerates, the longitudinal axis of development comes into being.

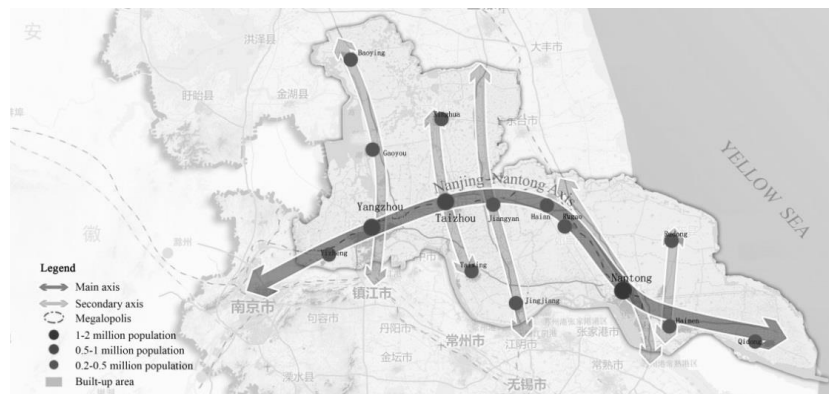


Figure 4. Urban Space Form in the Moderately Developed Areas in Jiangsu Province

Point-like concentration in north Jiangsu dominated by Xuzhou, Huaian, Yancheng and Lianyungang

The connection among the cities and towns in north Jiangsu area is fairly weak. In some regions with outstanding transportation advantages, the cities and towns begin to develop on the basis of transportation and a point-like space structure dominated by Xuzhou, Huaian, Yancheng and Lianyungang emerges. For instance, within Xuzhou metropolitan circle, there have appeared a space organization pattern, namely, one core city, Xuzhou; two city development axis, Xuzhou-Lianyungang and Zaozhuang-Xuzhou-Suqian axis; and a city connection channel, Suqian-Feng County-Pei County. In a circle at a radius of 300 km with Xuzhou as its center, the space connection is divided into the close-connected circle layer, economic cooperation circle layer and loosely-connected circle layer.

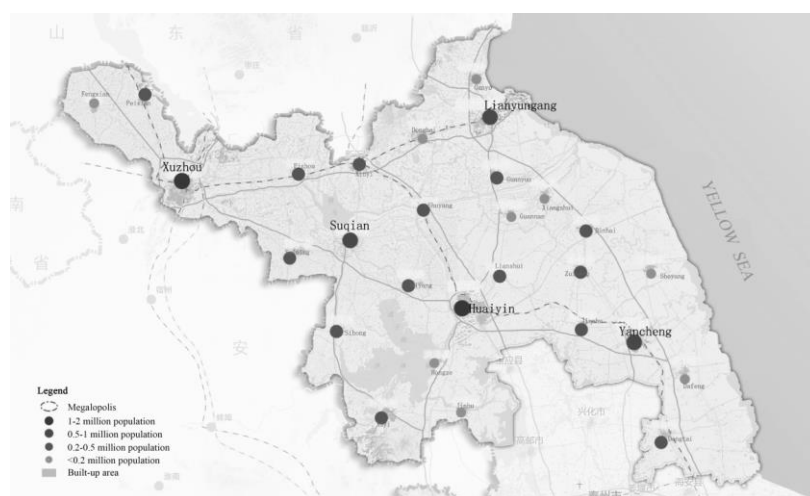


Figure 5. Urban Space Form in the Under-developed Areas in Jiangsu Province.

Different Evolution Dynamic Mechanism of Provincial Urban Space Form

Industry form dominates urban space form

Cities and towns are the base and backbone of industry development and industry is the source of urban development. The expansion of urban scale and the enhancement of urban status will provide better conditions for the development of industry, while the development of industry and the cluster of space will affect the urban development and spatial structure. South Jiangsu area strives to develop high and new technology industries, and some modern manufacture bases dominated by high and new technology have been formed. With the functions spreading of several cities like Nanjing, Suzhou, Wuxi and Changzhou, an industry structure network has been gradually established, and the development of each jointing city and towns has displayed a trend with homogeneous quality and spatial network. In some cities in central Jiangsu area like Yangzhou, Nantong and Taizhou, the technology-intensive industry clusters like petrochemical industry, fine chemical industry, superior automobile industry and household electrical appliances have been formed. The transportation-oriented heavy industry and manufacture industry has led to the formation of industry axis structure, which further promotes the belt cluster of urban space form. For north Jiangsu area, during its “Four Alongside Develop” strategy and the construction of “Three Latitudes and One Longitude” industry belt, the construction of the industry belt along the east Longhai Railway is highlighted, however, due to its disadvantageous base, the industries take a point-like form, which leads to the formation of point-like urban space form.

Traffic corridor pilots urban space form

The two core city regions, Nanjing region and Suzhou-Wuxi-Changzhou regions, in south Jiangsu area enjoy relative mature traffic network. A high level road net with Nanjing City as its core has been formed and the major cities spread along the radiation channels, among which Nanjing-Zhenjiang, Nanjing-Yangzhou and Nanjing-Wuhu are the main axis with advantageous development momentum. Suzhou-Wuxi-Changzhou region bears an inter-linked space structure, and for its systematic traffic network, the fluidity among its inner elements has been strengthened. As to central Jiangsu area, the cities and towns along the two highways, Nanjing-Nantong and Nanjing-Shanghai highways, especially those at the traffic hubs have developed rapidly, and the point-axis system has been increasingly improved. Among them, based on the development of traffic corridor composed by Nanjing-Nantong Highway, Nanjing-Qidong Railway and Yangtze River, Nanjing-Nantong traffic axis contributes to the planning of riverfront basic industry belt. The urban space structure in north Jiangsu area takes a point-like pattern, the cities and towns develops along the traffic corridor composed by Beijing-Shanghai Highway, Xinyi-Changxing Railway, Huaian-Yangzhou Railway, Beijing-Hangzhou Grand Canal, Tongjiang-Sanya Highway, Nantong-Ganyu Canal and the seaports, East Longhai Railway, and Xuzhou-Lianyungang Highway. Each city and town is independent, the number of small towns is numerous and the scale of the major cities is limited.

Science and technology guides urban space form

The economy of south Jiangsu area is fairly high and the level and quantity of the higher education establishments and scientific research institutions within this area has the outstanding advantage. The economy in this area is based on the advanced and new technology. With Nanjing, Zhenjiang, Changzhou, Wuxi and Suzhou as the joint cities, the cities and towns on the urban belt have robust economy, and the industry is shifting towards advanced and new technology industry. This area is the concentration place for the electronic information, biological engineering and new medicine, new material and new energy. It has a big density of

cities and high level of economy development, and the export-oriented degree of the cities and towns is growing. In many cities of this area, various types of technology industry parks, science establishments, college towns have been constructed to meet the need of adapting to the advanced and new technology and the rapid development of information economy. The advanced and new technology has become the dominant force for the development of the city marginal space. Due to the limitation of economic development level, the influence of science and technology is yet distinct.

Optimize urban space form according to local conditions

Promote the integration of south Jiangsu area and improve network development of space form

Promote the integration of south Jiangsu area and the integrated construction of urban and rural areas, and build grand urban region in south Jiangsu area. Upgrade the function of major cities, and develop actively the medium-size and small-size cities. Build multi-level functional complementary city areas, realize regional urbanization, and establish a structure with proper distribution, mutual connected and functional complementary of major-size, medium-size and small-size cities.



Figure 6. Optimization Measures for Urban Space Form of the Developed Area.

Strengthen urban traffic corridor in central Jiangsu area and construct the riverside and seaside urban development belt

The cross-river channels in central Jiangsu area has promoted the shift of industry from south to central Jiangsu area, provided a new environment for the development of advanced and high technology industries in south Jiangsu area, and created channels for the introduction of market space and capital for the riverside resources in central Jiangsu area; jointly develop industry parks, promote the share of resources and information across the river, and put hands together for development and construction; strengthen the cooperation between the joint cities, and based on the existing and cross-river channel to be completed, overcome the limit of administrative regions and promote the formation of unique economic zones. Build seaports in central Jiangsu area, promote the traffic and infrastructure level, and build an urban space structure of “three pole-one belt-multi joints”. With the main seaport area of Lianyungang Seaport, Yangkou seaport area of Nantong Seaport and Dafeng seaport area of Yancheng Seaport as the focus, promote the construction of Lvsi seaport area of Nantong Seaport, seaport group at Guanhekou area, Sheyang seaport area and Binhai seaport area of Yancheng Seaport at the right moment to support the seacoast urban belt, and make this area the most convenient exit to sea and a window to the outside world along Longhai and Lanxin Railway.

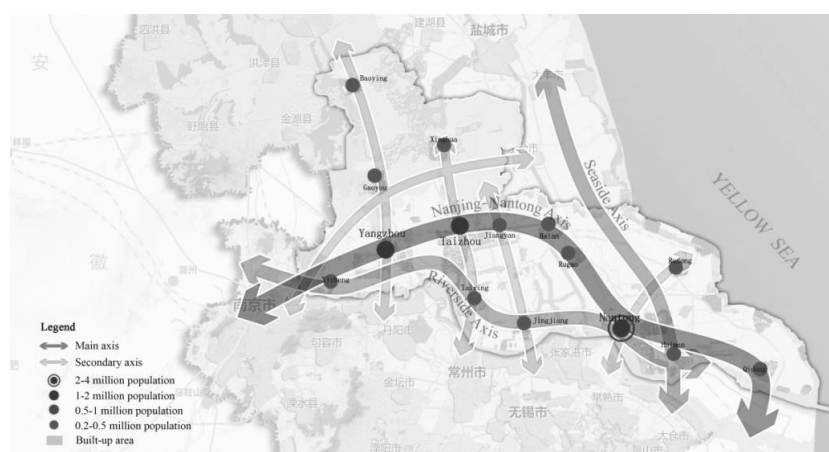


Figure 7. Optimization Measures for Urban Space Form of the Moderately Developed Area.

Cultivate growth pole in north Jiangsu area and construct urban groups with central cities as the core

During the development process of north Jiangsu area, attention should be paid to the cultivation of growth poles. Enhance the development of central cities, and bring the potential advantage into full play. Given the fact that the urban development is still at the cluster stage, we should give priority to the development of major cities and enhance the development of central cities. Actively cultivate central cities like Xuzhou, Huaiyin, Yancheng and Lianyungang and develop counties and central towns to transform the pattern of “ponies drawing cart” into the pattern of “a group of horses drawing cart”.

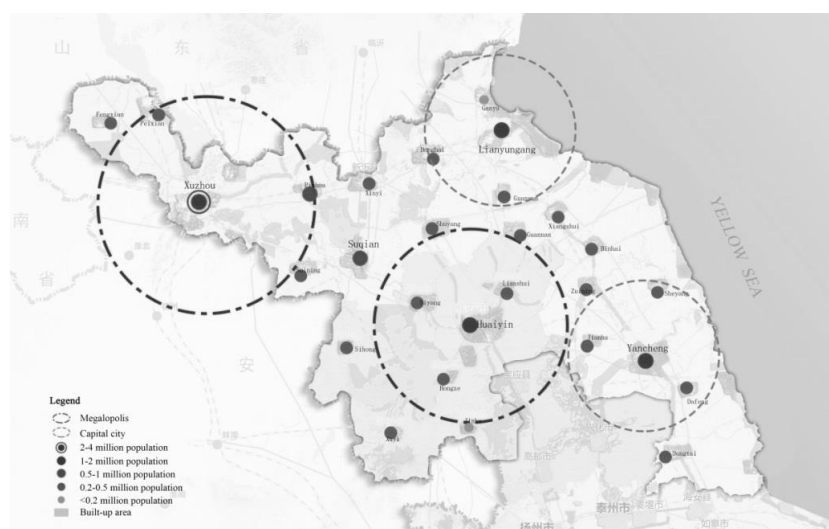


Figure 8. Optimization Measures for Urban Space Form of the Under-developed Area.

Conclusion

The unbalance in provincial economy is a common phenomenon in China. The economic development of the counties (districts) in Jiangsu Province presents a progressive decrease from south to north, with a gradient feature between south, central and north Jiangsu areas.

The urban space form of the areas with different economic development level varies significantly. South Jiangsu area takes a net-like cluster form with Nanjing region and Suzhou-Wuxi-Changzhou region as the dominant; central Jiangsu area takes a belt-like cluster dominated by Nanjing-Nantong traffic axis; and north Jiangsu area takes a point-like cluster dominated by Xuzhou, Huaian, Yancheng and Lianyungang. The new urban belts emerge in south and central Jiangsu riverside area, and central and north Jiangsu seaside area.

The evolution dynamic mechanisms vary greatly in the areas with different economic development levels. The industry structure dominates, the traffic corridor pilots, and science and technology guides urban space structure.

For the areas with different economic development level, different measures should be taken to optimize urban space structure. South Jiangsu area should stress the construction of giant city and promote regional integration; central Jiangsu area should mainly construct riverside and seaside urban development belt to realize integration of south and central Jiangsu areas; and north Jiangsu area should focus on the construction of urban groups with central cities as the core to achieve regional development.

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Gilberto Freyre's work: between urban morphology and building typology – first approaches

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Abstract. *There are many possible ways of reading Gilberto Freyre's work. One can read them to know about Brazilian society; other to understand the process of mixing races from which resulted Brazilian people; yet some other can do that to get to know the History of Brazil from a sociological point of view. But there is also another possibility which is to find morphological and typological approaches throughout Freyre's work. Since the sociologist adopted the house as the centre of interest of a great part of his works, and analyzed it to comprehend Brazilian society, there is a lot of information in his texts regarding certain types of buildings, as well as information concerning the cities where these buildings were placed. In fact, Gilberto Freyre was one of the first Brazilian researchers who gave attention to the study of the traditional house in relation to the urban landscape it composed. We aim here to present some morphological and typological approaches in Gilberto Freyre's work, considering the trilogy composed by *The masters and the slaves*, *The mansions and the shanties*, and *Order and Progress*, as well as some other important works in which he deals with the theme of the Brazilian house.*

Key Words: *Gilberto Freyre's work, urban morphology, building typology, the Brazilian house, 19th century.*

Introduction

During the 1930's, Gilberto Freyre published two of his main works: *The masters and the slaves* (1933) and *The mansions and the shanties* (1936). In both of them he adopted the Brazilian house as the centre of interest of his research on Brazilian society. In both of them he mentioned the creation and transformation of Brazilian types of buildings, mainly those destined for habitation, analysing the house produced by a society still in process of formation instead of the house or building projected by renowned architects.

Whereas in *The masters and the slaves* his focus of interest was the rural residence, particularly the sugar-mill complex, in *The mansions and the shanties* he was interested in the urban house – specially the two up to five-storey house which made up some Brazilian urban landscapes at the 19th century. To analyse the house, Freyre considered also the city, or the urban context, with its open and built spaces.

To do this research, Gilberto Freyre made use of some sources such as traveller's writings, biographies, memories, 19th century journals, 19th century photographs and pictures, and some other materials which were not vastly considered by Brazilian historians up to then. Therefore, regarding History and History of Architecture, Freyre's work was innovative in the use of these source materials, as well as in that consideration of the ordinary house which composed the majority of the urban and the cultural landscape.

In his work Gilberto Freyre studied the master's residence and slave habitation, the two-storey house and the "mucambo" (or the shanty), the ground-floor house and the five-storey house, and referred also to the chalet, to the garden small palace, and to the country house. In describing them, comparing them, relating them with landscape, with their surroundings, with society, with ways of living, he built up a typology of the Brazilian house of the 19th and preceding centuries.

Curiously he was not an architect but a sociologist interested in the study of the house for comprehension of society. It is also necessary to mention that previously to the writing of these

works he had the opportunity of studying in the United States and in Europe, where he would make contact with specialists who were worried about cultural aspects not under consideration in Brazil up to then – which meant an important influence on his work and thought.

Always remembered by the everlasting discussion on the advantages of mixed race, Gilberto Freyre should also be considered as one of the predecessors of professionals whose study of the type takes into account society, history and certain morphological aspects. When he came back to Brazil, he was ready to write several studies on the Brazilian house – in spite of his main objective being the study of Brazilian society.

Morphological and typological approaches in Gilberto Freyre's work

While in Europe the first studies of the urban form appeared at the end of the 19th century in works such as those written by Otto Schlüter who established a morphology of the cultural landscape, in Brazil the first studies of the urban form may be attributed to some travellers who visited the country during the 19th century whose analysis is more than merely descriptive. Differently from what happened in Europe, it was not the rapid increase of the cities that caught the attention of these travellers, but rather some lack of development in comparison with European civilisation as well as their peculiarities such as the fact of their being surrounded by tropical vegetation and their geographical aspects – not to mention cultural, social, historical, economical and architectural differences.

Certainly these studies did not compose a disciplinary field as those by Otto Schlüter and other European geographers; besides, they were written and produced by foreigners; however, they do reveal the 19th century Brazilian city in many aspects even if from an European point of view. Land form, climate, particularities of rivers and vegetation, the arrangement of houses and streets, numbers of floors, building materials, squares, public buildings, all of these characteristics of the 19th century Brazilian city can be found in some traveller's writings.

In Europe, Schlüter's influence spread out at the half of the 20th century through Conzen's works (Larkham, 1998). According to this geographer, the urban settlement has the essential attributes of a region and for this reason allows three complementary approaches: the functional, the morphological, and the historical-geographical (Conzen, 2004). In the case of the morphological approach, Conzen emphasizes on the one hand the importance of identification of formative processes and their geographical results in the townscape, and on the other hand the need of close attention to every significant townscape detail (Conzen, 2004).

In Brazil, Conzen's ideas did not spread out until the last decades, but Otto Schlüter has been a renowned geographer in the field of urban geography. Pierre Monbeig and Aroldo de Azevedo were responsible then for introducing, in the 1950's, the analysis of the urban space in Brazil taking into consideration geographical, historical, social, and cultural aspects.

Concerning typology, in Europe the study of the building type dates back to the epoch of the Industrial Revolution when Jacques Nicolas Durand attempted to classify types of buildings which made up the architectural pattern from the period. Philippe Panerai defined Durand's typology as analytical since it revealed but basic schemes of building plans and façades (Panerai, 1999). A typology interconnected with urban morphology that evinced relations between building types, the urban context, and the historical period was established in Europe only in the 1950's, when Saverio Muratori founded the Italian school of typology (Moudon, 1998). In the following decade, during the 1960's, Phillippe Panerai and Jean Castex started to develop a new method of typological analysis creating then the French school of typology (Moudon, 1998).

Whereas in Europe geographers were many times responsible for building typology during the 20th century, in Brazil it was Gilberto Freyre, a sociologist, who brought into light the importance of the study of the type for the understanding of man and society. Afterwards were historians of architecture rather than geographers who dedicated their research to the study of building types.

A considerable difference between building typology in Europe and building typology in Brazil results from this fact. When typology appeared in Brazil it was intrinsically related to social consideration, as well as to the urban and rural context.

In Gilberto Freyre's work social, geographical, and cultural aspects are always interconnected. When he studies and analyses some types of buildings, such as the mansion (or the two or more storey houses) and the *mucambo* (or the shanties), he does it with morphological and typological approaches. He considers house plans, as well as the house in relation to environment, streets, gardens, patios, and the landscape it composes. As a sociologist Freyre was able to establish a typology of the 19th century Brazilian house with a something of the study of the urban form.

If we take into account European or any other international study of the urban form or of building types, the relevance of Gilberto Freyre's work relies exactly on the importance he gave to social aspects in the study of building types as well as on his perception of the role of the house in society and in the shaping of man. Freyre believed that this type of architecture – the house – was one of the most important expressions of a culture. As a sociologist he recognized also the importance of this morphological element in the composition of landscape, specially the cultural landscape.

The Brazilian city in Gilberto Freyre's work

In 1960 the Brazilian geographer Aroldo de Azevedo published a text entitled "Gilberto Freyre's work examined by the light of Geography" (*A obra de Gilberto Freyre examinada à luz da Geografia*). In this text, Azevedo draws attention to the important contribution of Gilberto Freyre's work to the field of Geography in Brazil. Azevedo lists some of the main geographical aspects that can be found in Freyre's work such as certain characteristics of the Brazilian environment, or the process of colonization, as well as some relevant aspects concerning the Brazilian city.

In "The mansions and the shanties" Freyre presents a study of urban life in Brazil in the 19th century which has many times a geographical conotation as it includes information on the placement of Brazilian cities, on their urban characteristics, and on their streets, squares and buildings (Azevedo, 1960).

Recife is defined by Freyre as "socially an island and geographically something between an island and a peninsula" (Freyre, 2006a). Differently from what happened in most 19th century Brazilian cities, in Recife there existed flat streets where it was possible to find some four-storey houses – a consequence of the geographical characteristic of the place, since there was not much space so that houses could be larger than higher (Freyre, 2006a).

Rio de Janeiro was a city marked by its hills, and this geographical characteristic determined from beginning some social differences and spatial segregation in the urban space. According to Freyre, at first the rich built their houses on the top of the hills, while the poor lived at the bottom of them. Afterwards, the rich left the highest parts of the city to live by the sea, while the poor occupied the hills (Freyre, 2006a).

Regarding the city of Salvador, in Bahia, Freyre observes that it has always been characterized by large and extended streets, with houses open to the sea with plenty of palm trees in their yards (Freyre, 2006a). During the 19th century, the urban landscape of Salvador was also marked by gardens between the houses, mainly in the suburbs where the rich would live (Freyre, 2006a) – once again it is possible to find a relationship between the type of building and its geographical location in the work of Gilberto Freyre.

When the sociologist takes into consideration the city of São Paulo, he emphasises how soil type determined building materials during colonial times and in the earlier half of the 19th century, with a predominance of mud walls in urban houses, and how climate influenced architecture as in the use of glass windows instead of windows made of wood, due to the rains (Freyre, 2006a). He also affirms that in São Paulo there was a preference for country houses

surrounded by gardens and fruit trees to the detriment of urban houses – which partially explains the empty aspect of the city related by 19th century travelers (Freyre, 2006a).

The Brazilian city in Gilberto Freyre's work is considered in its morphological (or geographical) aspects, and these aspects are revealed to explain the way the city was structured – with spatial or social segregation –, to be related with some characteristics of the house itself, and to bring to light characteristics of Brazilian society. In Freyre's work everything is interconnected: the Brazilian city, the Brazilian society, and their types of buildings.

Types of buildings studied by Gilberto Freyre

Amongst those houses studied by Gilberto Freyre are the master's residence, slave habitation, the two or more storey houses, the ground floor house, the mucambo (or the shanty), and the chalet.

The first one is described at the preface of "The masters and the slaves": "(...) The sugar-mill master's residence that the colonizator started to build up in Brazil at the 16th century with large mud walls or stone and lime walls, roofed with straw or tiles, a porch in front and beside it, fallen roofs in a maximum of protection against the strongest sun and tropical rain was not a copy of Portuguese houses, but a new expression, corresponding to our phisic environment and to an unexpected phase of Portuguese imperialism: their agrarian and sedentary activity in the tropics, their rural and proslavery patriarchy. Since this time the Portuguese (...) became Lusitanian and Brazilian at once, the founder of a new economic and social order; the creator of a new type of habitation. It is enough to compare the floor plan of a 16th century Brazilian house with a 15th century Lusitanian manor-house to find out the enormous difference between the Portuguese from the reign and the Portuguese from Brazil." (Freyre, 2006b)

The sugar-mill master's residence was a symbol of power in rural areas. Not only slaves but also children and women were under domination of the master inside the limits of his property.

The first master's residences were simple to the point of being roofed with straw. However, throughout the centuries this type of building became more solid being built with less ephemeral materials. Palm trees started then to mark the front garden and the landscape, symbolising the nobleness of the house and the power of its owner. The patio garden was a mixture of the vegetable garden and the orchard, and presented a meaning of utility much stronger than an aesthetic value, as Gilberto Freyre observed in his second work (Freyre, 2006a).

Inside the master's residence one could find only the strictly necessary mobiliary; certain rooms would even appear predominantly empty to the European eye at the beginning of the 19th century. Some chairs here and there, sometimes a table, some other wooden mobiliary, and it was all that one could find there. Women would sleep in alcoves – bedrooms without windows – away from the eyes of the stranger and under the eye of the master.

The floor plan of the master's residence could be characterised sometimes by a porch between the guest's room and the oratory, a living room after the porch with bedrooms and alcoves on the left and on the right, and a kitchen at the back of the building close to the patio.

The master's residence was part of a complex in rural areas which included slave habitation. This was even more rustic than the former. In general, it was a rectangular building with mud walls, roofed with straw or tiles, with small openings, where slaves would sleep. Floor tiles were not used; instead the ground floor was made of soil. This type of building was in fact a large and rustic room for slaves.

While the master's residence – together with slave habitation – was placed in rural areas, the two or more storey houses were situated in the city. They were the richest type of urban house during the colonial period. As Gilberto Freyre emphasised, the number of floors as well as building materials were different from place to place. In São Paulo, this type of building used to have two storeys and was built with mud walls; in Salvador, Recife and Rio de Janeiro, they were made up of stone or brick and could have three, four or even five storeys (Freyre, 2006a).

The ground floor of such houses would commonly have rooms for slaves and guests, a store or warehouse, and a narrow corridor which led to the patio. The owner's family would live in fact on the upper floors, where there were rooms and alcoves. Kitchens used to be in the attic, where there were also rooms for female slaves. This kind of arrangement became so usual in the Brazilian house that Vauthier would affirm at the 19th century that those who had seen one of them had seen all of them (Vauthier, 1975).

The two or more storey houses were owned by some of the richest people of Brazilian society (from aristocracy and bourgeoisie), and symbolised the most civilised type of habitation in the tropics, according to Freyre: "There were not a few Brazilians from the first half of the 19th century to whom the good people, the good couple, the family well established, according to the patriarchal orthodoxy, should live, in the city, in a two or more storey house, leaving the ground floor house of any sort for those who were socially less consolidated. (...) This conception – of the two storey house still patriarchal and already bourgeois representing the best and highest Brazilian civilisation, at the end of the 18th century and at the beginning of the 19th century – seems to have been general amongst the cultured men of this epoch. Not only Brazilians would have it but also Europeans from the North – almost all of them impregnated with bourgeois and urban notions of civilisation." (Freyre, 2006a)

These houses were built side by side on the alignment of narrow lots without front yards (Reis Filho, 1970). Sometimes painted yellow or some other vivid colour, they made up some Brazilian urban landscapes up to the 19th century. But in between one and another building there would almost always be a ground floor house. This was simpler and poorer than the two or more storey house. It used to have a store or room at the entrance, followed by one or two alcoves, and a kind of dinning room with a kitchen at the back. Many times it would not present a tiled floor – which would contribute to a great extent to give it a dirty appearance. But however plain was it, this type of building would compose the Brazilian landscape in the same way as the two or more storey houses, built up on the alignment of narrow lots. One could say that it was even commoner than the former, mainly within those cities far away from the coast, where European influence was not so deep and commerce was less developed.

Narrow houses built on narrow lots on irregular blocks alongside narrow streets – this was the Brazilian urban morphological pattern during colonial times.

Near the city and sometimes inside of it there was the "mucambo" – one of the poorest types of habitation, but not the worst one concerning some ecological aspects according to Gilberto Freyre (2006a). The "mucambo" was a ground floor house made of straw and stick, and covered with palm leaves, in which it was clear the native and African influence. It was situated in mud flats or in swampy areas – the less valuable areas near the city. The internal arrangement was similar to that of the urban ground floor house, but instead of alcoves, it had bedrooms with windows.

Notwithstanding quality of materials used in this type of building or even the fact of its being an ephemeral house, the "mucambo" was in perfect harmony with the environment. In this sense, it was an ecological type of building.

In "The mansions and the shanties", Gilberto Freyre considered also the chalet, as one of the results of European influence on Brazilian architecture at the 19th century. Whereas in Europe the chalet was a wooden house which could be found in mountainous areas, in Brazil it became a mere style of some urban houses made of brick, characterised by front eaves in contrast with lateral eaves of traditional houses. This type of building used to have a small garden in the front yard – another European influence taking into account that during the colonial period the garden was situated in the backyard or in a patio surrounded by the walls of the residence.

The chalet was also considered in "Order and progress" (1959), in which the sociologist, based on a speech given by Vieira Souto, would express the necessity of a Brazilian architecture to replace certain foreign buildings such as the chalet that spread throughout Brazilian cities at the end of the 19th century and became common even in commercial streets (Freyre, 2004).

In his work, Gilberto Freyre wrote also on the country house, the villas (or small palaces), and the slum tenement. The country house was the best type of residence half way long the city and

rural areas or in the suburbs. It had the advantage of being situated near the city and as well the advantage of being surrounded by nature as the rural residence. Many travellers would emphasise the qualities of the country house and its surroundings such as Robert Burford and W. M. Gore Ouseley:

“(...) The houses in the suburbs are large, more convenient, and abound in the comforts of Europe: they are generally in large gardens, which during a great part of the year resemble huge bouquets (...)” (Burford, 1827)

“The Laranjeiras road is one of those that lead to the ascent of the Corcovado. It follows the winding course of a mountain brook, and the scenery is varied and beautiful. On either side are country houses, cottages, gardens, and ‘chacras’ or villas, in their enclosed grounds.” (Ouseley, 1852)

To the European eye the country house was a better place for someone to live in than the two storey house within the city. Surrounded by gardens, with a large porch, and many fruit trees throughout its terrain, such ground floor house with oratory, living room, bedrooms and alcoves, and a kitchen at the back, would seem to Europeans more advantageous in aesthetic and hygienic terms than the urban narrow two storey house.

The villas or small palaces in the same way as the chalet would be the result of European influence at the end of the 19th century as well as an expression of Eclecticism. According to Freyre the small palace was many times the residence of the “new-rich”, the “new-powers”, the “new-intellectual” (Freyre, 2004). It was another type of European building transferred to Brazil, where the social, cultural, and environmental context was totally diverse. But little by little it became one of the urban ways of living of aristocracy and bourgeoisie. Maria Cecília Naclério Homem has defined the small palace as the “type of one-family house, with one or more storeys, cellar, stylistic accuracy; a detached house, surrounded by gardens, with a service area and an annexe at the back” (Homem, 1996).

Inside the residence, as well as outside it, the small palace or villa would express a clear European influence on architecture. Sometimes neoclassical, other times eclectic, its rooms, its mobiliary, its architectural aesthetics would demonstrate that obsession with everything which was European. Above all, the urban small palace or villa, with its vast garden, would be a symbol of status as the master’s residence in rural areas.

While the small palace became the richest type of urban residence, the slum tenement became the poorest one. Carlos Lemos affirmed that the slum tenement was not a house in fact but a group of very small rooms where all the activities would be developed at the same place (Lemos, 1998). The slum tenement was characterised by the worst building materials and by a bathroom and service area common to all residents. It was not a healthy type of building but it was preferred to the “mucambo” by immigrants, and for this reason it became habitation for many industry workers (Freyre, 2006a).

In “The masters and the slaves”, “The mansions and the shanties”, “Order and progress”, and some other books, Gilberto Freyre brought to light relevant information on the Brazilian house. However, it was in “The mansions and the shanties” that he decidedly presented a typological study. In this book, he compared the two storey urban house with the “mucambo”, with the ground floor house, with the country house. He emphasised differences between two storey houses from one city to another. He established a relationship between the house and the street and analysed their transformation at the 19th century under European influence. He established a relationship between the house (or types of houses) and the 19th century Brazilian society – under European influence. He considered the “mucambo” within the environment it was part of. He established hierarchies and gave attention to materials, to room arrangements, to open and built spaces. In these terms, it is possible to affirm that he introduced the study of the type in Brazil, more specifically the study of the building type with some morphological connotation, at the moment he wrote and published his second work.

In Gilberto Freyre’s work it is possible to find some information on the Brazilian city and some information on the Brazilian house, but not only this. Freyre’s analysis of the Brazilian house as well as of the Brazilian city reveals some typological and morphological approaches

with a sociological refinement which is nowadays indispensable for any typological or morphological study.

The read of European and American texts was fundamental to his consciousness of the importance of the house in man's life, in society, in the urban or the rural landscape. As a sociologist he looked at the house to understand man and society, but the cultural inheritance from his work goes beyond this. The richness of his work lies not only in the comprehension of Brazilian society, but also in the knowledge of Brazilian houses, Brazilian gardens, Brazilian landscapes. His contribution goes far beyond the sociological field and reaches history of architecture, history, geography, landscape architecture, and so on. His work is certainly of great significance to Brazilian people but also to those who are interested in the way the sociologist analyses the house considering landscape and society.

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Meeting of minds: investigation on the common concepts and different approaches of the major Schools of Urban Morphology

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The purpose of this paper is to present the results from research conducted in the years 2011-2013, entitled: "Meeting of Minds", which investigated the common concepts and different approaches of the two major schools in urban morphology. The research focused on the survey work undertaken by the founders of the schools in order to carry out an urban analysis in England and Italy and thus establish, as well as, compare and contrast their different methods. Other sources of documentary references were found in books, publications in academic journals, together with, the reports of pupils who participated in the formation of these methods. Examples of convergence can be found in these approaches. Both, for example, consider the form as a product constructed throughout time and thus take the view that research should concern itself with the investigation of the transformations and continuities of the form in the urban landscape. However, the methods differ with regards to the scale of analysis. The English school tends to examine the form from the general to the particular, while in contrast, the Italian school chooses to take the building as the starting point and widens its focus to include the whole territory. In this sense, the concepts adopted by schools show both similarities and differences, however both reflect the specific goals of each approach. For the English school, the geographical approach is the guideline for a tripartite division of urban form. Conversely, for the Italian school, the architectural approach represents many focuses in relation to the basic built type and the typological process that transforms it over time. It is a primary contention of this article that the knowledge acquired from the structure of both schools may contribute to the development of a wider interdisciplinary approach to research on contemporary cities.

Key Words: schools of urban morphology; research; approaches; similarities; differences.

Meeting of Minds: Investigation on the common concepts and different approaches of the major schools of urban morphology

This paper describes the activities undertaken in "Meeting of Minds", a research project designed to investigate the common concepts and different approaches employed by the major schools of Urban Morphology, (FAPEMIG- PPM/ 2011-2013) which was accomplished in 2013. The incentive to develop this research is mainly due to teaching activity which has been based on the principles of the two traditional schools of Urban Morphology. These were previously presented on separate courses containing a practical assimilation of content over several years. In more recent years we have chosen to offer a course in condensed form containing the concepts of the two schools which have also been further explored in practical studies.

Another stimulus for this research was that it emerged as a result of suggestions made by Whitehand (2001) to those he encouraged in the development of studies designed to generate common concepts within the two schools. On the one hand, the main objective of the research comes from the need to disseminate the didactic concepts necessary for application in national Urban Morphology post graduate programs. On the other, the following specific objectives have

been identified: discuss common concepts in the various schools of urban morphology; identify the characteristics of each school; establish contemporary morphological thought.

The development of the research

The research was divided into two stages, the first being related to obtaining data on the English School of Urban Morphology and the second, to data collection on the Italian School. The first stage of the research began with a literature search on the main representatives of the English School in order to identify lines of investigation and conceptual currents. The literature in English was scanned and has been made available on the ISUF website and data was also obtained from interviews with key representatives, in addition to material obtained from books and periodicals. The data acquisition on the English School became a simple task and it was thus completed within the planned stage.

In contrast, the collection of data on the Italian School was rather more difficult. Some information is available on the ISUF website, but almost every article makes references to the professional architectural history of its founder, Saverio Muratori. (Marretto, 2012). Most of the data contains the work of Muratori's disciples who recorded, reinterpreted their classes with him and published a few books, almost all in Italian and now unavailable and out of print. Possible alternatives led us to interpret the projects planned by Muratori and assess possible concepts employed in his style and practices. Another strategy was to seek out publications written by Muratori's followers with the aim of establishing common concepts.

We opted to follow both alternatives, but the following factors have adversely influenced the development of the research project. Almost all literature is in Italian and as publications are not digitalised we were dependent on our Italian colleagues sending copies of the work in question, as well as, the availability of Italian teachers to fulfil such requests. Furthermore, there is only one publication in English on the method and in order to gain a full understanding it became necessary to translate and interpret the whole book (*Interpreting Basic Building* by Cannigia Gianfranco and Gian Luigi Maffei) (2001). Moreover, the concepts are not easily assimilated and it was necessary to promote seminars that provided an understanding of the work by reading the chapters and discussing the subject amongst members of the Laboratory of Landscape / EAUFMG. However, the main concepts were finally identified, analyzed, evaluated and compared, as the following part of the article will demonstrate.

The conceptual foundations of the traditional school of urban morphology

The conceptual foundations of the instrument have been addressed differently by followers. Analysis has been distinguished by greater emphasis on some elements of urban form rather than others, the differing focuses giving rise to the contrasting schools of urban morphology.

The English school of urban morphology structures its conceptual basis on the formulation of historicity which is the ability of the urban landscape to present the visible results of the morphological periods. Historicity is thus viewed as an attribute of the landscape that reflects the diversity and strength of its social historical and cultural content. Therefore, the overlap of new and old buildings is viewed as being the normal consequence of population growth, which has resulted in the adaptation of existing structures to meet current needs. Also apparent is the transformation that these structures have undergone in order to render them suitable for contemporary uses.

For these reasons, the evidence of historicity in the urban landscape suggests identification of these processes of historical interest generally, and such phenomena may be viewed as the ensembles of cultural and social needs during successive, more or less distinct cultural periods (M.P.G. Conzen, 2004). The morphological processes result from the development of the plan and its economic, cultural and functional determinants. The study of the successive plans of a

city and the oldest evidence of historical morphological phases show the city's development in terms of growth and inner transformation over time.

This study, together with analysis of the plans, aims to contribute to increasing the perception of the three morphological complexes, the road system, the standard division of plots and the built up area, which make up the urban landscape. These categories are closely related to individual buildings and units of land use, are found anywhere in the urban landscape and serve to accommodate one or another element of the urban plan. (Conzen, 1969)

In contrast, the Italian school is structured on the belief that there is a way to build homes that is intrinsic to a particular people, manifested in its culture at a given point in time. This particular way is viewed as a kind of gift already rooted in people's minds as a prototype inherited by every inhabitant of the group that proposes to build a house. This reproductive capacity of the people, to build prototypes without barriers and judgment, is referred to as spontaneous consciousness. Therefore, this consciousness, together with, human interactions with nature, structures the fundamental concept of the Italian school. (Caniggia ET Maffei, 2001).

As a methodological alternative the built type is considered "synthesis a priori" and the object of the morphogenetic historical research of the existing urban fabric. A typological study consists of the selection of a basic type which is in turn compared to other existing types. As such, it is possible to determine the appropriate level of specificity and thus establish the types of morphological distinction. With the structure of types and their respective classification established, the processes of evolution of urban areas can be traced leading to an understanding of the human environment. These are, in summary, the basic conceptual theories of the two schools of urban morphology. Their similarities and differences are discussed below.

Similarities and differences between the traditional schools of urban morphology

The common basis of the two schools lies in the researched object - the urban form and its transformations. Both schools study the transformation of the urban fabric and describe the transformative processes that occur over time, as well as, manifesting a shared notion of the urban form's formative and transformative process (Pereira Costa et al, 2013). Another commonality between the two is the realization that urban forms reflect the social, political and economic actions of agents within society.

The actions of economic forces often occurs through land speculation and, as noted by Rossi in 1980, through the implementation of urban plans that are determined by economic forces. The author concludes that the study of these actions is facilitated by the abundance of material in the capitalist city, usually manifest in plans. Both founders of the schools agree with such contentions. Thus for Conzen, (1969) the urban plan of the city is a reflection of the needs of its inhabitants and how the economic order settles at different times to meet such demands. According to the author, a reading of the urban plan gives us above all, an understanding of the different legal economic and political conditions prevailing in each period. These perceptions are important primarily because they allow the researcher to identify, through the decoding of planning regulations, the legal restrictions, political and economic data prevailing in each period.

Muratori, for his part, considers urbanism as a set of architectural products that renew and adapt according to the needs of society and thus the architectural objects are a physical reflection of these needs. For Muratori (1959), cities are great architectural compositions; they thus become a theoretical and methodological instrument of great importance. He comments that for urbanism, the essential fact is the urban organism and the character of the cities. The latter can be taken as a basis for the original sense of the urban development plan over time. It can also be viewed as a manifestation of the role of urban structures and buildings in civic and social life, moral environment, traditions and history. Pardo (1980).

The commitment to the preservation of the cultural bases of their respective countries, demonstrated by the two teachers throughout their academic careers, is also another important common point between the two schools. (Moudon, 1997). However there are differences regarding the approach of these schools which can be attributed to the academic background of the two founders: Geography and Architecture.

Differences

If the main object and beliefs share a common basis, the differences are mainly due to the methods of approach, characterized largely by the academic background of the two founders and their respective nationalities. The method developed by the German geographer M.R.G.Conzen, (Whitehand, 1981), the most eminent representative of the English school, is often referred to as a tripartite vision. In this, the urban landscape is seen as a composite of forms which belong to the three systematic categories: the urban plan; the urban fabric and the pattern of use and land occupation. In any urban landscape these categories are closely associated.

According to Conzen, the plot is the essential element in the urban plan as it represents the functional aspect of the city which expresses the logic of the genesis of a geographical settlement. The author notes that, even if changes related to the road system and land subdivision occur in the form of cities, the plot demonstrates the ability to align towards the streets and their extensions, adapting and maintaining its characteristics in the face of urban transformation over the centuries.

Moreover, the process of land subdivision in cities reflects the economic and social order of the inhabitants and transformation throughout time. The correct combination of each element is the result of land conditions and it is established by morphological homogeneity over all existing area units. This represents a planning unit which is unique and distinct from any other existing in the surrounding neighbourhood. Different regions combine their hierarchical system to form the whole of the urban landscape and it is vital to ensure the permanence of urban landscapes as important cultural assets.

The practices and articles written by Conzen led to the conclusion that the investigative line found in the English Morphology School is a result of a geographical background based on concepts developed at the Berlin School of Geography before the Second World War (Whitehand, 1981). The concepts learned by Conzen, during his academic training at the school, were applied in his daily practice in England after immigration in 1933.

The English Morphology School sees the urban form as a structure settled on a natural site. The method takes into consideration the global view of the site in order to analyse the town plan and its components, the road system, the standard division of plots and the built area. The method takes a broad view by going into a detailed analysis of the land occupation.

Conversely, the vision of the Italian school is structured in reverse. The school sees the city as a living organism, in constant transformation that is structured by built forms. Muratori conceives the morphological analysis based on an architectural scale and by focusing on the study of the building type - the prototype of the residential building can be viewed as a synthesis of a collective history defined from the observation and interpretation of the built environment. The architectural type is a construction, a built organism, which springs from the mind of an individual and thus expresses an experience that is repeated various times in order to meet the typical requirements of society. In a way, it absorbs and reflects all essential human aspects.

Analysis of the morphological type starts with the selection of the building type which resembles a cell, and as such, forms groups of constructed units. These clusters are established around the nucleus connected by what is known as a matrix route. The buildings are constructed parallel to the matrix route and this consequently leads to subsequent occupation within the area. Another further development is a pathway which follows a perpendicular trajectory in relation to the matrix route and thus gives rise to the construction of other connecting routes.

Other buildings are constructed far apart and settled parallel to the line of the matrix route. In order to reach these new buildings, new routes are constructed in parallel to the main axis and the block becomes consolidated. Thus, the scale of research widens gradually due to the establishment of blocks of similar building types, which in turn structure the urban fabric. The city then becomes a mosaic.

The formation of the sets of urban fabric, receives from the Italian school of urban morphology, a comprehensive and detailed conceptualization. Furthermore, the territory is viewed as being strictly and directly related to the spontaneous consciousness of a human being's feeling of belonging to a certain place at a given time. This assumption leads to the concept of a cultural area whose limits are different from other bordering geographical territories due to the fact that they manifest specific cultural characteristics.

In summary, the analysis of these concepts from both schools reveals fundamental differences between them concerning comprehensiveness and applicability. This is because one is structured from a universal and the other a regional perspective, being that, the first structure has a notion of territory based on Human Geography while the latter Italian, is based on regional architectural interpretations. (Pereira Costa, 2013).

The geographical concept identifies the formation of routes as structural elements of communication and consequently, input vectors in the formation of urban centres, as such, they are considered to derive from a universal concept. In contrast, for the Italian school routes appear due to the human sense of belonging to a specific place and time, thus the concept is restricted to Italian culture and to the specificity of a given territory. (Strappa et al, 2003).

The notion of territorial pre-existence has permeated the studies of the founding fathers of the two schools. However, it is perhaps significant to mention that they never knew of the existence of the other or had knowledge of each other's respective studies which were then in development. According to Samuels (2002), they were only a generation apart, came from different cultural and professional worlds and yet had similar techniques when arriving at conceptions of the evolution of urban form.

Synchronicity between themes and independent approaches

Reports recognize the presence of similarities between scientific research in different areas of knowledge which interface chronologically and linearly and yet have no physical relationship with one another, given the great distance of time, culture and other circumstances that separate them. This phenomenon is named by Jung (1980) as synchronicity and corresponds to a coincidence in which two or more events, without causal relationship, manifest themselves simultaneously and with the same meaning for the human psyche. This can take the form of an external event and is independent of time and place. Basically synchronicity is defined as coincidence and significance, which in turn, requires the existence of an archetype. Archetypes are psychotic factors which have the power to transgress because they are not unique to the psychic sphere. They can also occur in non-psychic circumstances thus constituting the equivalence between the external physical and psychic process. Jung (1980)

This phenomenon was also observed by Thomas Kuhn (2007) who thought that time and space should be considered from the point of view of synchronicities, due to the fact that, objects of research always show aggregated results for scientific ends. According to Kuhn, the advance of science is not cumulative or linear and usually occurs, in contrast, in discontinuous ways characterised by major rupture or "scientific revolution", such historical watersheds being marked as a time of paradigm change. Paradigms are defined by Kuhn as a particular way of looking at the world, which articulates in a coherent manner, problems, concepts, research methods suitable for specific communities according to certain periods of time.

Jung contends that synchronicity occurs in more perceptive and attentive minds that somehow are the catalysts and in a certain way, the guardians responsible for the cultural heritage of the social group. There is no evidence to affirm whether this phenomenon also

occurred in other areas of knowledge of the period, however it can be recognized in the field of Human Geography and Architecture and Urbanism and especially in Urban Morphology. In the latter, therefore, the title custodian of knowledge, can be held by certain morphological elements - the plot for the geographer and the house for the architect.

The selection of the plot and the study of its transformation is due to the fact that it is the smallest unit into which human beings divide the land and establish the urban form. In addition, the plot is the place where human beings individually establish themselves and define their individual limits in the collective place. This selection is of the utmost importance because to Conzen, it is on the plot, the smallest divisible parcel and one which houses the distribution functions of the urban structure, that the whole process of transformation will be more clearly manifest throughout time. Likewise, in the architectural field of knowledge, Muratori highlights the basic type, the residential space and the urban element that is found abundantly in cities. For him, the house is an extension of the human body, which is part of a larger organism - the city.

The events that succeeded World War II demonstrate the effectiveness of the two choices - both being pioneering and catalytic, as well as, fundamental in deciding which morphological elements should be preserved. Furthermore they demonstrate how the two morphological elements, the plot and the house, are chosen to maintain the memory and preservation of morphological knowledge, for without these we would have no discussion here in 2014.

Conclusions

Presented here are the results of the research on Urban Morphology conducted by the Laboratory of Landscape/ UFMG. The main goal of the project was to establish the methodological knowledge generated by both schools in order to facilitate the development of a larger, interdisciplinary approach to the urban morphology of contemporary cities. Thus, it can be concluded that the urban form is constantly transformed either by the individual or by collective decisions taken throughout history. These decisions reflect the cultural aspects of their era and are in turn objectified in the formation of the urban landscape, setting in motion the evolutionary process, which is the object of analysis in urban morphology. As transformation is a natural process in the evolution of urban landscapes so its permanence must be identified, analyzed and elected for the preservation of cultural and environmental value. Thus, permanencies are also the result of human decisions and are aspects that significantly contribute to the unique quality of the urban landscape.

Therefore, in order to understand the process which results in the construction of a building or a city, it is necessary to investigate the latter's formation and transformation. The different forms of transformation were described by the founders of the two schools on different scales and levels of abstraction. The Italian school of urban morphology, for example, sees the typological process in relation to the transformation of the building type, which leads to the classification of buildings or other elements. In contrast, the English school sees, in the evolution from a morphological or historical period to the subsequent era, the long-term transformation of the form as constituting a complete range of transmitted features a specific culture can generate.

Taking into account a broader view of both sides of the analogy, it appears that there are significant similarities between the typological process and the theory of evolution of urban landscapes. Both concepts can be used for the benefit of contemporary research approaches to the built environment. Conducting a comparative study of the different types of approach have proven fruitful in comprehending the development of the complex structure of contemporary cities. In this sense the differences between schools are critically important because they can represent, not only differences in approaches, but also provide the complementary tools necessary for enhancing overall methods and results in Urban Morphology.

Acknowledgements

The authors acknowledged the support received from the Fundação de Amparo à Pesquisa de Minas Gerais – FAPEMIG, from the Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES to develop this research and to present this paper.

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Urban analysis techniques and role of morphology in post crisis urban design: the case of Rubattino and Ortica districts in Milan

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Abstract. *Urban spaces and towns are facing different and contradictory dynamics, between “endless” expansion and “shrinking” trends. Post financial crisis urban renovation also deals with different practices, between real estate development and temporary use entailing reappropriation of urban areas. It is nowadays almost impossible, at least in Europe, to realize major town plans similar to those carried out in the past decades, but new forms of urban renovation, much more complex and fragmented, or temporary and low cost, are now spreading. They allow the participation of different actors (public / private partnerships), flexible timing and spatial organization, with the not secondary goal of reusing urban territories and buildings. The aim of renovation projects is more and more focused on social issues and challenges, for example in terms of quality of life and health, also by means of innovative housing programs, and sustainable layouts over the years: which will be the effects of this “programmatic” architecture on urban morphology? The completion of elaborate programmes requires deep and integrated urban analysis, based on a “reading of the town” through multiple and complementary methodologies (i.e. considering the town as combination of layers, the town seen as an archipelago or a “town within the town”). Urban morphology plays an important role in defining urban strategies, especially within fragmented or superimposed layouts. Rubattino and Ortica districts in Milan represent a meaningful case study for research and design: it could be described as a multi-layered and multi-composed scenario, considering its various parts and their “complementary”, “separated” and even “contradictory” status, as opposed to a homogeneous and uniform one.*

Key Words: *post crisis urban design, programmatic architecture, town as combination of layers, town as ‘archipelago’, Rubattino and Ortica districts in Milan*

Contemporary situation of urban settlements

Towns and urban territories have to deal simultaneously with contradictory dynamics: on the one hand “expansion”, that is mainly linked to urbanization trends at a global level (Bugatti and Shiling, 2011), and characterizes the *megapolis* of developing countries (i.e. Asia, South America), or the sub-urbs of urban territories (Garcia Vázquez, 2011).

The meaning of “town” (Rossi, 1982) itself is changing (Cacciari, 2003) as the existing habits, rules and procedures contributed to create an uncontrolled urban effect and to the “*eradication*” of planning activities. The results are evident in terms of urban “sprawl” (Ingersoll, 2006) that could represent also a loss of meaning for human settlement. “Greenfields” are economically attractive for the real estate industry, so that urban settlements too often expand with no relationship with landscape and environmental sustainability.

On the other hand, urban degrowth and town shrinking are already occurring, mainly due to postindustrialization and post financial crisis effects that are affecting specific territories (i.e. Detroit in Usa). Sometimes these events create large urban “vacancies” involving social, economical and political problems, and even the loss of “urbanity”. The focus should be shifted also on the reuse of existing buildings and “brownfields”: innovative uses and strategies should be defined in accordance with more complex situations including soil pollution, existing and underused architectures, lack of density and functions. Urban design should find new tools and

methodologies to deal with these trends in a different way: it is evident that urban renovation based on large and ambitious town plans (i.e. Milan “Bicocca” plan, by V. Gregotti) are no more effective and sustainable from many points of view.

Architecture, social challenges and the role of programs

Even if the effects of financial crisis are deeply affecting society, the causes that generated it still have to be solved (Rossi G., 2011).

Social needs are strongly and increasingly emerging - even if not like in the past - and they involve larger parts of the population.

Architecture and urban design are not autonomous: new or renewed social needs in the post crisis society concern housing (i.e. lack of or too expensive), but also working spaces, facilities, infrastructures, public spaces and all functions that affect urban quality and quality of life. Quality evaluations take over quantity ones: the failure of urban planning leaves the strong need for “urban” futures (Bertolino, 2013).

Architecture should also face the changing meaning of “community” (Moroni and Brunetta, 2011): different kind of “contractual communities” are possible (i.e. Usa, North Europe) and they reveal the potentialities of unexpressed needs in terms of shared spaces, activities, values. Which could be the effects of a larger diffusion of these kind of experiences on urban development?

The meaning of “housing” itself, between “private” and “non private” spaces (Riley, 1999), is rapidly changing accordingly to new life styles and to new enlarged concepts of “family”. The modernist approach to men’s needs and life organization is definitely over.

Architectural and urban design should actively act within this innovative framework, for example by dealing with flexible and multi functional layouts and realizing innovative social “programmes” (i.e. via Cenni Social Housing in Milan).

More flexible configurations can include also innovative and diversified housing, (i.e. temporary or co-housing) (Delsante, 2011), work spaces (i.e. coworking), creative , high-tech, or other forms of soft production spaces (i.e. start-ups, incubators, etc), and also other functions (Delsante, 2012). Functional mix and social diversity are some of the key words tracked in these experiences (Fernandez Per, Mozas and Arpa, 2011).

As a matter of fact, the architectural “program” (social, functional) becomes more and more important: a well defined program could better fit fast changing scenarios and social needs as well as the reuse of existing and underused buildings.

“What pressures - specific of the twentieth century -. does the combination of programs impose on architectural form?” (Holl, 2011); in other words, if post crisis architecture becomes “programmatic”, which are the effects on urban design and morphology?

Innovative tools and procedures to regenerate urban settlements

Many techniques and procedures could better meet the actual conditions of urban territories in the post crisis framework.

Updated or innovative public private partnerships (PPP) can better fit a more complex urban organization with multiple actors and wider needs. At district level, “private” driven requalification initiatives, even small scale (single or multi owner residential buildings), could become part of larger initiatives including public spaces and infrastructures (i.e. smart town projects).

Forms of “contractual communities” could also represent innovative ways to approach urban renovation: in some cases, groups of tenants organizing themselves to develop a refurbishment project of an existing building (i.e. Numerozero in Turin). Auto construction and participated

design processes represent the most meaningful examples of these experiences, whose effects should be deeply evaluated.

Other approaches support the “temporary” use or reuse of existing spaces and/or buildings (Bishop and Williams, 2012). Flexible, low-cost, light architectures and installations often reflect new forms of social organization (i.e. Temporiuso in Milan). These kind of transformations are usually connected with innovative “participation” processes, promoted by or agreed with public authorities. The results of these experiences are not only significant in terms of use of public spaces, and of transformation of unused spaces or land (i.e. taking care of “urban agriculture”), but also of reuse of underused or dismissed buildings with no chance to be transformed, as a consequence of the economic downturn and lack of private investors (i.e. Macao and the *Torre Galfa* in Milan).

All these different kinds of urban habits call for social sustainability and realization of innovative and flexible programs meeting the complexity of actual urban conditions. Which are the effects of complex, multiple and even temporary forms of renovation on urban design and morphology?

Needs are new and diversified, and the tools do not seem completely adequate: the “urban dilemma” is still not just economical, technical or even social but it is also a “*design*” issue.

Rubattino and Ortica districts in Milan

The districts of Rubattino and Ortica represent a meaningful case study to show the effect of post crisis design on urban morphology. They were originally constituted by two different historical settlements outside the “town” of Milan, along two important communication routes.

These historical centres are nowadays still recognizable but they were merged by urbanization process mainly after World War II. The history of both districts is strictly related to the industrialization process that started in the beginning of the XX century. Ortica area became a factory and railway neighbourhood with poor life conditions, that led to the development of social housing, whereas Rubattino was historically linked to big car factories such as Maserati and OM). Huge industrial yards are still visible on part of the original places, as a memory of that era.

The whole urban area of Rubattino and Ortica is historically (from the middle of XIX century) surrounded by infrastructures and strongly separated from the “planned” city (town plan by Beruto, 1884).



Figure 1. Aerial view of Ortica and Rubattino districts.

The west and south facing sides of the area are defined by the strong edge represented by the railway (the urban ring and the Milano-Venezia line), with high concrete walls showing strong differences in height: along the entire south and west perimeter just two small tunnels link the site to the town. Large inaccessible and unused spaces under the elevated highway (eastern ring

road) depict - as a matter of fact - the end of this urban district on the eastern side. Except for the huge industrial factories, large greenfields and agricultural areas are still present just outside this eastern edge: unfortunately, real estate development assisted by law procedures still continues to build new and meaningless “architectures” instead of recuperating the large amount of dismissed areas. This is a meaningful example of contradictory trends in contemporary urban settlements, between “endless” expansion and the complexity of reuse and reappropriation of urban vacancies.

Inside Rubattino and Ortica district different parts can be recognized, which are characterized by functional and morphological specific features: historical settlements with their monuments, social-housing blocks, big industrial sites, large old barracks, blocks of small factories, residential areas from post war expansion, recent and high density post industrial housing complexes recently recuperated for creative and cultural activities.



Figure 2. Urban fabrics with preservation and renewal areas.

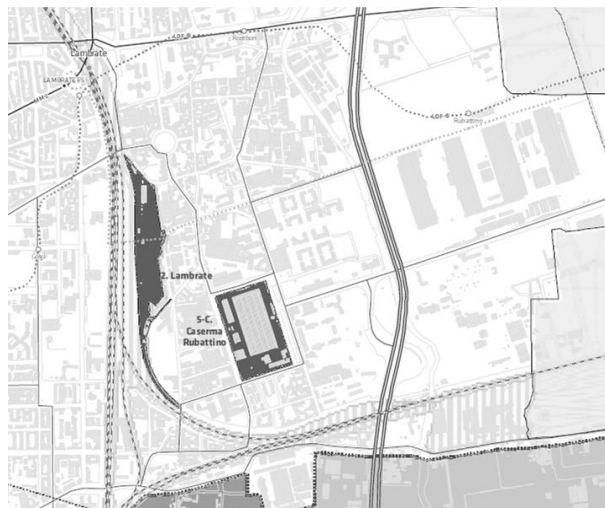


Figure 3. “Transformation Areas” (in dark grey) according to the new PGT (Territorial Administration Plan).

The attempts to carry out an urban renewal in the middle of the ‘90s through large real estate plans suddenly stopped, and were partially unsuccessful, since some of the residential blocks

still need to be completed due to real estate crisis. Even if the reuse of outer dismissed industrial sites is still replaced by more convenient developments on close greenfields, some innovative and also temporary reuse of old manufacturing yards and buildings show a successful pathway to urban “regeneration”. Different buildings have been reused and rearranged for creative activities (i.e. fashion ateliers, designers’ studios, creative productions, etc): in addition to this, there is an extended use of underused or dismissed industrial sites during Milan Design Week (via Ventura district).

So, what to do with large underused areas and old barracks? Milan municipality recently approved a new Territorial Administration Plan (PGT, 2012) that supports new planning strategies, accordingly to a general vision of a “shrinking” town that is reducing its population. According to the new plan, within the above selected district we can distinguish two main “Transformation Areas”: the first deals with the site of the disused barracks of Rubattino, whereas the second one runs along some unused railway lines close to Lambrate station.

A truly “programmatic” architecture is needed to better meet the needs and the social transformation of the whole district: urban morphology should play an important role in defining strategies able to face the complexity and multiplicity of the urban structure. There are no actors (public or private) with the financial capacity of transforming the whole complex of dismissed sites, but there is the chance to transform them on the basis of a progressive, sprawled, multiple actor urban regeneration process.

Techniques for complementary urban analysis

Taking into consideration the complex urban framework and the lack of homogeneity in the urban fabrics, the aim of the research on Rubattino and Ortica districts is to deal with urban analysis in accordance with different approaches, showing their complementarities and effects on design strategies.

Post industrial towns are characterized by “differences” more than by homogeneity and the town is intended as a sprawled and open structure that cannot be reduced to a homogeneous system: “Appropriate techniques have to be found for identifying the character of these disparate places, defining it and developing its specific features, either by adding the missing functions or by perfecting the existing ones” (Ungers and Vieths, 1997).

There is still the chance to identify specific and recognizable features, also in a morphological sense, as already revealed by some urban studies years ago (Boeri, Lanzani and Marini, 1993).

Continuity and “separation” are two complementary issues of urban structure: they “are not the consequence of each other, but they are two simultaneous phenomena meant to reinforce each other” (Aureli, 2011).

The whole and its parts (Ungers and Vieths, 1997) should be recognized (i.e. “the town within the town”) and the post crisis urban territories identified as an “archipelago”: “the idea of separated parts links the possibility of an absolute architecture to the idea of the archipelago as a form for the city. The concept of the archipelago describes a condition where parts are separated yet united by the common ground of their juxtaposition” (Aureli, 2011).

Moreover, the superimposition of different urban elements (in time or in space) should also be read and interpreted (i.e. “the town as a combination of layers”). Differences and contradictions emerge and cannot be reduced.

Post crisis urban regeneration is characterized by morphological multiplicity and variety, with complementarities, differences, separation more than homogeneity and the uniformity of the “sea of urbanization”.

“Conflicts, fragments, unresolved contradictions and oppositions are, however, the original criteria of the “town as a combination of layers”. The various structures are superimposed, like the layers of a historical city [...] the variety of forms and spaces is intentional, the result of a clear and strictly defined process. This process takes into account the topographical and

historical factors, the techniques as well as the social requirements and formal concepts. Nothing is decided in advance, decisions are taken on a case by case basis” (Ungers and Vieths, 1997).

As a matter of fact, two approaches appear to be more appropriate to describe the features and morphology of Rubattino and Ortica districts: one is based on the idea of “archipelago” that describes the city as a unity of different and independent, though complementary, parts. It deals with typological and morphological features, more than with mere functional ones. The other one is based on the idea of the town as a “combination of layers”, showing the interference of different functions and “systems” (not just historically), and of contradictions and differences, also due to superimposition. The analysis of spaces through these different methodologies represents the chance for a comparative study.

The results of urban analysis, developed also within the course of Architectural Composition 3 held at the University of Pavia (Academic Year 2013-14 – by Ioanni Delsante; side professors: You Yinan and Nadia Bertolino) show the effectiveness of the selected methodologies.

Reading the city in layers led to a better understanding of the superimposition of historical developments, physical structures (i.e. rail systems), mix of functions and diversified spaces not just per dimension but also per role, use and quality.

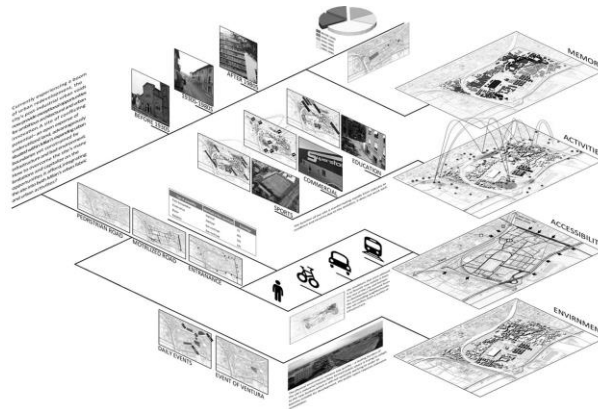


Figure 4. Urban analysis by “layers”.

Reading the city in parts showed morphological “differences” together with functional and social “clustering” processes. “Continuity” and “separation” are two complementary faces also defined by the buildings themselves.

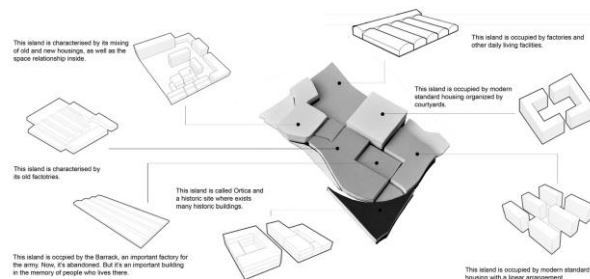


Figure 5. Urban analysis through “islands” and “archipelago”.

Urban analysis is the basis for the consecutive design activity: interpreting the urban complexity, also from a morphological point of view, can lead to define strategies that are more adaptable to fast changing scenarios.

Some design experimentation could better show the results of this process, but simply as an attempt and as a consequence of the interpretation of urban structure.

Some urban strategies clearly emerge and can be briefly described as follows:

- i) deal with the urban scale and dimension, and not with pre assigned perimeters or enclosed spaces. Relationships and enclosures are two complementary features, depending on specific site conditions. Urban morphology is one the key factors in defining the dimension and the “edges” of the project;
- ii) define a clear architectural “programme” with also different or progressive timing, including social, economical and functional goals;
- iii) take care of multiple actors or public /private initiative, with fragmented, complex or even enlarged perimeters in comparison with the fixed ones stated by planning regulations or “transformation areas”. Urban design supports flexible, progressive, inclusive strategies at urban level;
- iv) define a strategy in terms of preservation and transformation of existing buildings, with short and long term planning, also depending on economical conditions. Social needs have to be translated into a morphological strategy.

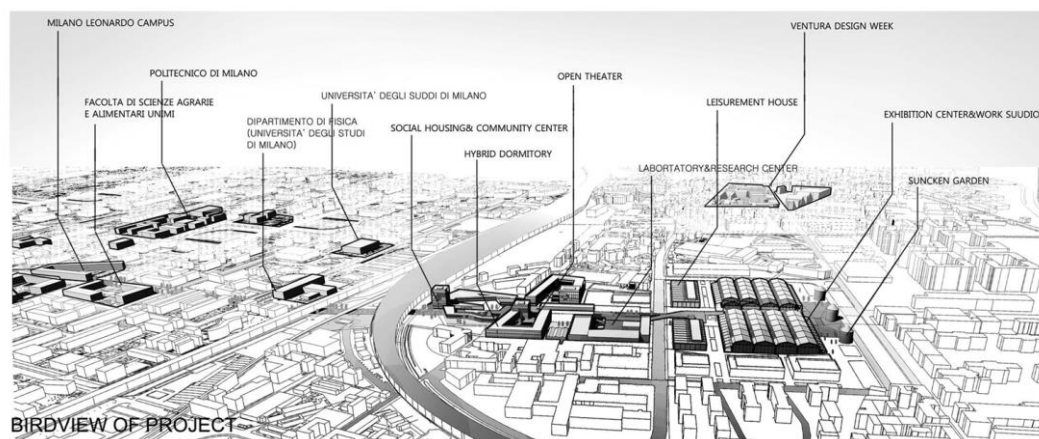


Figure 6. The project scale is urban, involving public and private actors in accordance with the specific program and goals.

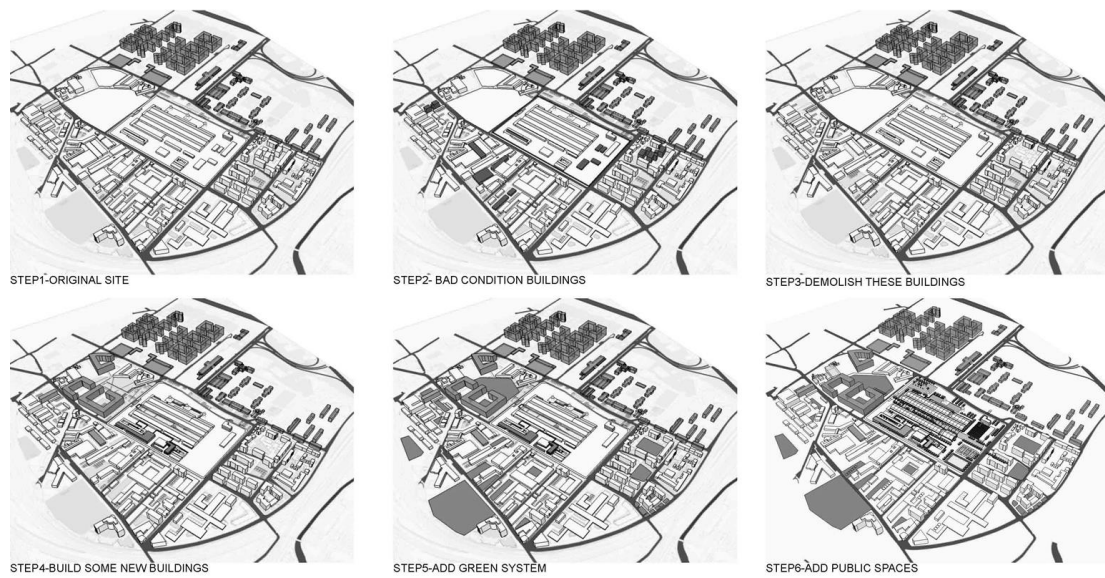


Figure 7. Progressive design including existing buildings and public spaces.

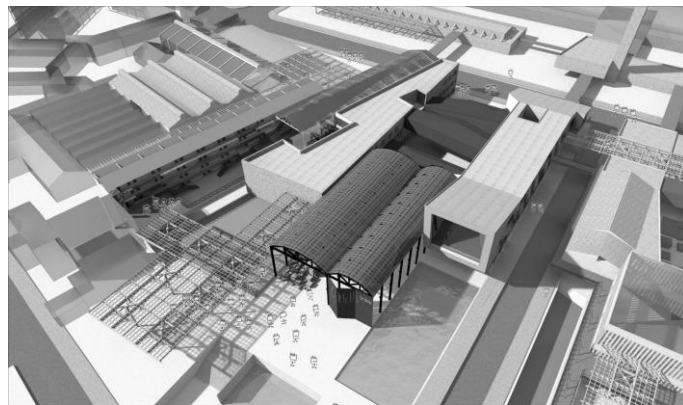


Figure 8. View of one of the experimental projects: new urban shapes defined by reuse and addition of functions in existing urban fabrics.

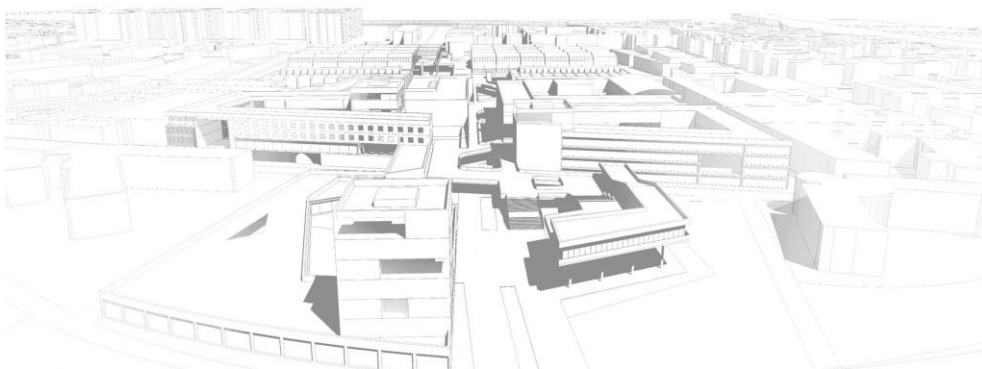


Figure 9. The superimposition of morphological shapes on the existing framework.

Conclusion

Taking into consideration the post financial crisis framework and the conditions of urban settlements and architecture, urban analysis in Rubattino and Ortica areas should deal with selected methodologies to better meet and describe urban “complexity”.

Societal challenges and economical trends shift the focus of the project on the “program” that should be sustainable from many points of view, and not just technically.

Urban morphology plays an important role in identifying features, continuities and separations, also through differences and contradictions that fragmented or progressive programmes can realize in multiple steps and long term periods.

The results of the research developed on Rubattino and Ortica districts in Milan show the effectiveness and the complementarities of multiple urban analysis representing a meaningful case study in terms of coherence between morphological strategy and urban renewal techniques and tools.

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Past and present: an architectural survey of Birni Lafia, a Dendi village

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Abstract. *How a city's architecture and urbanism, seen as particular manifestation of material culture, can reflect its identity? In collaboration with the multi-disciplinary project Crossroads of Empires, mostly composed of archaeologists and anthropologists, a group of architects conducted a study of contemporary villages of Dendi, a rural territory in north-Benin, bordering the River Niger. This architectural study was conducted in 2013 and 2014. The evolution of Dendi villages was only poorly documented since the first European explorations and the whole Crossroads of Empires project aims to emphasize the development of identity and material culture in northern Benin. A specific village, Birnin Lafia, was studied as a case study using a typo-morphological method of analysis combined with oral inquiries. This paper presents various aspects of the fieldwork.*

Key Words: North-Benin, field survey, urban morphology, rural area, anthropology of space

Introduction

Since two decades, the relationships between territories and identities are at the center of a debate that concerns social sciences in a methodological and epistemological point of view: in a globalized world, (Sassen 1991) do different territories prefigure specific cultural identities and reciprocally, do distinct identities involve specific territories? (De Biase, Rossi, 2006).

This link between territories and cultural identity is the core of the *Crossroads of Empires* multidisciplinary project, initiated in 2011 by Anne Haour, archaeologist and researcher at the University of East Anglia in Norwich, UK. The main goal of the project is to study to what extent medieval empires of the Sahel-Sudan (Cornevin, 1966) have influenced the political, economical and religious history of the regions surrounding the Niger River. In a more specific way, through a combination of archaeological diggings, compilation of oral traditions, comparative analysis of technologies and cultural studies, the project aim to understand how material culture was structured and dispersed between 1200 and 1850, at the start of European colonization. The period studied by the anthropological and architectural part of the project is more recent and starts around 1850 until the 2000s. Indeed, the majority of contemporary villages have emerged in the second half of the nineteenth century. The overall goal is to understand whether there are links between contemporary settlements and ruins discovered by archaeologists and to collect data on population dynamics through material culture and technical activities. In a region where the main historical sources available are relatively poor, the issue is also to establish if the results of the excavations are coherent with historical data from written documents and oral sources and to understand how the identity of this particular area developed over the centuries.

A rural territory in north Benin

Dendi is a key case study in many aspects. From a methodological point of view, Dendi is a narrow region (about 200 km long and 15 km wide), parallel to the axis of the Niger river, which may be covered systematically. This territory, almost virgin of any scientific research, is

at the edge of two of the largest well-known historic areas of west Africa (Kanem and Bornu empires to the west and the succession of empires of Ghana, Melli and Songhai to the east) and a myriad of kingdoms (Hausa city-states, Sokoto caliphate, Gulmantchéba kingdoms). These empires and kingdoms were subject to different studies, allowing a comparative approach. Because of its location, the Dendi was the theater of major population movements and has long been a crossroad of ancient trade routes linking the Hausa cities to forested areas currently known as Ghana. 'Marginal territory', 'crossroad', 'refuge area' : the commercial, military, demographic history of Dendi explain how this territory can be so heterogeneous in both linguistic, ethnic and technical level.

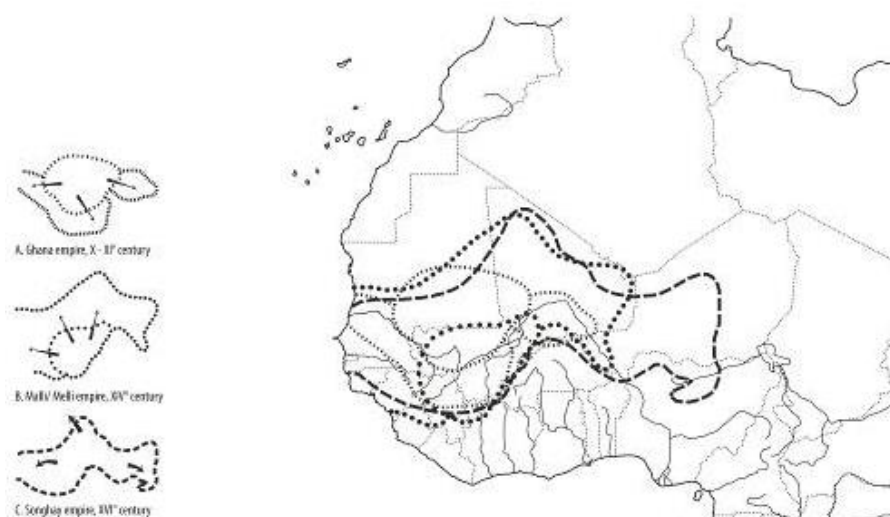


Figure 1. Map of main medieval West African empires.

These population dynamics, particularly complex, result in considerable ethnic diversity in the region and the creation of one own cultural identity, but also by the formation of a two-headed political power where the leadership of the land belongs to groups of farmers identified as indigenous or natives while the leadership of the villages and people is in the possession of non-native groups of warriors designated as newcomers or non-native and usually coming because of the fall of the Songhai empire (Haour, 2013).

It is important to stress the difference between Dendi as a territory, dendi as a language, the dendi cultural area (that far exceeds the boundaries of the region) and the dendi identity. The same term is used to designate the language, territory and the people who live there, even if they are very heterogeneous. The literal translation of dendi is 'go downstream' or 'down the river' (Bako Arifari, 1998). The term does not refer to an ethnical connotation but geographical, the river in question is the Niger river.

The dendi 'culture' or 'identity' is an inclusive culture that tends to assimilate elements which are originally foreign. The Dendi language or *dendi cine* is a vehicular language and therefore shared by different ethnic groups. The notion of a 'dendi ethnicity' seems quite questionable and seems to rather be a result of the construction of a shared identity by inhabitants, in order to make bounds between different ethnical groups. This structure was reinforced by the impact of colonizers who had a tendency to regroup people of this territory under the same name (Bako Arifari, 1998).

Available historical records regarding Dendi are relatively rare. Except for some sketchy references present in the Tarikhs (Houdas, Delafosse, 1913) and memories of european explorers and military (Barth, 1959; Toutée 1897; Drot, 1904) the main information about this area during the last centuries came from colonial administrators (Larose, Perron, 1924 Ardant du Picq, 1933 Sere River, 1965) and studies from the late 1980s (Bio Bigou 1987; Bako Arifari

1989; Baka, 1992; Dembou, 1992; Whalter, 2006). Most of these studies are master thesis of history or PhD theses which investigate the political upheavals in depth but discuss little the daily lives of people and rarely describe architecture and environment.

During the French colonization, the Dendi territory was largely marginalized in the reports because it was too remote and lacked natural resources. The increase of forced labor between 1920s to 1930s seemingly also had a strong impact on the area, not concerning migration, but also construction techniques and to a certain extent, material culture. For example, some people left to border regions or to cities in order to escape the forced labor and upon their return, they brought with them habits, techniques and customs foreign to the dendi (Vennetier, 1976). After the independence of Benin in 1960 and two revolutions in 1963 and 1972, a new political way of functioning in the village chiefdoms was introduced.

Transmission of the function of village chief, previously hereditary became subject to an election. Therefore, the ruling dynasties in the Dendi were on a large scale overthrown for a time. However, this change in the system appears to have concluded into some form of compromise since the 1970s: it is often the 'legitimate' heirs who presents themselves to the electoral vote.

The place of architects in a multidisciplinary study project

The integration of architects in the project team provides new skills and a reflective analysis based on an architectural survey of built forms and existing habitats, a quality relatively unique in this type of archaeological study. Alongside the archaeological excavations, we had to develop a method of analysis suitable to the field, complemented by interviews with inhabitants.

Although the typo-morphological method of analysis was born in Europe in the 60s, in the context of 'sedimented' cities with relatively 'steady' models (Muratori, 1960), we believe that this method, by its phenomenological and essentially descriptive nature, is adaptable to African territories that are, urban or rural. Analysis of African cities using the tools of typo-morphological method of analysis without necessarily declaring itself as such already exists (Maas, Mommersteeg 1992; Bourdier, Minh-ha 2005). The analysis of rural dwellings, which dates back to early eighteenth century (De Foville, 1894 Brunhes, 1920) has quickly emerged as a hub of questions about society and the theories that were elaborated on it. Rural areas, villages and houses, but also the old neighborhoods of our cities have become a pertinent laboratory. (Rivière 1941, Lévi-Strauss, 1958 Chombart Lauwe, 1959, Bourdieu 1969).

If cities have the ability to integrate into their framework social and urban mutations while keeping traces of their past development states, rural villages, mostly composed of concessions made of mud and lasting rarely more than a generation, seemed to be *a priori* much more sensitive to any urban upheaval and therefore much more difficult to analyze. Our assumption, which was verified during the field survey, was based on the hypothesis that urban structure (roads, parcels and to some extent the implementation of buildings on the plot) persisted over time, although the buildings themselves were renewed regularly. In that way, the study of the contemporary state of Birni Lafia can provide actionable insights on its previous states on the urban scale but also on the typological scale by studying the evolution of construction techniques and building types (Garmy 2012).

By questioning spatial arrangements, urban structure and space appropriation, it is possible to address issues studied by the entire project team. By understanding the architecture and urbanism as the expression of a specific material culture or 'identity' and trying to understand how people live, the village's history and its development based on personal and families stories, we were able to open some 'doors' on other specific knowledge.

It was thus to understand whether there were recurring structures passed on over generations, observable on both an urban and architectural scale. These specific elements of material culture of the studied city should be not necessarily unchanged over time but consist in what Ryckmans identifies as a permanency. *'Permanency is not what denies transformation, but what informs it'*.

(Ryckmans 1991). The identification of these elements and their description should provide the basis for a typological classification.

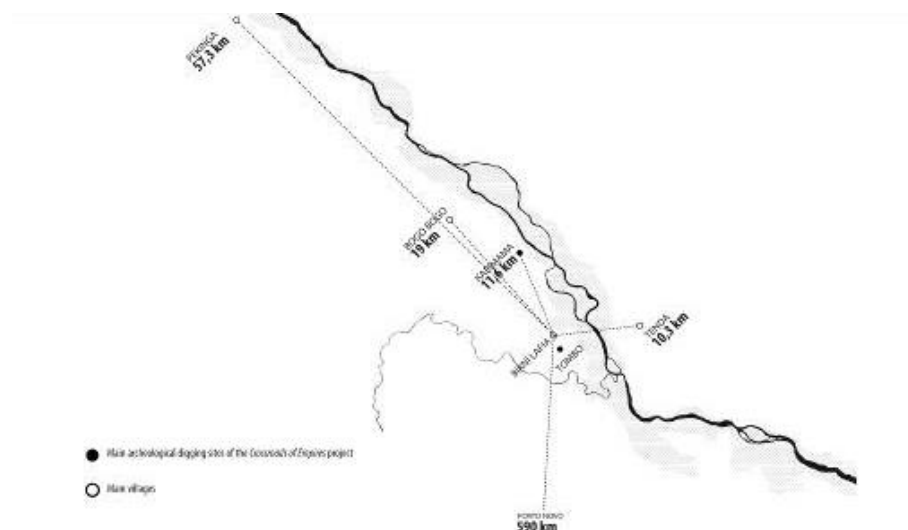


Figure 2. Relationship between Birni Lafia and other cities.

Site

In 2013, we chose to work on Birni Lafia, a village whose name comes from the hausa words *birni* (enclosure, wall) and *lafia* (health). This choice was made initially for very practical reasons : Birni Lafia was the location of the base camp of archaeologists. Without cars at our disposal, it greatly simplified our logistics. In more methodological terms, the size of the village allowed us to do a detailed and fairly representative field survey, and which could lead to an understanding of the 'whole picture'. Finally, because the idea was to understand links between the existing villages in the region and ruins discovered during archaeological campaigns, Birni Lafia turned out to be an interesting site by its proximity to one of the major archaeological excavation sites in the region.

Birni Lafia is located in the north of Benin, on the right bank of the Niger river. Major cities around Birni Lafia are Karimama and Kompa in the north, Tenda and Gaya in the east, on the left bank of the Niger river and Malanville and Guene in the south on the Benin side. If the city is located 4 km far from the river, its adjacent to the river basin which is around 7 km wide close to Birni Lafia. These lands, cultivated by the inhabitants mainly to grow rice, tomatoes, peppers and onions, are water covered during the annual floods which regularly flood new areas in the north of the village.

Before the field survey, we created a map of Birni Lafia based on satellite pictures of the village. From a methodological point of view, this process may seem somewhat risky because of the many uncertainties that include: poor definition of the pictures can lead to confusion in the interpretation of the elements, the scale can be subject of a margin of error, foliage can hide certain elements... In fact, this work was relatively accurate as we have seen during the subsequent field campaign. This process has allowed us to quickly produce a map highlighting the existence of circular and rectangular buildings, the presence of voids within the framework, some roads and on the whole, the overall shape of the city. During this fieldwork, mapping fences and walls that were mostly missing in the first map allowed us to understand the geometry of concessions and establish an preliminary land registry.

During the campaign conducted between January and February 2013, we interviewed 114 people in Birni Lafia using a survey form asking the identity of the inhabitant (name, age,

ethnicity, activity), their level of wealth (oxen or cow number), some genealogical information and family history or village history in general and, finally, architectural information (floor plans to fill in, technical or specific information). We compared this research material with archaeological data and information based on a cartographic analysis mostly conducted on the network of roads and land plots in the city. Family trees that we could reconstruct from interviews with inhabitants indicate that the village has existed for five or six generations on average. Assuming that the average length of a generation is 25 years, it can be estimated that the village exist since 125 to 150 years, which actually place his creation before 1900, during the second half of the nineteenth century.

Urban form

Globally, the shape of Birni Lafia corresponds to that of an almond which the more slender side would be headed north. The village has a more densely built area which we will call 'center' and a less dense area that can be described as 'peripheral area'. The boundary between the two is quite porous, fuzzy. The town is bisected by a highway that follows a north-south axis. Eastern part of the village is more important than the western part. Dimensions of buildings are repetitive and regular. At first glance, their disposal seems random. However, taking into account the fences and walls, we can discern houses that form coherent sets.

The identification of the locations of political, economic and religious powers places, based on the descriptions given by the village inhabitants, suggests that the village that once functioned on a radio-concentric pattern around the village chief and land owner houses, changed to a linear model. The market, the administration, the school, the main mosque of the village are located around the road, as a kind of 'strip' (Venturi, Scott Brown, Izenour, 1972).

The transition from one model to another appears to be related to political and historical circumstances: the states of war promote compact forms, easily defensible. Since the French colonization and the appeasement of tensions between villages, the village could take another shape, more suited to its economic development, polarized by the highway. This evolution of a radio-concentric shape to a linear shape seems to be common across the Dendi and has been observed in various other villages in 2014.

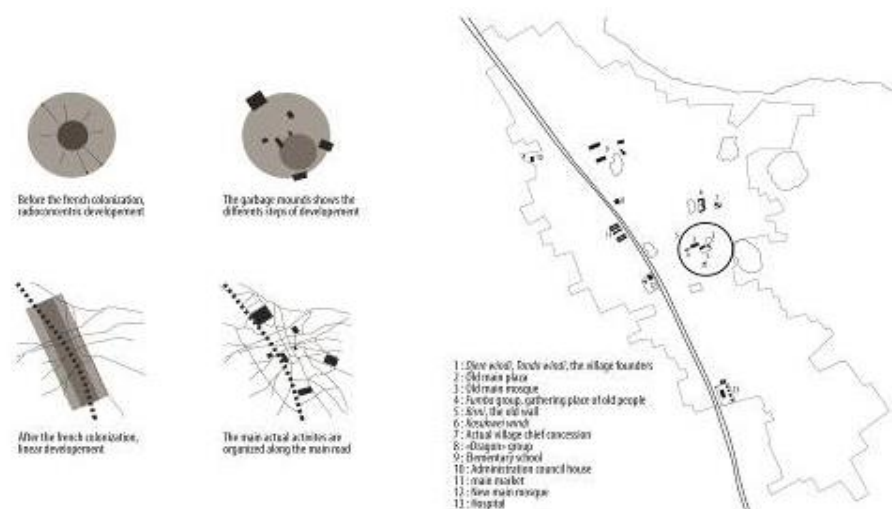


Figure 3 and 4. Hypothesis of development: the influence of french colonization & Old and current main places of power.

Borders

The territory around Birni Lafia is relatively empty, dotted with isolated villages. It is not a context of dispersed housing. It is therefore quite easy at first to draw the outline of a city.

According to the interlocutors the various entities that compose the city vary in number. The designations used also change. Based on their interviews, Birni Lafia seems to be composed of two large areas.

The first one is the 'old town' or *kwara zema*, which includes the oldest parts of the village, whose boundaries correspond to the former surrounding wall (the *birni*) and which corresponds to a dense 'core' containing no fields. It is also the part of the city where the vast majority of the holders of traditional power still live today.

The second one is the 'new town' or *kwara tegui*, which surrounds the old city and which boundaries are less defined. From the study of building density, we have chosen to divide it into two subgroups: a first periphery moderately built, interspersed with large open spaces where we can see some fields and a second periphery, less built and much more recent, comprising mainly fields and a few isolated houses. This third entity acts as transition between the first two and the bush.

The boundaries between these three entities are sometimes materialized by a street, a row of trees, granaries or may be intangible, symbolic.

To this relatively common to all respondents division is superimposed over a second division in quarters which corresponds more to ethnic or family groups and, in this case, vary to a large extent from an interlocutor to another. The 'confusion' in the designation of quarters probably reflects power struggles (Rozenholc, 2004)

The *basfonds*, or clay extraction areas, that have been flooded later for some and became small artificial ponds where fish farming is practiced, were clearly identified by locals as markers of extension of the city. According to the myths of creation of Birni Lafia, the first settlement was surrounded by piles of garbage. When the village expanded, new piles were made at its limits and residents dug new clay extraction areas, marking steps in its evolution.

Roads layout

Two structures appear when studying roads of Birni Lafia: in the most central part of the village buildings are aligned along orthogonal roads, very regular in contrast to the tortuous paths which are distinguished elsewhere.

During the field survey, we understood that this transition from an organic road framework to orthogonal roads is a legacy of colonization. Indeed, after colonizing Benin, the French did not only built the highway that cuts the village in two but also ordered to inhabitants of different villages, including Birni Lafia, to create roads, that people call *vons*, following a orthogonal layout.

This work, which respond to a hygienist, military logic and should serve as firewalls, are not unlike, on a smaller scale, the boulevards Haussmann carved in central Paris, relatively speaking. They created a major trauma in the collective consciousness. During the interviews, inhabitants explained that the French have 'broken the village' when they forced people to destroy some houses to trace the *vons*. The French also tried to force people to align their homes on *vons* but it was not very effective.

Due to their irregular pattern and reduced size, the *fondos*, which can be translated in English by 'path' or 'trail', appear older than the *vons*. Some *fondos* are referred to as *fondos ndangaize* or 'where only one foot passes' and correspond to very narrow alleys. Besides this, the status of *vons* and the *fondos* differs : while *vons* are a public shared space without owner, *fondos* are a private, shared space. Among the *fondos*, we can distinguish paths that connect two open housing groups mostly used by the residents and paths between different housing groups, bordered by mud walls or straw fences. Even if they are originally a private shared space,

temporary they receive the status of public space or path and are used in some cases as an right of way, a more or less forced servitude

In Birni Lafia, we can perceive three logics in the pattern of roads. First, the colonial logic that led to the development of the orthogonal layout of *vons*. The second logic relates to the site, the topographic morphology of Birni Lafia and the third logic is the expression of the social relationships between the inhabitants (White-Pamard Quinty and Bourgeois, 1999). Both the second and third logic are used in the organization of *fondos* (White-Pamard Quinty and Bourgeois, 1999). The hierarchy of the social structure in Birnin Lafia seems to have been highly hierarchical, based on a caste system (e.g. oldcomers, newcomers and slaves). Therefore, it is possible that the obligations or prohibitions that bind clans, families and everyday relationships (e.g. ceremonial greetings, necessity) have determined the location of concessions (which must be allowed by the dual power of land chiefs and village chief) and pathways between concessions. Pathways and in particular some *fondos* have specific purposes determined by daily activities. For example, people greet each morning the old 'aunt' or 'uncle' of an affiliated family to inquire about his health or women ask for condiments to allies rather than feuding families that could poisoning it. One will thus avoid some concessions. Similarly, one will not enter impunity in the housing group of a sorcerer or a leader.

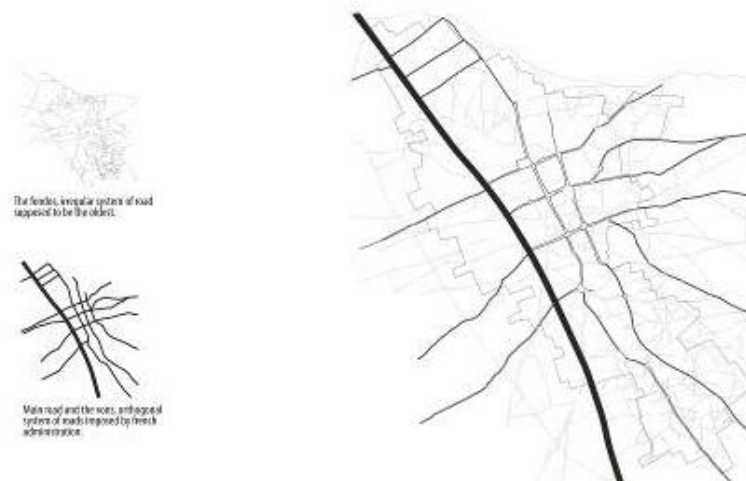


Figure 5. Two roads structures.

Plots layout

Before the survey, due to the lack of any land registry, we did not have prior information about plots. The limits defined by the people during the field survey helped us to develop an approximate plot map. This map, open to changes, provides information related to the size and geometry of the plots.

By analyzing plot sizes, it is important to quantify the order of magnitude of variations between large and small plots. If the difference in size between the families of plots is small (e.g. one or two), the study of dimensions is not necessarily very significant. However, if the difference is higher (e.g. one to five, one to ten or more), it can be used as a tool for defining the types of plots (Panerai, Depaule, Demorgon, Veyrenche, 1980). In our field survey, we mapped a difference between plot sizes in medium of one to five.

We defined two groups of plots: a group of small irregular plots in the center of Birni Lafia and a group of large orthogonal plots located in the outskirts of the village. The orthogonal plots seems linked to the *vons*, a road pattern itself orthogonal, while the irregular plots seems more linked to the *fondos*. However, this rule is not absolute. As the *vons* have superimposed the layout of the oldest roads, some irregular plots were served or cut by the *vons*.

Considering the hypothesis that due to the inheritance process from generation to generation, the plots, handed down from generation to generation, are successively subdivided, then the size of the plots could be interpreted as a marker of anteriority. Although this hypothesis is validated by the testimony of the inhabitants, we must nevertheless moderate it. For example the smaller parcels are not necessarily the oldest. It would be useful in this regard to report swarming issues or on the contrary dividing plots issues. The field survey showed that the majority of smaller parcels are occupied by the descendants of slave families. In addition, some plots do not appear to have varied in their dimensions over time, or just a few. Then, can we consider that there are optimum dimensions for the plot? Is there a density of building or a configuration from which the heirs choose not to share their land but to create new ones ?

Transmission of plots is still complex to understand. It is difficult to find a recurrence in inheritance. It is not always the eldest son who inherits the plot. In some cases, because the eldest son got married and was too old to stay with his parents, he leaved the housing group and created a new plot. In this situation, the youngest son remained until the death of his parents and inherited the whole plot. How inheritance is distributed in the case of a larger family? Within the limits of our study, we have not been able to answer these questions precisely.

Are there different modes to occupy a plot depending if the owner is part of one or the other groups mentioned above? Some plots are constructed on the entire surface while others are built on only a part of their surface, the other being left empty.

The buildings in general are organized around a courtyard called *windi guende*, where one or two trees are planted. This courtyard is the centre of the housing group and a shared living space. In addition to this, the position of the buildings on the plot obeys in one hand to the geometry of the plot, and on the other hand to the location of the plot in the village. For example, the organization of an isolated plot is not the same as that of a plot located in the village centre or along the highway. All the buildings follow the non-adjointing rule imposed by the French military as a protection against fire.

Building types

Buildings or *fou* of all the concessions that we could visit in Birni Lafia are very repetitive and can be classified into six types. The first one which seems to be oldest type, is a circular building in mud bricks called *kouroukoutou*. The other five types are orthogonal buildings called *kata*, *werenda*, *cheroga*, *kabanda* and *salon*. Apart the obvious anteriority of the *fou kouroukoutou*, we are currently unable to determine whether one of the five type is older than another. It is highly likely that the five orthogonal types have been introduced in the Dendi in the same period and that the choice to build any specific type is due to the owner's personal preferences or his means and eventually the geometry of the plot.

By analysing the changes in building typology depending on the ethnicity or main activity of the occupants, we noticed that some professions mark the appartenance to an ethnic group or a caste, even nowadays. In Dendi, in a certain time in history, potters and dyers were slaves. Nothing can distinguish the homes of their descendants in typological terms from those of others. During interviews, some people had explained that the buildings were all the same, regardless of ethnicity but '*fetishes changed*'. Then, how can we perceive the invisible? We observed that some families brought more attention to cleaning their courtyard than others, but this does not seem really significant and it is more related to each family customs. It is possible to find smoking rooms and nets in the fishermen houses while in a home of blacksmiths or potters we could find other very specific tools. That is the only difference we observed besides the difference in size of the plots.

We elaborated two hypotheses about the changing of building typology from circular *fou kouroukoutou* to orthogonal types. According to our first hypothesis, the most evident, this transformation is related to the influence of colonization and is a side effect of forced labour. The villagers have reproduced the internal organization of buildings constructed for the settlers

and have replaced the traditional clods of clay, straw roofs and techniques plastering by adobe bricks, concrete and tin roofs.

However, a second hypothesis arises due to the fact that European explorers described starting from the eighteenth century orthogonal constructions with flat roof in Tombouctou, Djenne and in other major cities of the region. The medieval empires and kingdoms of the Sahel-Sudan have long before developed a building typology of their own, in constant dialogue with the Arab-Berber architecture and material culture conveyed through caravan trade (Cissoko, 1996). It is possible that this Arab-Berber architecture was disseminated in all territories controlled by the medieval West African empires and may have influenced the Dendi architecture.

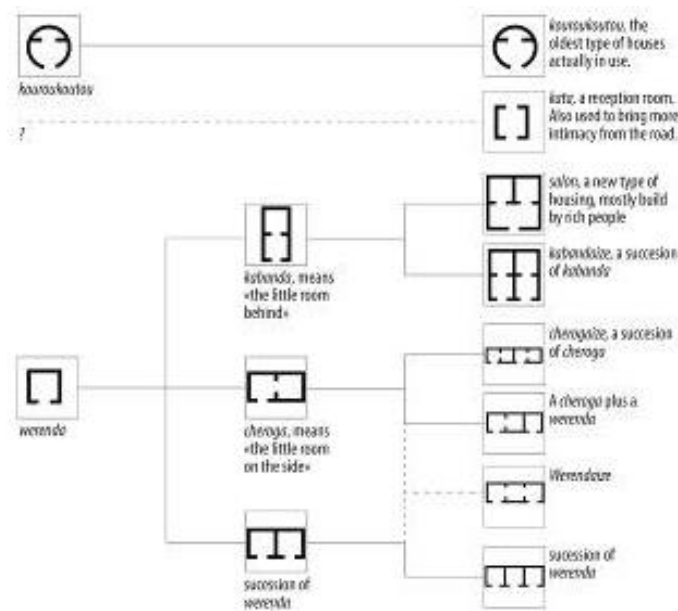


Figure 6. Building types 'genealogy'.

Conclusion

The work during the field survey was challenging and enriching because it implied the need to adapt a methodology and a language usually used for architectural and urban research in a multidisciplinary team composed mostly of archaeologists. The typo-morphological method of analysis proved to be very effective in the fieldwork, especially when it was coupled with interviewing inhabitants. By articulating social analysis and spatial descriptions, we wish to develop a fundamental research on the anthropology of space. (Twitchell Hall, 1971 Van Eyck, 1972 Paul Levy and Segaud, 1983; Depaule, 1994; Choay, 2006; Segaud, 2007).

The anthropology of space is not yet a well defined discipline, but is more a common thought, a common attention given by researchers and authors from different disciplines usually dealt with separately. The method used by anthropologists for developing knowledge has long been the one, 'malinowskian', of the 'detailed study of a defined area' (Stocking Jr. 2003) and in this context, the correspondence between identity and territory was proved particularly interesting with regard to the Dendi.

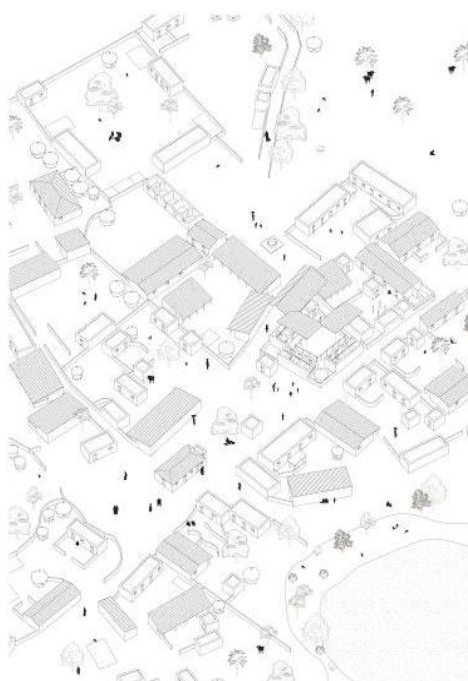


Figure 7. Axonometrical view of the east part of Birni Lafia.

Dendi villages that we visited are currently in a process of transformation. Far from being influenced by the globalized trends while remaining in a form of marginality, they suffer radical changes, visible from one year to another. We observed transition of some architectural and urban forms as well as of some construction techniques to other forms and techniques. The passage of the circular types of buildings to rectangular buildings is also observed in the nearby regions (Augustin 1994).

Among the various results collected, the study highlighted the impact of French colonization in the structure of villages and architectural techniques. Transformations of the urban form and of architecture stand as evidence for the political and social changes in the region and are observed also in other Dendi villages. There are not many architectural characteristics from one village to another or from one ethnic group to another. The people have clearly explained that *'they built the same as other people where they live.'* Thus, despite a very heterogeneous population, due to the long history of evolution and the influences from the West African medieval empire, the Dendi identity in general terms remains homogenous.

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Urban form and its implication for the use of urban spaces

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Abstract. *The objective of this paper is to discuss urban form and some of its implication for the use of urban spaces. The relationship between urban form characteristics, such as those related to type of building use and amount of visual and functional connections with the public open spaces, and presence of people are considered. A comparison is made between 'traditional' urban form and 'modernist' urban form. In a 'traditional' urban form buildings have front doors and windows facing the public streets, whereas in a 'modernist' urban form buildings tend have doors and windows far away from the public streets and/or facing inward open spaces with no distinction between front and back windows and doors. Therefore, examples from cities in different countries are used for the comparisons and reflections involving these issues. The main outcomes from these discussions emphasize the need for a better understanding regarding the implications of urban form for the use of urban spaces. Additionally, type of building use and amount of visual and functional connections with the public open spaces tend to have significant consequences for the vitality of urban space.*

Key Words: *urban form, use of urban spaces, traditional urban form, modernist urban form.*

Introduction

Mainly after the Second World-War the urban form has been shifted from its 'traditional' characteristics to a 'modern' approach. Whereas the first is characterized by a direct relationship between buildings and public open spaces, the second is characterized by a loose relationship, with public open spaces merely resulting from the layout of blocks of flats.



Figure 1. Ouro Preto-Brasil.



Figure 2. Diamantina-Brasil.



Figure 3. Prague-Czech Republic.



Figure 4. Porto-Portugal

In a 'traditional' urban form, as in Ouro Preto (Brazil) or in the historic areas of Prague (Czech Republic) and Porto (Portugal), buildings have front doors and windows facing the public streets, whereas in a 'modernist' urban form, as in the residential superblocs in Brasília (Brazil), buildings tend have doors and windows far away from the public streets and/or facing inward open spaces with no distinction between front and back windows and doors.

Although, some authors (i.e., Gehl, 2010, 2011; Jacobs, 1984) have highlighted the importance of the relationship between buildings and open spaces, as has been the case in the 'traditional' urban form, the 'modernist' urban form, the 'modernist' urban form appear to be the model for most of the contemporary planning including university campuses and residential areas of Olympic Parks or equivalents such as the Residential Vila of the Pan-American Games in Rio. Therefore, there is a need to further discuss the implications of the 'modernist' urban form in comparison to the 'traditional' urban form.

Hence, the objective of this paper is to discuss the urban form and some of its implication for the use of urban spaces. The relationship between urban form characteristics, such as those related to type of building use and amount of visual and functional connections with the public open spaces, and presence of people are considered. A comparison is made between 'traditional' urban form and 'modernist' urban form. Therefore, examples from cities in different countries are used for the comparisons and reflections involving these issues.

Relationship between buildings geometry and street alignment

In the 'traditional' urban form, for example, in the historic areas of cities such as Ouro Preto or Diamantina, Prague, and Porto, buildings geometry have a direct relationship with street

alignment, its main façade plane being parallel to the street alignment. This allows for these buildings facades being part of a person's visual field while walking, enriching the aesthetic experience and making easier the connection between people and the buildings. Nonetheless, in the 'modernist urban form' this relationship tend to be broken, mainly after the Second World War, when the 'Unité d'Habitation' designed by Le Corbusier, was built in Marseilles between 1947 e 1952, following the modernist ideas such as the inclusion in a single large scale block (140 meters long, 24 meters wide, 56 meters tall and 19 floors, including the ground floor on stilts and the rooftop terrace) not only residential units (337 flats) but also service, commercial and leisure activities such as post office, laundry, general and food stores, restaurant, hotel, gymnasium, kindergarten, a 300 meters jogging track (Curtis, 1996; French, 2009). The layout of the 'Unité d' Habitation' follows the east-west orientation of its longer facades, provoking a misalignment of the block to the adjacent street, and a lack of a direct relationship with the public open space. This lack of relationship or geometrical coherence tends to make the visual perception and so the aesthetic experience poorer, what also tend to negatively affect the use of urban spaces. Sítte (1992) have criticized the irregularity of the streets limits caused by the recede and advance of building facades, affecting the perception of continuity of the built perimeter in the interface with the street space.

Visual and functional connections between the buildings and the open spaces

The visual and functional between the buildings and opens spaces tend to have an effect on security and vitality of open spaces (Gehl, 2010; Jacobs, 1984). These connections allow the visual supervision of open spaces by those inside the buildings and the requests for help as well as the demand for refuge by those in the open spaces. In the 'traditional urban form' such visual and functional between the buildings and opens spaces tend to be present while the opposite frequently happens in the 'modernist urban form' . Moreover, while the visualization of openings in the buildings generate visual stimulus creating a more satisfactory aesthetic experience, the lack of visual stimulus provoked by the blind walls generate a poor aesthetic experience for those using the public streets.



Figure 5. Terraced houses in Porto Alegre, RS, Brasil.



Figure 6. Sapucaia Estate, Sapucaia, RS, Brasil.

This interface or edge between the buildings and public opens spaces constitutes the facades that are closely experienced, is part of the places where we walk in the city, is where we come in and out of buildings, where the inner and outer urban life can interact; this interface, particularly, at ground floor level has a decisive influence on urban space vitality and must have a certain degree of transparency or visual permeability (Gehl, 2010). The existence of narrow units and many doors, complemented by a wide variation in functions provide many points of exchange between inside and outside and many experiences (Bentley et al, 2013; Gehl, 2010). Therefore, while ‘soft edge’, such as a shopping street with its windows, attracts and retains the pedestrian, a ‘hard edge’, such as blind walls at ground floor, does not attracts the pedestrian since there is nothing to see, not even the frame of a window (Gehl, 2010). In Miami, the urban planning legislation was recently revised establishing new rules that propose to integrate individual ownership with the public sphere, leading to ground floors with adequate activities and levels of visual and functional permeability (Miami 21, 2010).

The existence and type of use in the ground floor and the public open space

Together with other factors (i.e. visual and functional connections) ground floor use is an important issue to be considered in the relationship between buildings and public open spaces, since the existence of adequate type of use can contribute to the urban dynamics, making the urban experience safer and more aesthetically pleasing, this being the usual characteristic of the ‘traditional’ urban form (Gehl, 2010, 2011). On the other hand, ground floor inadequate use such as parking, lack of eventual use or permanent use as provoked by stilts , does not have the potential to contribute to urban dynamics. Access to garages or parking areas can fragment the edge between buildings and public open spaces and weaken or compromise the idea of continuity (Gehl , 2010). In Brasilia, the modernist principle of stilts is normally present in the residential buildings, preventing the building from having a direct connection with the public open spaces (Holston, 1993).



Figure 7. Porto, Portugal.



Figure 8. Istambul, Turkey.



Figure 9. Unité d'Habitation, France. Source: Fabiano Scherer.

The distance between the buildings and the street

In the 'traditional' urban form buildings usually are closely connected to the streets, on the perimeter of the block, while in the 'modernist' urban form, mainly after the Second World War, buildings tend to be disconnected from the streets, being located inside a block, defining a layout characterized by isolated buildings interspersed with empty spaces, as in the residential superblocks in Brasília, and in many university campuses and in residential areas of Olympic or Pan-American Games. Therefore, while in the first situation the city user is invited to look at or/and to go inside a building, in the second case the user is kept away from the building and so from its direct visual and functional impact; in this case, what is first perceived is the void or the open space in front of the building and not the building itself. The cohesion or contiguity of buildings defines a permeable wall for urban open spaces and is responsible for the harmonious effect of the whole due to the continuous enclosure of space by buildings (Sitte, 1992). The cohesion reflects the potential for visual appeal far higher than an isolated building or buildings containing voids between them (Cullen, 1971). Hence, the urban experience tends to be poorer in the 'modernist' than in the 'traditional' urban form.

Definition of open spaces by buildings and user control

In the 'traditional urban form' open spaces are generally defined by the buildings creating an interaction between the open spaces and the buildings with positive results for the use of open spaces (in many cases, such use is an extension of the use inside the building), potentially improving security and the aesthetic experience of urban spaces. These open urban spaces tend to have a clear hierarchy (i.e. regarding what is a public and what is a private space), definition and control.



Figure 10. Istanbul, Turkey.



Figure 11. Porto, Portugal.



Figure 12. Vienna, Austria.

On the other hand, in the 'modernist urban form' open spaces tend to be left over spaces, with no clear definition and control and with no clear connections with the buildings, and so, without clear purpose of use. Therefore, the consequences generally are a poor visual experience due to the lack of nearby building facades generating visual stimulus and a lack of use or the existence of inadequate use. This can be exemplified by the illegal occupation of communal open spaces for private uses (i.e. building of garages and barbecue area) in many housing estates in Brazil characterized by the 'modernist urban form', with negative consequences, for example, concerning aesthetics, the use and security in the open spaces (Reis and Lay, 2012).

Additionally, in the 'traditional' urban form buildings tend to have a front and back regarding its relationship to public urban space. The front facades themselves define the sidewalks or have some retreat giving room to a private front yard, whereas the backyard has a greater degree of visual and aural privacy in relation to the space of the public street. On the other hand, the 'modernist' urban form has eliminated the front and back of buildings, and so, the different levels of privacy, either in the open spaces as well as inside the buildings, promoted by these differences.

The 'conceptual' or the 'identity' open space, and social interaction

An open space that can be perceived as having an identity, a character, due to its definition by the formal attributes (i.e. height and fenestration) of buildings and their relationships to the open spaces, tend to be present in the 'traditional urban form' and lost in the 'modernist' urban form. The 'conceptual' (Prak, 1985) or 'identity' space appears to be perceived not only as an aesthetic qualified space but also as an inviting space for people to stay and carried out some social activity. Analyzes carried out by Holston (1993) in Brasilia showed that residents of

superblocks rejected the street characterized by an absence of connection with the buildings, since it does not stimulate social interaction.



Figure 13. Pan-American Games Residential Vila – Rio de Janeiro, Brasil.

The absence of a continuous sidewalk bordered by the facades of buildings made the street to lose its characteristic of attracting people to go for a stroll, and so, reduced pedestrian movement on the streets (Holston, 1993).

Repetition of identical large scale horizontal or vertical blocks in a vast open space

The repetition of identical large scale horizontal or vertical blocks in a vast open space has been a common layout adopted in the 'modernist' urban form, as shown in the designs by Le Corbusier such as 'La Ville Contemporain', the 'Plan Voisin', and the 'Ville Radieuse' (1930).

Moreover, the internationalization of this urban form has reached Brazil, as in the case of the design in 1942 by the architect and urban planner Atílio Correa Lima and his team of the Várzea do Carmo Housing Estate in São Paulo (Bonduki, 2004), and Brasilia. Residents of standardized superblocks in Brasilia, criticized the lack of differentiation of buildings and its consequently monotony and impersonality, with no visible personalization by residents, due to their difficulty in doing so (Holston, 1993). Two housing estates are emblematic of the problems caused by the intense repetition of identical large scale horizontal or vertical blocks in a vast open space, namely, Pruitt-Igoe

, in St. Louis, Missouri, U.S.A., and the Killingworth Housing Estate in Killingworth, north east England (Greger and Steinberg, 1988; Kellet, 1987; Reis and Lay, 2012), giving support to the following: "The uniformity and rigidity of 'modern' housing estates all over the world has lead to drastic problems of negligence, lack of maintenance and even vandalism – as a form of helpless counter-reaction of its inhabitants." (Greger and Steinberg, 1988, p.23). The Pruitt-Igoe housing project was partly demolished 20 years after its completion and occupation in the mid 1950s, been planned to house about 15,000 people in a group of 33 widely spaced, 11-storey, high-rise buildings. Although some point to social and economic problems as the main reasons for its demolition (i.e., Montgomery, 1977), others emphasize that the modernist design of Pruitt-Igoe was a strong determinant of its failure to satisfy the residents, like Peter Blake (1977), in his book 'Form Follows Fiasco - Why Modern Architecture Hasn't Worked'.

The Killingworth Housing Estate, an award-winning project, with high quality of construction and detailing, was demolished in 1987, only 15 years after its completion. Containing 740 housing units in 27 multi-storey towers of 6 and 10 storeys, it was designed to accommodate 3,292 inhabitants. Although social, economic and political factors can be associated with the its demolition, and even poor management as pointed out by the architect who designed the Killingworth Towers as the main cause of problems, design problems were evident. Even though the majority appeared to be satisfied with their new homes, with generous

internal spaces, central heating and bathrooms at a high standard compared to the old housing, 'people in a position to choose preferred traditional low-rise houses with gardens, to multi-storey accommodation' (Kellet, 1987, p.5). Moreover, the fact that residents did not like the overall layout of the estate can be illustrated by the fact that the bleak, monotonous, large-scale and above all unattractive appearance of the estate may have influenced people to leave (Kellet, 1987), and by the following declaration that show that although the dwellings themselves were well liked by the residents, the problems with the housing estate design were clearly expressed:

They [dwellings] were nice inside when you shut your door. Beautiful, we had them lovely (and) couldn't have asked for anything else. We all said that we would have liked to have taken our houses (out of the Towers) and put them on the ground somewhere (in Kellet, 1987, p.7).

Additionally, results from research about urban aesthetics (i.e., Reis *et al.*, 2011), give support for the fact that the large repetition of identical large scale horizontal or vertical blocks in a vast open space tend to produce monotonous environments with resulting unsatisfactory aesthetics, due to the lack or very low visual stimulus produced by the repetition of a great number of blocks deprived of an architectural composition that might be characterized by the ideas of order and visual stimulus. As highlighted by Prak (1985, p.69) "People might suffer from perceptual deprivation if the built environment does not offer them enough variety". Moreover, the open spaces that were left between the blocks also tended to be deprived of any major visual stimulus. It can be noted that many complaints about the lack of variety in modern architecture, particularly in suburbs and office buildings, were made by architects themselves (Prak, 1985). These characteristics of the open spaces also affect the quality of views of people inside the buildings, and so, impoverishing their architectural experience not only outside but inside the buildings too.



Figure 14. Pruitt-Igoe Housing Estate, St. Louis, U.S.A.

Moreover, stimulating visual fields when walking in the cities would be characterized by the possibility of having, at every moment, a different look and not by the look that gets lost in the infinite (Sitte, 1992). This principle can justify the vitality of medieval streets of numerous historic cities and streets in some parts of contemporary cities.



Figure 15. Killingworth Housing Estate, Killingworth, England.

On the other hand, the modernist principles tend to generate monotonous and empty spaces around the buildings (Sitte, 1992). In addition, the ‘traditional’ urban form is generally characterized by buildings with predominantly vertical lines, whereas the ‘modernist’ urban form tends to be constituted by horizontal buildings. In the first case walking seems smaller while in the second case the horizontal lines emphasize and reinforce the perception of greater distance (Gehl, 2010).

Traditional streets and elevated walkways or streets in the air

The walkways between blocks, as in the Killingworth Housing Estate, which reflect the modernist idea of streets in the air and the strict differentiation of functions - the strict differentiation of pedestrian walkways and car-routes, create a pedestrian circulation channel devoid of major sensory stimuli, deprived of visual supervision from people in the housing units and from pedestrians and people in public or private transport. Additionally, the vertical access to the walkways is destitute of visual surveillance and access control. Nevertheless, the architect of the project expressed his full conviction in the appropriateness of his design concept:

“In this ‘vertical village’, unlike conventional multistorey flats, which tend to isolate families, the high level streets or decks will encourage the growth of a community without reducing the privacy which everyone wants to enjoy within his own home. The decks will provide safe walking above the roads ... and places where neighbours can meet and talk, or watch children playing in the public gardens below.” (Killingworth Development Group, 1967, in Kellet, 1987, p.7).

On the other hand, substantial evidence to the contrary can be provided:

‘This romantic vision of ‘streets in the sky’ was not merely inaccurate but completely mistaken. In reality the decks had the opposite effect on social relationships and became associated with anti-social behavior and a sense of acute insecurity and fear. No windows face onto the decks which became anonymous semi-public spaces with access through unsupervised common entrances completely open to all – residents and strangers alike. This created a lack of privacy and control which may have encouraged vandalism and crime. Young children could not be properly supervised from the decks which in addition were noisy (with living rooms directly below) and inappropriate for the exposed climate.’ (Kellet, 1987, p.7).

Hence, there appears to be sufficient evidence to support the idea that the streets in the air do not reproduce the traditional urban street. This is characterized by visual and functional connections between buildings and public open spaces, allows the perception of activities in adjacent buildings and in the public open space of the street itself, tends to be provided with sensory stimuli (visual, olfactory, aural) and to allow visual monitoring from people in adjacent buildings or in the street itself.

Wayfinding in the ‘traditional’ and in the ‘modernist urban form’ and building access

As stated by Passini (1992, p.159) ‘Wayfinding is an important aspect of environmental quality.’ and ‘... wayfinding is a fundamental key to environmental appreciation, be it at the level of architecture or at the level of urban and natural landscape.’ The ‘traditional’ urban form tends to be legible and make wayfinding easier since people move following the streets and access buildings directly from the public space of streets. On the other hand, in the ‘modernist’ urban form wayfinding is generally made more difficult due to the lack of direct connection to the building entrance from the streets and to the great repetition of identical blocks. Moreover, as exemplified by the Guajuviras Housing Estate, the lack of legibility, due to the expressive number of repeated four storey blocks of flats without greater formal distinctions and to building entrances away from the streets, can be made worse when the communal open spaces

do not have a clear definition and control and are disorderly occupied by illegal buildings, such as garages, that tend to narrow and hinder the circulation among the blocks, change the space hierarchy and estate appearance, and negatively affect accessibility and wayfinding in the housing estate (Reis and Lay, 2012).

The idea of ‘urban fabric’ and ‘urban object’

The idea of ‘urban fabric’ is defined by the whole of identical or similar buildings, while the ‘urban object’ stands out, contrasting with the ‘urban fabric’ and generating visual stimulus, focus of attention. The idea of ‘urban fabric’ and ‘urban object’ tends to be clear in the ‘traditional’ urban form (In historic cities or historic downtowns most private buildings, including housing, tend to characterize an ‘urban fabric’ whereas public buildings such as churches and city councils, tend to characterize an ‘urban object’). This relationship between ‘urban fabric’ and ‘urban object’ tended to be a well orchestrated one, with the object creating a focus of visual attention from time to time, and making the urban experience an aesthetically stimulating and rewarding one. Nonetheless, these relationships tend to be lost in the ‘modernist’ urban form where the ‘urban fabric’ tends not to exist, since neither the perimeter block nor smaller buildings facing the street are present. In addition, the ‘urban object’ tends to be isolated from other buildings that are neither part of ‘urban fabric’ nor are ‘urban objects’. Therefore, in the ‘modernist’ urban fabric the idea of designing the urban space and its elements, establishing a relationship between them, the proper idea of urban design, is lost in favour of focusing on individual buildings standing out or not as ‘urban objects’.

Distance between buildings

In a ‘traditional’ urban form buildings tend to be near to each other (since most of them are connected through side walls) and to define open spaces that generally are not so large as to generate huge sunny areas and to make walking uncomfortable during summer. On the other, in a ‘modernist’ urban form, as in many university campuses and residential areas of Olympic or Pan-American Games, the distances between the buildings tend to be big enough to generate huge sunny areas and to make walking uncomfortable during the summer. Moreover, these distances tend to weaken the use of open spaces, since such use is not supported by nearby buildings activities, and to make walking a less enjoyable aesthetic experience than in the ‘traditional’ urban form, where such experience is stimulated by the presence of nearby buildings facades and uses.

Conclusion

These discussions about ‘traditional’ and ‘modernist’ urban forms and some of their implications for the use of urban spaces have emphasized the differences between these two concepts of urban form. These differences show that the ‘traditional’ urban form tend to better respond to urban user needs than the ‘modernist’ urban form. Exemplifying, the relationship between buildings and urban open space, type of building use and amount of buildings’ visual and functional connections with the public open spaces tend to contribute to the vitality of urban life in the ‘traditional’ urban form, to the presence of people in open urban spaces, whereas in the ‘modernist’ urban form these contributions are generally lost. As mentioned by Gehl (2011) people attract people, and having a choice of walking on a deserted or on an animated street, we would generally choose a lively street. The fact that urban experience tend to be much richer in the ‘traditional’ than in the ‘modernist’ urban form, is a major difference between these two approaches to urban form. As emphasized by Rapoport (1977, p.208): “The many

environments in different areas, eras and cultures which are liked and preferred have one thing in common: they all seem to be perceptually interesting, complex and rich.”. The main outcomes from these discussions emphasize the need for a better understanding regarding the implications of urban form for the use of urban spaces, and so, concerning the implications of adopting the ‘modernist’ urban form.

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Application of morphological concepts to characterize German immigration's nucleus in Brazil

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Abstract. *This article seeks to analyze comparatively morphological structures as a result from German immigration's occupation in Espírito Santo, from middle XIX century. For this investigation, Gunter Weimer's advanced studies it's assumed as reference, concentrated in the decades of 1970 and 1980, about German architecture in Brazil's southern region. Weimer (2005) is elected because he's a Brazil's central reference about the approached theme. The intention is to recognize and present by mappings some morphological configuration's particularities of urban sites located in espirito-santense's centro-serrana region; occupation structured by hydrographic basin from Santa Maria da Vitoria's and Jucu's river. It is recognized, at the territory's physical-geographic dimension, both the adoption of river courses as structuring elements of land division and the sites' location at high and cold lands. In the urbanistic dimension, there are two types of nucleus: Strassendorf, urban form structured by a central and commercial road; and Angerdorf, urban form when the central road widens open to a square.*

Key Words: *Urban form, German immigration, Espírito Santo/Brazil*

Introduction

This article investigates morphological structures sedimented by German immigrants' occupation in Espírito Santo, from the mid-nineteenth century. For this analysis, Gunter Weimer's advanced studies it's adopted as reference, focusing on German's urban morphology and its deployments in the occupation of Germany's immigrants in Brazil. The intention is to recognize and represent, through photographs, diagrams and mapping, morphological configuration peculiarities of urban sites located in Espírito Santo's central mountainous region, and the occupation structured by river basins of Santa Maria da Vitória and Jucu, in Santa Leopoldina, Santa Maria de Jetibá, Domingos Martins and Marechal Floriano (Figure 1).

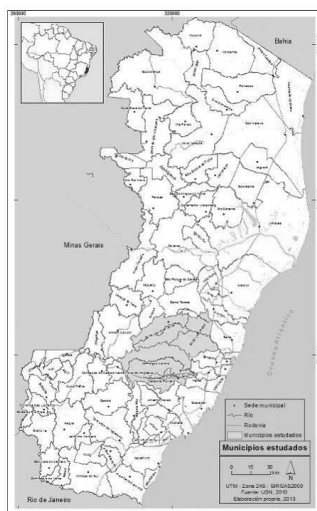


Figure 1. Municipalities' location of Santa Leopoldina, Santa Maria de Jetibá, Domingos Martins e Marechal Floriano. Source: Elisa M. Taveira.

It is recognized, in the territory's dimension, both the adoption of courses of rivers as structural elements of land parceling, as the location of settlements in high and cold lands. In urban dimension, it is identified three types of nucleation: *Strassendorf*, urban form structured by central trade route; *Angerdorf*, urban form that the central trade route widens open to a square; and *Haufendorf*, urban form derived from a spontaneous growth.

The identification initiates from the state of the art, referenced in Weimer, from which studies conducts to German researchers, experts in the urban form's history of villages built in ancient Germania. These represent the effort of human groupings' characterization and systematization originated from times long lasting, related to Northwest European Space's cycles of territorialization.

The historical data's methodology survey and the current cartography's construction for the cities analysis are based on the study by Elisa Machado Taveira in the Master Planning's thesis, "*Redescubriendo el patrimonio: revaluating them culturales paisajes Santa Leopoldina*," under Joaquín Sabaté Bel's mentorship, Professor at the Universitat Politècnica de Catalunya, under development.

Gunter Weimer's advanced studies

Weimer (2005) presents Germany's sedimented morphological characteristics, from two German authors' investigations, Werner Radig²¹⁴ (1955) and Heinz Haushofer²¹⁵ (1974), as analytical subsidy for German occupation's in Brazil, especially in Rio Grande do Sul. This publication leads and guides this article's analysis, in analogy to German immigrants' urban nucleus occupation in Espírito Santo.

In Europe, in the early nineteenth century, in regions where farmers are free, the property is limited to a small land's glebe within the village, encompassing home and garden - a *Hof* - and the land's remainder, forests and pastures, joint exploration. Each parcel is subdivided into arable zones - a *Felder* - and each farmer is entitled to one, in three parcels (Willems, 1946 p.327-328, cited in Weimer, 2005, p.37). The medieval villages' formal evolution varies according to socioeconomic regional logics. The simplest way is the *Weiler* (Figure 2), a set of two or three *Hof*, called *Einzelhofsiedlung* if it's isolated from each other.



Figura 2. (a) A Weiler's scheme. Source: Weimer (2005, p. 41); (b) French Weiler, composed by four sites. Source: Radig (p. 86, cited in Weimer, 2005).

If the *Weiler* grows irregularly, it's a *Haufendorf* (Figure 3), which is the most common village form in *Hünsrcück*²¹⁶. If the *Weiler* develops along a street, it's called *Strassendorf* (Figure 4), commonly found in the *Westphalia*²¹⁷. When the street widens open in the village's

²¹⁴ Radif, Werner. Die Siedlungstypen in Deutschland und ihre frühgeschichtlichen Wurzeln. Berlin: Henschelverlag, 1955.

²¹⁵ Haushofler, Heinz. Die Agrarwirtschaft in der Bundesrepublik Deutschland. München: B.L.V., 1974.

²¹⁶ *Hünsrcück*: region between the Moselle and Nahe's rivers, in Germany, where comes more than half of Brazil's German immigrants. Weimer, 2004, p. 58.

²¹⁷ *Westphalia*: northwestern Germany region, from where comes about 20% of Brazil's German immigrants.

middle road, forming a public place (in the original sense, public passage for cattle), it's an *Angerdorf* (Figure 5). An *Angerdorf's* variation is the *Rundling*, where the street leads to the village and ends in a *devesa* (Latin *defensa*, enclosed property), it's the most common form of Elbe's east settlement, where is located Pomerania²¹⁸ (Figure 6). There are also other settlement's forms, such as *Punkdorf*, *Hufendorf*, *Zeilendorf*, *Waldhufendorf*, *Marschhufendorf*, *Rundweiler* and *Streuselung* (Radig, 1955: 95-96 cited in Weimer, 2005, p 41 -42; Redensek, 2007)²¹⁹.

In consonance with Weimer (2005), Wolf (1926, cited in Redensek 2007), defines the small villages kinds: *Angerdorf*, where houses are arranged around a green space or Anger; the *Strassendorf*, where a central street is the characteristic axis; the *Rundlingdorf*, where houses are arranged around a central green space, and whose radiation is outsourced; and the *Reihendorf*, whose implanted houses are aligned.



Figure 3. *Haufendorf*. Source: a) *Haufendorf*, Radig (cited in Weimer, 2005, p.42); b) *Haufendorf*, Weimer (2005, p.42).



Figure 4. *Strassendorf*. Source: a) *Strassendorf*, Radig (cited in Weimer, 2005, p.42); b) *Strassendorf*, Weimer (2005, p.42).



Figure 5. *Angerdorf*. Source: a) *Streusiedlung*, Radig (cited in Weimer, 2005, p.42); b) *Streusiedlung*, Weimer (2005, p.42).

²¹⁸ Pomerânia: extinct northern European territory, under the Baltic Sea, located between Germany and Poland. From there comes the other 20% of Brazil's German immigrants.

²¹⁹ *Hof*: Site, residence's assembly, betterments, orchard and vegetable garden that compose an agricultural establishment's seat, within the village; *Strassendorf*: village in which the sites are built along a road; *Angerdorf* – *Strassendorf*: where the road bifurcates to give place at a square; *Haufendorf*: site formed by various buildings irregularly arranged; irregular design village; *Rundling*: Village which had only one access, where the sites were located around a square in which animals were originally guarded at night

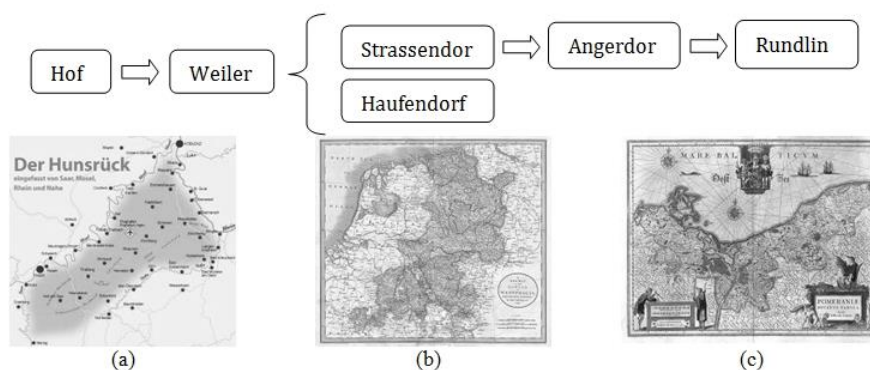


Figure 6. Map of Hunsrück, Vestfália and Pomerânia. Source: a) Hunsrück's thematic map, 2010; b) Westphalia's map, 1799; c) Pomerania's duchy map, 1635.

For illustration's purposes, Mattedi (2009) argues that this occupation refers to the traditional northern and eastern Germany urban form model, where originates the majority of Brazil's German immigrants, and to Espírito Santo, as the Lubeck city (Figure 7), dated 1143, whose morphology is molded around a commercial axis with roads that connect with the countryside. According to Peluso (1991, p.392, cited in Mattedi, 2009), the cities plan from German colonists is thus described by the urbanist Bernoulli:

The city must be safe over a mountain's back or protected by a river; must have a market, a long and wide main street that reaches a large square in the center. It's streets' system should be understandable at first sight ... The church with its cemetery should be separated from the traffic, but so that the largest nave and the bell tower, emerging from the housetops, dominates the main square.

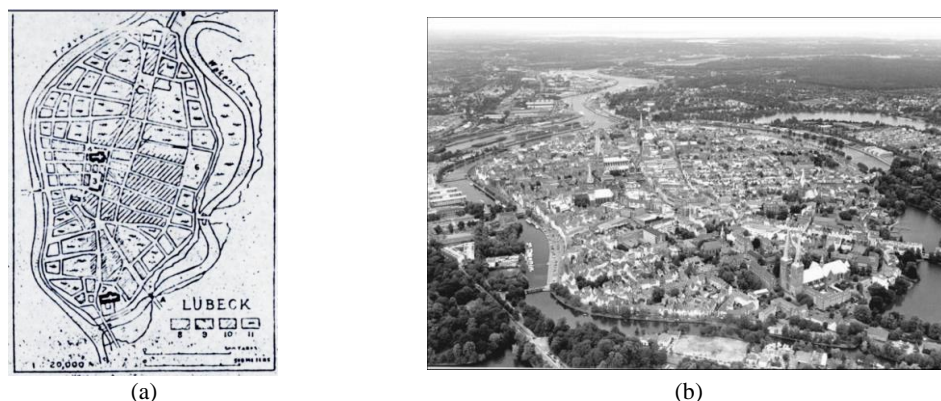


Figure 7. Strassendorf, characteristic urban form. Lubeck. Source: Mattedi, 2009.

Therefore, the German's colonists sedimented in Brazil urban form is synthesized up in the following way.

The next item is dedicated to characterizing the morphology of four urban settlement experiences, deriving from the German immigration in Espírito Santo's solo process.

Urban form characterization. Experiments in German immigrants nucleus constituted in Espírito Santo / Brazil

The German immigration to Brazil begins in 1824, with the arrival of the Dutch ship *Argo*, to Rio de Janeiro (Seide, 1980), bringing 251 colonists destined for São Leopoldo, Rio Grande do Sul, and 29 men for the Brazilian army, recruited by the German Georg von Anton Schäffer. Besides Rio Grande do Sul, the Germans occupied Santa Catarina and Rio de Janeiro. With the success of these colonies, in 1855, Pedro II idealizes the foundation of German colonies in Espírito Santo (Figure 8). According to Schwarz (1992, p.2), in 1855, it's founded Suíça, a colony in the river Santa Maria da Vitória waterfall region, with an area of 567 km², consisting of equal lots of 62,500 *braças quadradas*²²⁰. In 1857, it was installed 99 Swiss, 24 Hanoverians, 6 Luxembourg, 3 Prussian and 8 holsteinianos (Seide, 1980). Few years after, these are relocated to the site "more fertile and crystal streams cut" (Ferrari, 1968), four leagues below the first installation, which is erected a temporary home for the Cologne's director, warehouses and a shack for housing 50 families. Next to the shack, install traders, builds a chapel, and, by its side, a cemetery, and new buildings for service providers' housing and workplace.



Figure 8. Espírito Santo's european immigration (source: Kill, cited in Posenato, 1997, p.18).

Figure 9, below, illustrates the Topographic Letter of the Espírito Santo's Province in 1878, which is possible to identify the Santa Izabel and Santa Maria colony location, where they are located in the following year, the Santa Leopoldina's colony.

Raises the hypothesis that the colonies' delimitation attends watershed embraced regions: the colony of Santa Leopoldina is referenced by the river Santa Maria da Vitoria; the Timbui's nucleus, linked to the Santa Leopoldina's colony, is referenced by the Timbui river; Santa Izabel, by Jucu river; and Rio Novo, by the Benevente river. For confirmation its analyzed cartographic documentation (Figure 10) and secondary data, emphasizing the interest in establishing the immigrant in place close to watercourses, besides the subsistence factor (Schwarz, 1992; Posenato, 1997).

²²⁰ A measurement lot area unit adopted in Brazil in the nineteenth century, with no equivalent measure for the English language.



Figure 9. Espírito Santo's colony map detail, 1878 (source: Arquivo Nacional, Rio de Janeiro).



Figure 10. Espírito Santo's colony map detail, 1866 (source: Arquivo Nacional, Rio de Janeiro).

The Seyferth's research (1988, p.4 and 5) is in consonance with Ferrari (1968), to inform that in Espírito Santo, such as Rio Grande do Sul and Santa Catarina, the German colonization focus are the upper valleys of the Jucu and Santa Maria da Vitória rivers (mountainous region called *cold lands*). In the upper river Santa Maria valley, there is Pomeranians predominance although the first colony, Santa Isabel, 1847, has been founded by Hesse and Hunsrück immigrants. Seyferth (1988) also emphasizes the German immigration importance as a sociological and historical phenomenon, by constituting a diverse society from the national. Regarding the context of Brazil immigration, the Germans stand out by establishing in homogeneous and compact areas, modifying the agrarian structure and rural life.

Until the mid-nineteenth century, Espírito Santo is one of Brazil's most backward provinces; this fact was mainly attributed to serving as a natural barrier for Minas Gerais gold protection. For such, the Portuguese Crown allows only the coastal belt occupation, restricts navigation and prohibits clearing of the interior (Posenato, 1997). Later then, by the very mountainous regions weather conditions, occurs non Lusitanian immigration, given the Imperial Government program, in the need to occupy the interior lands (Schwarz, 1992). The first colony begins in 1812 with the official creation of Santo Agostinho colony (currently Viana, in Grande Vitória) where arrives 250 Azorean, between 1812 to 1814 years.

The German colonists in Espírito Santo founded two colonies: Santa Isabel, 1847, originating Domingos Martins and Marechal Floriano cities; and Santa Leopoldina, 1857, yielding Santa Maria de Jetibá and Santa Leopoldina cities (Posenato, 1997). Most Germans, both in Santa Isabel as Santa Leopoldina colony, live in dispersed sites in family-colonies, and only a few merchants and artisans families concentrated in the urban nucleus (Table 1) (Muniz, 2009).

Table 1. Dados relativos às Colônias de Santa Isabel e Santa Leopoldina / ES

Colony	Foundation date	Colonists quantity	Predominant foreign nationality	Urban nucleus
Santa Isabel	1847	753	German and Pomeran	Domingos Martins
			German and Italian	Marechal Floriano
Santa Leopoldina	1857	1065	German	Santa Leopoldina
			Pomeran	Santa Maria de Jetibá

Source: Relatory presented to Espírito Santo's Province, 1862. <http://www.ape.es.gov.br/pdf/Presidentes%20da%20Provincia/1862_05_25_Jose_Fernandes_Costa_Pereira_Junior.pdf> Access 04/29/2014.

Methodologically, its designed an *Siedlung* (urban form) matrix as a way to diagram maps and images for the four urban nucleus characterization. All of them obey the following matrix:

Urban form methodological matrix – *Siedlung*:

Old picture	Radig's scheme
Recent picture	Weimer's scheme
Aerial photo	Local urban form scheme

Santa Isabel Colony

Domingos Martins

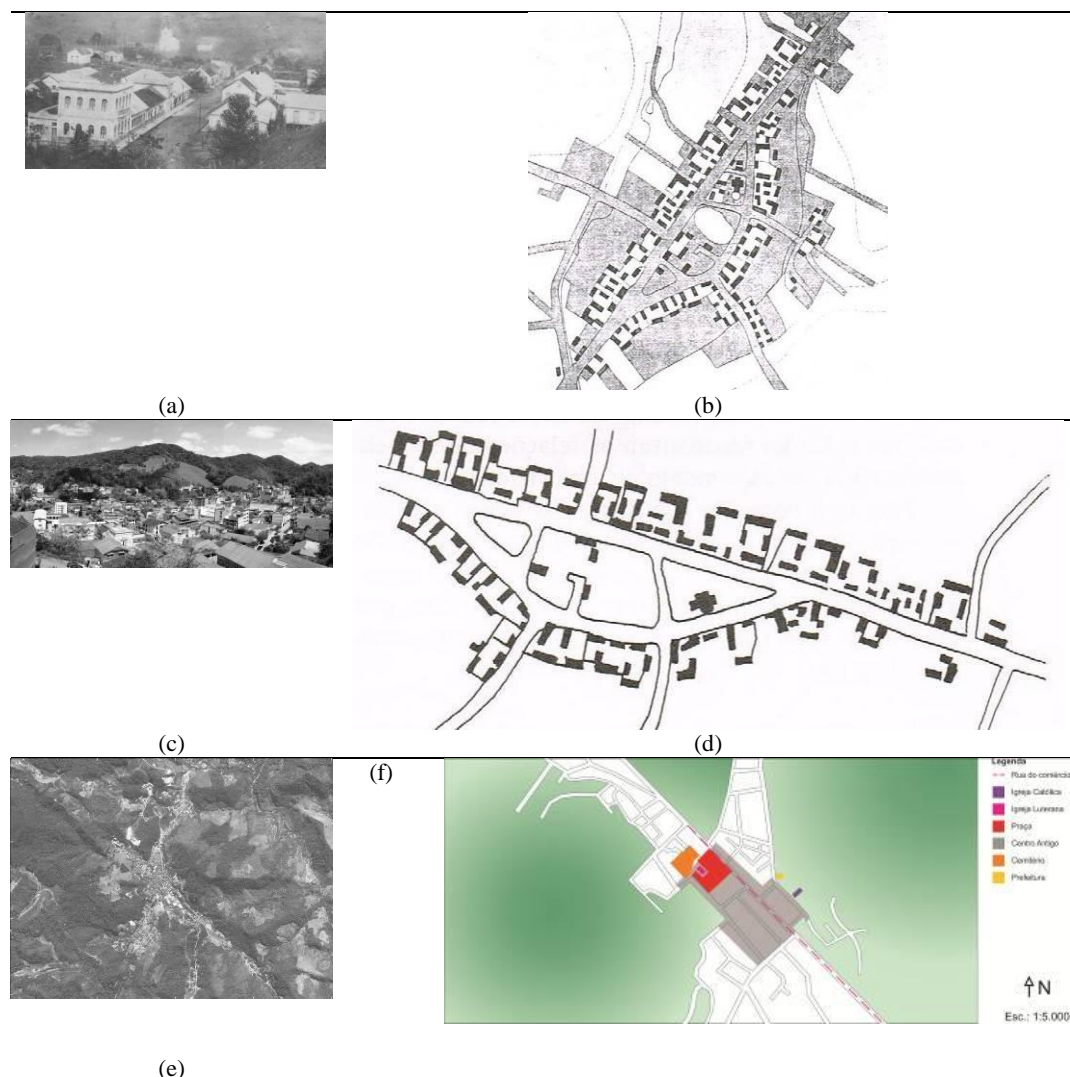
The first Germans coming from the *Hunsrück, Rhenish Prussia*, in particular the *Koblenz, Lötzburen* and *Traben-Trarbach* cities arrive at Espírito Santo's capital on December 21, 1846. Remain a few days in Vitória, and then follow to Santa Isabel colony, first founded colony, by Dr. Luiz Couto Ferraz, President of the Espírito Santo's Province. The colonist moves up the mountain along the Jucu river northern arm margin and settled on January 27, 1847, in Serra da Boa Vista. There are 39 families, 16 Evangelical-Lutheran, and 23 Catholic, totalizing 163 people.

The first chapel is soon built on the Boa Vista's hill where it also intends to build a village. Over there remained about 10 years. Some of the immigrants, for climate reasons, rise higher, and then that Catholic families settle in Santa Isabel and the Lutheran pursue a little more, reaching a flat spot among the mountains which they called Campinhoberg – Morro do Campinho. In 1852 the first Catholic Church is consecrated in the Santa Isabel village. Between the years 1858 and 1860, in Campinho, Lutherans begin their temple construction. First, however, build a small chapel in the area's center where the cemetery is located today.

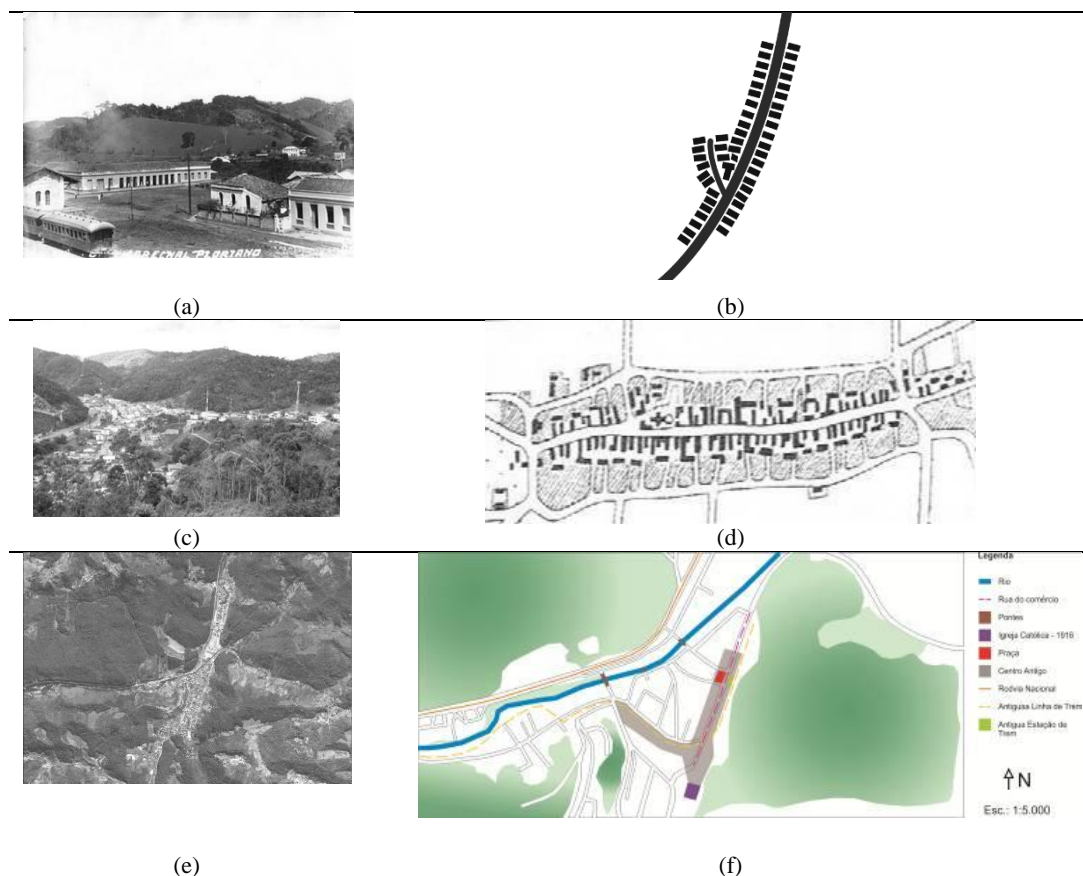
The Colony gradually progresses and then emancipates Viana; being elevated to the status of *Freguesia*²²¹ in 1869. On October 20, 1893, the Santa Isabel municipality dismembers from Viana. Its installation takes place in Campinho, on December 19 of the same year. On December 20, 1921 the municipality's name changed to Domingos Martins, in honor of Espírito Santo's hero, Domingos José Martins.

Next, in Table 2, presents hallmarks references synthesis of Campinho's urban form map.

²²¹ Freguesia is a political administrative category adopted in Brazil, in the nineteenth century, similar to a Municipality, with no equivalent for the English language.

Table 2. Campinho's Urban form – *Siedlung*.***Marechal Floriano***

After the first German immigrant's arrival and installation on demarcated lands in Santa Isabel and Santa Leopoldina colonies, in 1860, the Agriculture's Minister ordered the demarcation of 100 new lots in the Jucu's region, belonging to Santa Isabel colony, and the construction of a bridge over the southern arm river, which crosses the municipality. Thus, in 1862, it's inaugurated the Southern arm village, occupied by the new German immigrants arriving to Espírito Santo, and later, also by the Italians. On May 13, 1900, the village is named Marechal Floriano in honor of the 1st Republic's Vice President, Marechal Floriano Peixoto. On October 13, 1991, Marechal Floriano is emancipated from Domingos Martins. In addition, next, the Table 2 presents hallmarks references synthesis of Marechal Floriano's urban form map.

Table 2.1. Marechal Floriano's urban form – *Siedlung*.

Santa Leopoldina's Colony

Santa Leopoldina

On December 15, 1855 a resolution establish the Santa Maria's river waterfall region as a foreign colony. Originally marked an area of 567 km². In the year 1857 come to the colony the first 140 Swiss German language colonists, and in the following year 222 people of various nationalities such as Germans and Luxembourgers and then Tyrolean²²².

The land's implantation is given by the valley bottoms with front to the river and back to the hill. Unlike the German tradition in which farmers live in small towns, the colonists are distributed at sites in the valley bottoms, in a dispersed linear occupation²²³.

The Santa Leopoldina colony begins in 1857, with 222 German settlers in Porto do Cachoeiro Santa Leopoldina village, where a river port works. Each family gets a lot of 62,500 *braças quadradas* of land (about 190.000 m²). Into the nucleus settlement are reserved 500,000 *braças quadradas*, with plazas, churches, schools, with urban lots of 10 fathoms in length by 25 background (about 22 meters in length by 55 meters deep), with cemetery located outside the village (Muniz, 2009).

²²² Arquivo Público do Espírito Santo. Imigração no Espírito Santo.

Source: <<http://www.ape.es.gov.br/imigrantes/html/historico.html>>. Access 11/20/2012.

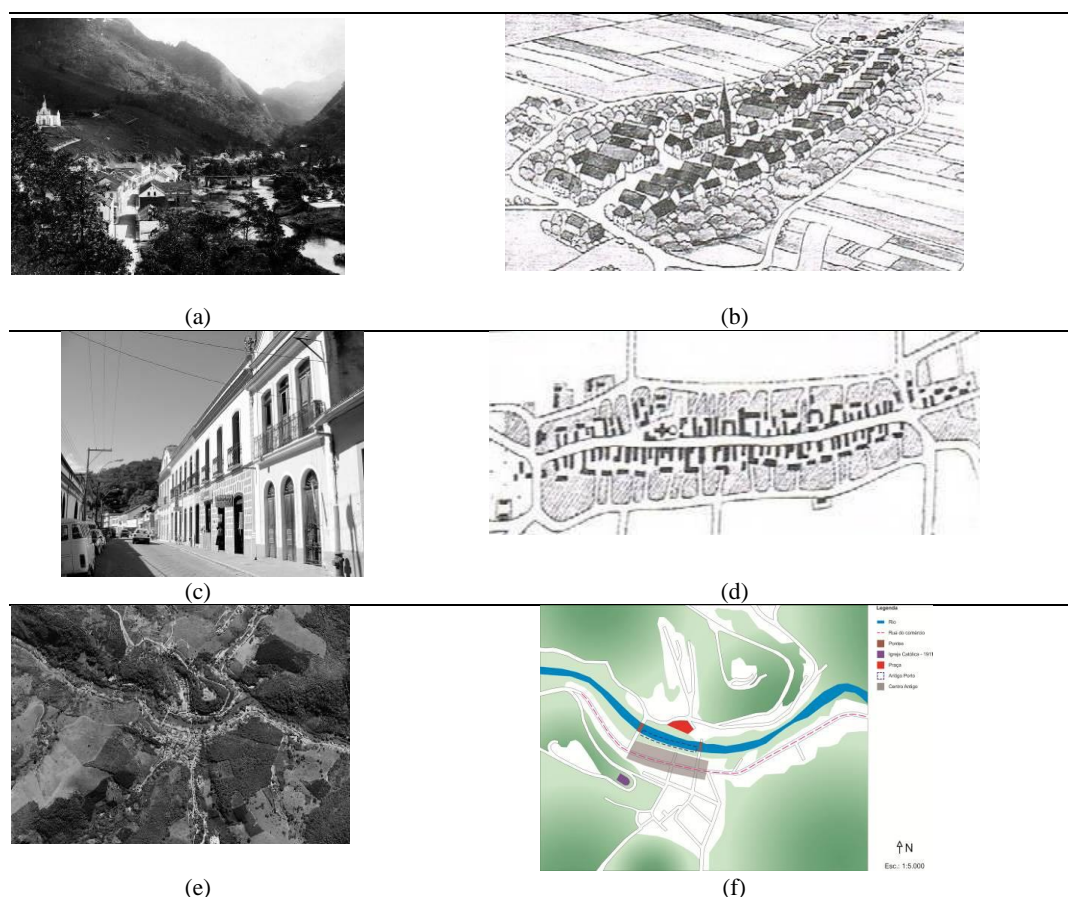
²²³ Espírito Santo (Estado). Relatório da Análise da Proteção do Ambiente Cultural de Santa Leopoldina. Vitória, Secretaria de Estado da Cultura, 2008.

Subsequently, other immigrants arrive: the Dutch established between the years 1857 and 1862; Austrians and Luxembourgers are established in 1857; Germans arrives in 1859, most from Prussia, Saxony, Hesse, Baden and Riviera. Most Pomeranians established between the years 1872 and 1873; while the Italians begin to settle from 1875; but most of it direct to Santa Teresa municipality. The Cachoeiro Santa Leopoldina Village emancipates on June 6, 1882 and Law No. 21 of April 4, 1884, elevates the colony to the status of municipality.

In the figure “a”, in Table 3, there is Santa Leopoldina urban nucleus developed around the commerce street, "back" to the Santa Maria da Vitoria River, due to the location of the port flowing coffee to the coast; and a restricted occupation on the opposite margin, endowed with limited flat area (Figure f, Table 3).

Next, the Table 3 presents hallmarks references synthesis of Santa Leopoldina’s urban form map.

Table 3. Santa Leopoldina urban form – *Siedlung*.



Santa Maria De Jetibá

In May 1873 landed at the Vitoria port hundreds of German families, mostly coming from Pomerania, then belonging to Prussia and now Poland territory. First comes 413 Pomeranians, and also in the same month, comes more 366 Pomeranians, all Lutherans, a people who lived isolated between Germany and Poland, with extremely different cultural habits from the rest of the population.

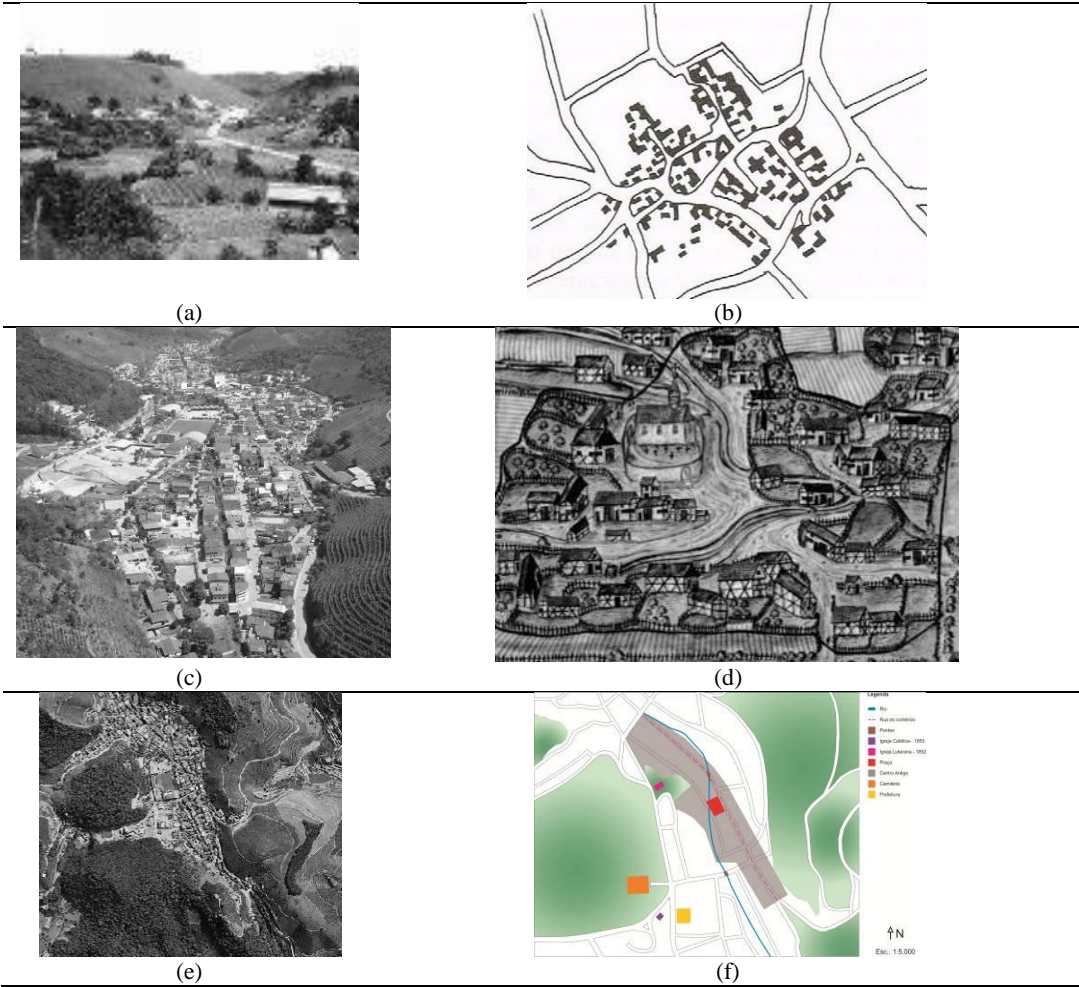
Although not considering themselves Germans, Pomeranians immigrants are treated as such and sent to the mountains top, in Santa Leopoldina’s colony, where other German immigrants had settled. Most Pomeranians settles in regions still called Luxembourg and Jequitibá, in Santa Leopoldina colony. In the following decade, some of these immigrants leads to Santa Maria de

Jetibá region, but among them there are also immigrants from Luxembourg, Netherlands, and the *Rhine* and *Hessen* regions, in Germany, which thus initiate a second stage of the immigration process. Until 1943, the town is known as Jequitibá, being a Cachoeiro Santa Leopoldina's district. By state law no. 4067 to May 6, 1988, the district is elevated to municipality with the current name of Santa Maria de Jetibá.

The Santa Maria de Jetibá's nucleus implementation follows the *Strassendorf* logic, as identified in Santa Leopoldina. However, instead of developing surrounding a street, develops around the São Luis river, Santa Maria da Vitória's tributary (Figure a, Table 4), because the flat valley area allows the occupation to the hillsides limits (Figure b, Table 4) (Weimer, 2005).

Next, the Table 4 presents hallmarks references synthesis of Santa Maria de Jetibá's urban form map.

Table 4. Santa Maria de Jetibá's urban form – *Siedlung*.



Urban Nucleus Form Constituted by German Immigration. A Comparative Matrix

The comparative analysis indicates a *Strassendorf* predominance, identified as main morphological characteristics in the colonies settlement of German dominance, or its variation, the *Angerdorf*. The territory physical dimension is recognizable both in the adoption of rivers courses as structural elements of the land's division, lots located along watercourses, generally orthogonal to the water frontline; as in the settlements location in high and cold lands. Despite

the characteristic factor of the immigrant's sediment close to watercourses, it doesn't represent an urban form front role, because the main street is the structuring force line of the settle.

The urban dimension stands out the inhabitancy from nucleation, and the dominance of a structured pathway by a road, generally central and characterized, functionally, by the commercial activity prevalence. The built settle, consisting of peculiar architecture and detached and distant position, distinguished the single central tower church.

From Günter Weimer, the Santa Leopoldina and Marechal Floriano urban morphology analysis allows to recognize the predominance of *Strassendorf* formal type, ie the, urban design structured from a commercial street, main, one of the German colonization in Brazil central attribute. Furthermore, there is a river role in choosing the occupation locus, despite not representing morphology front role.

In Santa Maria de Jetibá, *Haufendorf* is the predominant type, with spontaneous growth characteristics, polygonal shape, decentralized from the Santa Maria da Vitoria tributaries, and may in some ways be considered *Angerdorf* due to the formation of a square during urban area growth. Finally, in Domingos Martins, the predominant type is *Angerdorf*, a variation of *Strassendorf*, in which the central street widens open to a central square.

Conclusion

This paper intends to acknowledge and present the urban areas morphological configuration particularities derived from the German immigration in Espírito Santo. Chronologically sequential, occupations promote urban settlements with more than a few similar characteristics. Importantly, this is an initial approach to German colonization in Brazil urban heritage studies, especially in Espírito Santo experience.

The geopolitical dimension, initially, draws attention to the underlying territorial cutout for the colonies settlement logic: situated in the colonial occupation limits areas in Espírito Santo. This first criteria seems to follow the physical and geographical territory dimension, recognizable both in the adoption of rivers courses as land division structural elements - lots located along water courses, in general, orthogonal position to the waterfront; as the settlements location in high and cold lands.

The urban context stands out the settlement from nucleation, and the structured pathway dominance surrounding a road, generally central and characterized functionally by the prevalence of commercial activity. The built settle, consisting of peculiar architecture and detached and distant position, distinguished the single central tower church, if any.

The urban morphology analysis, from Günter Weimer, in Santa Leopoldina and Santa Maria de Jetibá, in Espírito Santo, presents a *Strassendorf* formal type predominant, ie the urban design structured from a main street, commercial, one of the German colonization central marks in Brazil, in addition, it's noted the river role in choosing the occupation locus, however, is not a protagonist urban form role.

As future deployments, it's pointed out urban morphology related investigations in other immigrants cities (Weimer, 2004) in Espírito Santo; from a deepening in specific literature, focused on Werner Radig, in German language, with the objective of identifying and mapping the immigration nucleus settle in Espírito Santo, from the nineteenth century, territorialized in the Santa Maria da Vitoria and Jucu river basins.

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Exhibition of City. The case of Lisbon 1940 vs Rome 1942

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Abstract. *In order to exhibit their own dominance, during fascism in Italy and the authoritarian regime of Salazar in Portugal, the respective capital cities, Rome and Lisbon, were to plan an International Exhibition. At a different scale of analysis, the responses of both States to the public space present analogous elements as well as differences, links of continuity however, can be found. Rome and Lisbon have not been arbitrarily cited as example, but chosen because they are directly related through their planned exhibitions. If we do a comparison between the scales of the two cities (Roman occupied an area of about 400 hectares, Portuguese and a much small area), there are similarities between the two like the choice of the place and manner of their integration (or not) in the existing city. Like in Lisbon wanted to bring the city to the Tagus, in Rome Mussolini wanted to bring it to the sea and, in both cases, the urban redevelopment included a change in the road network, as well as the creation of new connections. The aim of this essay is to analyze and understand how both these countries responded to urban issues, summarized in three points: the territorial scale, in this case the degree of connection with the historical city; the organization and exhibition of a "new city".*

Key Words: Exhibition, Estado Novo, fascism, Urban Planning.

Aderire perfettamente alla vita d'oggi, materiale e spirituale, pur rispettando le condizioni di ambiente. Ammettere quanto vi ha di universale, di corrispondente alla civiltà contemporanea, nei movimenti artistici europei, innestandovi le nostre peculiari caratteristiche e tenendo presenti le nostre speciali esigenze di clima. Ecco il nostro compito.¹ (Marcello Piacentini)

During the fascist regime in Portugal and Italy, the respective capitals, Rome and Lisbon, were to plan an international fair (almost at the same time): the outcome of the planning proposals presented both similarities and differences, however signs of analogy and continuity can be found, determined by constant diplomatic and cultural exchanges between the two countries at that time.

The paradigm underlying expositions on this scale implies thinking and building a "new city" inside the City itself: how to design this new part of the town; whether it should be integrated with its present fabric, historical heritage and urban complexity; how it should take into account its past, and the course decided for its future. And furthermore what future will there be for that "new part" inside the historical city? Architecture, as design process developed on a specific period, involves the dimensions of time and space. Thinking a set of pavilions as if they are "ephemeral" or rather to stay and to last, define the urban choices for the urban planning of the compound itself. All this is sublimated in a representative architecture that stands and states a clear ideological choice of those involved.

From the late nineteenth century, and especially in the '30s, the debate about urban planning via the alteration of the historic town with the "modern city" entered its maximum point, and was closely bound to the ideology and propaganda of the specific country.

Ideology and propaganda

In Portugal, along the riverside district of Belém, the exhibition called *Exposição do Mundo Português* was planned for the year 1940; the Italian Exhibition was designed for Rome, for the

year 1942.

Both Fairs had some common purposes; the main one was to represent the valour and strength of the State, under the concept of nationalism in the context of the broader notion of "Empire".

Both Rome and Lisbon intended to assert themselves as capitals of the Empire: the "Roman Empire", so celebrated by Mussolini; and the "Portuguese Empire", that claimed to have given the rest of the world its "Latin civilization" through its homeland extension to its colonies in Africa and South America.

This premise outlines that the two city's expos shared similarities on its urban and architectonic design especially throughout a bond of political and ideological principles that uses architecture (and its image) to demonstrate abroad, the modernity of the country, and at home, national pride celebrating the country's iconic values to the people.

On that matter, the link between Portugal and Italy, was supported by Portuguese government itself by António Ferro (Director of National Propaganda Secretariat) and Duarte Pacheco (Minister of Public Works), senior representatives of the political regime.

In political and ideological terms, Antonio Ferro often looked at Mussolini's regime as a point of reference to shape Antonio Oliveira Salazar home politics: it is widely documented that Portugal studied the background of the Italian political system at that time, identifying affinities with their own national interests and aims, especially after its distancing from the Nazi Germany's ideology after 1939. The Portuguese political reorganization itself, called "Estado Novo", took as a reference many of those political changes that occurred in Italy, such as for example: the juridical reform, corporatism, the FNAT³, educational reform, the AEV and youth organization (*Mocidade Portuguesa*⁴), among other models of political and socio-economic organization.

But if on one hand, the Portuguese government with António Ferro and Duarte Pacheco, always showed great interest in Italian politics, artistic and architectural models, on the other hand Italy itself was keen to share influence and dominion beyond its borders. Many institutions were established in foreign countries (for example, the Caur, the Fasci all'Estero, the Italian Institutes of Culture) to promote

the Italian propaganda abroad. All this boosted and strengthened the Portuguese-Italian connection also in terms of cultural orientations.

Within this framework of political and ideological influences with Italy, the grounds to organizing a "Portuguese World Exhibition" were set. This represented an opportunity to show to the rest of the world, the strength, the grandeur and modernity of the country when simultaneously, as Salazar wrote, "*fosters self esteem of the Portuguese people and remind you of its value as a nation*".⁵

Marking history: the value of time

The ideology behind investments on this scale - the universal expositions of Lisbon (1940) and Rome (1942) – consisted in building an artistic propaganda tool, based on the celebration of each country and their heroic past and present, displaying to the world the modernity achieved from their heritage. Both exhibitions therefore feature significant events of the past history of each country.

In Portugal, on the 20th of February 1929, Dr. Alberto de Oliveira, in an article entitled "1140-1640-1940", published on the *Diário de Notícias*, launched the idea of celebrating the eight hundredth anniversary of the foundation of the country (1140) and the tri-centenary anniversary of the Portuguese Restoration War (1640). However, his proposal was not immediately taken up. Only in 1938, in an "Unofficial Note from the Presidency of the Council", published on March the 27th, on the *Diário de Notícias*, did Salazar declare his intention of celebrating the double anniversary with an exhibition about the *Portuguese World*.

In the same years, in Italy, after the events of 1936 that led to the proclamation of the

Empire, the “Bureau International des Expositions” accepted the Italian application, submitted in 1935, to hold an international exhibition, originally scheduled for the year 1941. In 1937 the final date for the exhibition that was called *Olimpiadi della civiltà* was set for 1942. This date was chosen by Mussolini himself to be representative of the two decades that had elapsed since the establishment of fascism (1922-1942).

The date of the Italian exposition was announced before that of the Portuguese and it naturally provided an example that could be followed.

However, while the development of the Italian exposition “E42” had already been prepared some time before, the planning of the Portuguese celebration was delayed. Salazar, conscious of the lack of time and of the limited economic resources of the country, outlined a short-term plan for the works: only two years to organize the event in a difficult context where the international situation had worsened with the onset of the war in 1939.

The main idea was to make the work express, on one hand, a historical orientation, traditionalist and official, intended to assert Lisbon as the capital of the Empire, conforming the symbolic values of the *Estado Novo*; on the other hand to brand themselves with “Imperial Rome” in its symbolic meaning: the architecture, the relationship with the city, the monumentality, the strength of representative statuary.

The model of Rome

Notwithstanding the influence of the European context at the time, and of German and French architecture, it is pointed out in this paper that the Portuguese exhibition owed most to the relationship with the Italian exhibition.

The reference to Italy was already clear in 1934, at the “First Congress of the National Union,” which was designed as a documentary exposition planned by the architect Paulino Montês, where Ferro proclaimed the “May 28” Movement. One example mentioned was the Italian exhibition held for the celebration of the tenth anniversary of Mussolini’s march on Rome, in 1932. In the Portuguese fair, the attention given to Roman architecture was clearly expressed by the creation of a more modern and rational space, always informed by an awareness of the different scale of the two countries. In an interview with engineer Carlos Santos, comparing the exhibition with the Italian one in 1932, claimed to “feel a disappointment, because it is at the scale of the country, but ten times smaller”.⁶

Following the Italian 10th anniversary exhibition: “*Mostra della Rivoluzione Fascista*”⁷ in 1932, Portugal celebrated in 1936, the tenth year of the National Revolution. The Portuguese exhibition had to deal with similar spatial problems to those in Italy, especially regarding fitting the desired design layout within the existing environment. The solution involved, as it had done in Rome, combining ancient architecture with a monumental structure with straight and rational lines “and, despite the considerable difference the way in Italy and Portugal solved the same problem, we had learned something from the Rome exhibition”.⁸

Besides the exhibition of 1932, following chronologically, the Milan Triennial of 1933 and 1936, reported in national and international journals of the time. were also known amongst Portuguese architects

Simultaneously, we must not forget that Portugal had participated in other exhibitions, such as Italy: Paris 1937, New York and San Francisco 1939; which were important to consolidate the image of the *Estado Novo*, used as an opportunity to experiment with the pavilions a new representative architecture with the aim of asserting the identity of the state. The 1937 exhibition in Paris was certainly a significant one for Portugal. In this same exhibition wide visibility was also given to the Italian pavilion designed by architect Marcello Piacentini, as shown by the repeated publication of this work in *L’Architecture D’Aujourd’hui*⁹, an international journal which arrived in Portugal, impressing (their) architects.

At the time, architecture and monumentality of Italian contemporary works were clear references for the Portuguese architects, many of whom had travelled to Italy, staged or

collaborated with Italian architects. These contacts are documented in the state archives and private archives of these architects, where there are many surveys, photographs, books and Italian magazines.

The plans for the new fair in Rome, were published in the magazine *L'Architecture d'Aujourd'hui* few months after the proclamation of the intention to prepare a Portuguese exhibition, precisely in the issue number 10, October 1938¹⁰. It is interesting that, later in 1940, a special issue (from the same magazine) "Expositions"¹¹ presents simultaneously the two exhibitions: "Rome 1942" and "L'Exposition de Lisbonne 1940".

Press and magazines were the main vehicles for the diffusion of the plans of the Roman exhibition, named with the initials of E42 (after the war renamed EUR¹²) (Fig.01). There, the project was widely documented since its presentation in 1937, first by the Italian press, then reissued later in the main Portuguese magazines: *Arquitectos*, *A Arquitectura Portuguesa e Cerâmica e Edificação*.

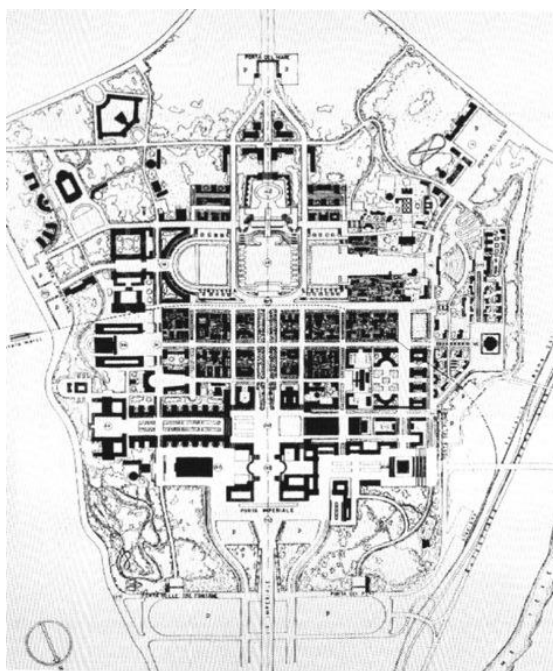


Figure 1. Plano of the E42, Rome, 1937-'42 (source: Tafuri,M., Dal Co, F., *Architettura Contemporanea*. Electa, Milano 1976, p.260).

In 1937, in Rome, Marcello Piacentini was appointed as chief architect of the E42. In Lisbon, two years later, 1939, the architect Cottinelli Telmo was nominated as director for the Portuguese expo. Their relationship was close. Mainly because, at the time, Cottinelli Telmo was also director of the Portuguese magazine *Arquitectos* (magazine of the National Union), where he had, as a correspondent from Italy, Plinio Marconi¹³, Piacentini's collaborator. Plinio Marconi had already represented Portugal before, at the General Assembly in Paris on 1937, covering for Pardal Monteiro - one of the most influent architects of the urbanism of the *Estado Novo*, the latter also involved in the exhibition in 1940.

Cottinelli Telmo himself, while director of the union's magazine, had first-hand access to the foreign magazines¹⁴, many of them from Italy: *L'Architettura Italiana*, *Casabella*, *Domus*, *Edilizia Moderna*, *Rassegna*, *Architettura Rivista del Sindacato Nazionale Fascista Architetti*, which began publishing the Roman exhibition since 1937¹⁵. It is essential to know that, among the most important documents from Cottinelli Telmo's library, there is the volume *Exposição Universal De Roma 1942-XX*, which includes the paragraphs: "program", "General Rules" and "Invitation to the World", with drawings, photos of the model and the expo buildings

(Portuguese edition of 1938).¹⁶

It is likely too, that rumours of Italian exhibition reached Portugal with the help of the architect Giovanni Muzio who was called to Portugal in 1939 to replace Marcello Piacentini working with the Municipality of Porto, when he took over the responsibility for planning the E42.

In the same year of 1939, with the construction of the exposition in Belem already started, the Roman magazine: *Civiltà: Rivista dell'esposizione universale di Roma*¹⁷ . arrived in Portuguese universities. The presence of this magazine in the Portuguese universities is not surprising considering the diffusion of Italian propaganda abroad, one of the pillars of foreign politics for Mussolini.¹⁸ In those years, it is important to remember that those involved in the Belem exhibition had already travelled to Italy. For example, in 1939, Adelino Nunes, returned to Portugal with the most important books of Italian architecture of the time, during the time he was planning the Post Office building of the Belem expo. Also the artists who played a key role in representing the monumentality (Fig.02) had had a connection with Italy: Leopoldo de Almeida, for example, considered the main sculptor of the expo, author of the *Padrão dos Descobrimentos* (along with Cottinelli Telmo) had worked in Italy for three years, having performed in Rome a solo exhibition of his work.



Figure 2. Photo of Exposição do Mundo Português.

In 1939, a book by Gustavo Giovannoni arrived in Portugal called: *Lineamenti fondamentali regolatore del piano di Roma Imperiale*, with 12 panels of drawings.¹⁹

On the other hand, Italy also asked the Portuguese National Committee for the Centennial, an appropriate space reserved in one of the pavilions of the Portuguese World Exhibition as well as at the inaugural act on July the 1st. Previously the Chief of State and members of the Portuguese Government, Admiral Umberto Monico spoke on behalf of the Royal Navy of the Italian Empire, marking the connection of Italian and Portuguese empires. To honour the country, the Italian magazine *Architettura* reproduced some photographs of Portuguese exhibition, with the following commentary: "Excellent examples of good architecture well suited to its function".²⁰

If we put aside the comparison between the scales of the two expositions (the Roman one occupied an area of about 400 ha, while Portuguese a much smaller one), there are similarities between the two regarding the issues that arise when planning an event of such scale: the choice of the place and the way of its integration (or not) with the existing city.

In Portugal, the coordinators of the exhibition - Júlio Dantas, Augusto de Castro and Antonio Ferro - who had the responsibility to present "the true city of Portugal's history", after some doubts about the place, decided its final location to be in Belem, with the pavilions organized around the garden in front of the Jeronimos Monastery.

The site is a flat terrain, relatively far from the city centre, surrounded by notable pre-

existences and at the time partially occupied by some warehouses which were demolished, but which allowed the integration of the Tagus river within the exhibition as a key element to achieve the historic character required (fig. 03). Another aspect considered in Lisbon, was the integration of the city's main historical elements with the very site of the expo through light effects. The castle of *São Jorge*, the monument to the Restorers and *Liberdade* Avenue, geographically isolated poles of the city were connected with Belem using electric light beams. A scenic ensemble, full of symbolic sense, to be seen by the river.



Figure 3. Site plan of Exposição do Mundo Português (source: Guia da exposição do mundo português, Lisboa, 1940).

In Rome instead, a completely empty lot was chosen. Far from the historical city centre, unrelated to the rich architecture of Roman antiquity, and thought to be planned together with a new road axis linking Rome to the sea. A "fourth" Rome. Lisbon wanted to bring the city to the Tagus, and Mussolini wanted to bring Rome to the sea. Whatever the goal, in both cases, the urban redevelopment included a change in the road network, as well as the creation of new connections.



Figure 4. Aerial view of the portuguese exhibition in Belém, 1940 (source: Eduardo Portugal, 1940, Arquivo Fotográfico CML).

Regarding the spatial distribution of each plan: The kernel of Roman exhibition was a square crossed by a road leading to the historic city; in the Portuguese case, the axis that structure the whole layout is constituted by the river and a main square, interconnected with the elaborate presence of the *Jeronimos* Monastery. Thus was born the Empire Square, bounded on one side by the river, on the opposite by the monastery and on the other two sides by two pavilions: the main ones.²¹ The exhibition was like a "modern" take on the historical city: the new square

designed for the exhibition recalls the Commerce Square of historic Lisbon, reaffirming the Portuguese dominance of the sea in the memory of the discoveries.

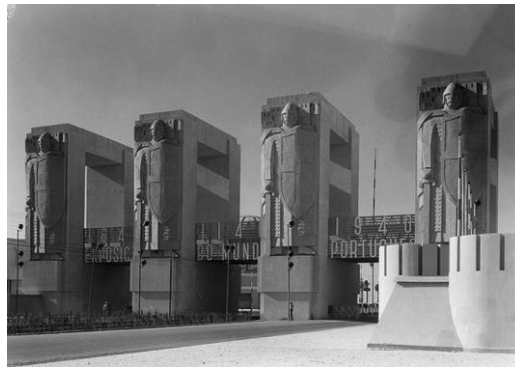


Figure 5. Exposição do Mundo Português (source: Guia da exposição do mundo português, Lisboa, 1940).

In the Belem expo, the pavilions (Figure 4) were distributed in a fragmented way, in a relation to the outdoor spaces, where the perspective is not axial, but constantly changing. Water is a key component. As a symbol, it reinforces the historical importance of Portugal in maritime trade. It has architectural potential, in the sense that the water reflects and extends the architecture, supported the pavilions like if were floating boats. The pace of the public space between the pavilions have a hierarchy dictated by voids, on the opposite to what happens in Rome, where the rhythm is given not only by the emptiness but, above all, by the metric and monumentality of the architecture. The buildings design in Rome create a coherent whole, unlike in Belem, where the pavilions were designed with different languages. In Belem a hierarchy of styles was chosen for the pavilions: modern for the most monumental and traditional for the minor ones, arriving even to reproduce "Portuguese villages". This choice was not random. Amplify instead the marked difference within the architecture of the two regimes: on one side the Italian fascism in search of modernity and monumentality; on the other side the ongoing commitment between modern taste and traditional rhetoric, characteristic of the *Estado Novo* (Fig. 05). The Portuguese exhibition also learned from the Italian one to reinterpret the elements of the historical city and use them for its own purpose,: Belem came out as future expansion of Lisbon, when the E42 was intended to be a new, almost independent, block of Rome.



Figure 6. Photo E42, Rome, 2012 (photographer: Alessio Agresta).

Another difference is that, in Rome, the E42 was designed from the beginning to last beyond the exhibition itself, therefore, the architecture features a greater solidity in all aspects: urban

planning, construction criteria and used materials (Figure 06).

The exhibition of Belem was conceived rather to be an ephemeral experience running over a specific period of time. This is reflected in the choice of materials, speed of execution and reduction of costs. Being approved in 1939 and scheduled to run the next year, in Lisbon, the general plan of the exhibition was seen as a test case for future changes inside the city, considering impossible, in the immediate, a definitive urban transformation. As Cottinelli Telmo stated later: the exhibition was intended to show to the world the strength of the state, and the great ability of Duarte Pacheco as Minister of Public Works.

In the preface of the "Exhibition of the Portuguese World guide" the main reasons of that choice could be read: *"For the first time a great exhibition of History was held here. Until today, only international or national fairs for commerce, industry or colonialism were made here. That should be a lesson of energy, a portrait of the Portuguese genius through all their spur of greatness, a balance of spiritual forces. I mean: the exhibition will not be a Museum of dead things, but an example and an exaltation of the permanent and immortal forces of our nation"*.²²

Clearly this is an ephemeral architecture. That was clear to Salazar and to the architect chief Cottinelli Telmo, when he said: *"the ephemeral architecture is a kind of adventure within the architecture"*²³. Among the objectives to be launched for the future, not an archaeological demonstration looking at the past was pursued, but rather *"whether it's fair or exhibition of every nature, architecture always look forward and participates in the spirit that exists in the composition of advertising. It is always a manifesto"*²⁴. The important thing was to show (off).

The pavilions were built as ephemeral elements, but even so, Cottinelli Telmo was convinced, based on the E42, that what will last is *"a preparation of a vast urban plan,"* and that the exhibition was *"a dress rehearsal of the first International Exhibition to be held in our country"*. Was fully clear, the desire to be first and foremost a "Symbolic City" that *"will be in the shadows of the storm of the current world, the document of national consciousness and faith with, strong of a glorious past that celebrates, the Motherland affirms the unwavering certainty of the Future."*



Figure 7. Photo of the Palazzo della Civiltà, 2012 (photographer: Alessio Agresta).

Comparing the urban choices, the architectural languages of the pavilions, Rome (Fig.07) and Lisbon were both trying to rebuild their own classicism.

Voluntarily, Portuguese architects, choose to be never completely away from tradition. Always leaving - even in the most "modern" cases - a reminiscence of vernacular identity: so in the most obvious cases there is always an element that refuses to be merely trendy to be "modern and Portuguese ", fulfilling so the primary mission requested by the *Estado Novo*. So says Augusto de Castro, General Commissioner of the Exposition: *"It has been demonstrated*

that it was possible to elevate life and national consciousness to a level unanimous understanding and an environment of collective elevation that many assumed unattainable" ²⁵.



Figure 8. Photo detail of the Palazzo della Civiltà, 2012 (photographer: Alessio Agresta).

The history and development of exhibitions is a complex story and deserves - to be properly understood - a more detailed reading of the various determinants, as well as a careful examination of each pavilion and sculpture (Figure 8). Due to the beginning of the war, we never got to see the full E42 (Figure 9) and, as to the Portuguese World Exhibition of 1940, remain no more than a spectacle offered to the country.



Figure 9. Aerial photo of E42, Roma, 1953 (source: wikipedia).

Notes

- 1- original text from: Piacentini, M. (1930), *Architettura D'Oggi*, Paolo Cremonese (Editore, Roma), 39.
- 2- for a further study, look the bibliography of António Ferro: *Viagens a volta das ditaduras* (1927); and *Salazar, O Homem e A Obra* (1933), where is clear the connection to Mussolini and the Italian regime.
- 3- FNAT (Fundação Nacional para Alegria no Trabalho) founded in 1935, inspired by the "Opera Nazionale Dopolavoro" italiana de 1925, that will be the base for the "Obra do Trabalho Nacional" (ref. Arquivo Salazar PT/TT/AOS/D-M/16/1/18).

- 4- AEV (Acção Escolar Avanguarda) was a youth organization established in 1934; then renamed in 1935 *Mocidade Portuguesa* (Portuguese Youth), inspired by Italian style of ONB (Opera Nazionale Balilla) founded in Italy in 1926.
- 5- TRABULO, A., (2004), *O Diário de Salazar*, Parceria A.M. Pereira Livraria Editora, Lisboa, 2004, p.139.
- 6- “A exposição documentária”, in: “O Século”, 27/5/1934, pp. 10-15; interview with Eng.º Carlos Santos, pp.2.
- 7- Alfieri, D., Freddi, L.(a cura di), (1933), *Mostra della Rivoluzione Fascista- Guida storica- I Decennale della Marcia su Roma*, Rome.
- 8- Acciaiuoli, M.,(1998), *Exposições do estado novo 1934-1940*, Livros Horizonte, 22.
- 9- *Architecture D’Aujourd’hui*, n. 5-6, Maio/Junho de 1937, “especial issue of Paris 1937”, pp.110; e *Architecture D’Aujourd’hui* n.8, Agosto de 1937, pp.24-25.
- 10- *Architecture D’Aujourd’hui*, (1938), n. 10, October, 24-25.
- 11- *Architecture D’Aujourd’hui*, (1940), n. 1-2, 1940, p.45, pp. 82-84, p.87.
- 12- E.U.R. is the acronym of *Esposizione Universale di Roma*, also called Eur.
- 13- Plínio Marconi (1893-1974). Italian architect and urban planner. Among many projects, was responsible, since 1933, for urban plans along Italy. He worked alongside Marcello Piacentini, replacing him in 1950 at the Faculty of Rome.
- 14- Foreign magazines came to Portugal: from France *Architecture D’Aujourd’hui* and *L’Architecture*; from Germany *Modern Bauformen*, and from the USA *The Architectural Forum*.
- 15- For example: *Architettura*, n.4, 1937; *Casabella* n.114, 1937; *Architettura*, Dezembro 1938.
- 16- Information took from the thesis of Martins, J.P., *Cottinelli Telmo, 1897 - 1948 : a obra do arquitecto* (Texto policopiado), (1995), Master thesis in History of Contemporary Art, Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa.
- 17- *Civiltà: Rivista dell’esposizione universale di Roma*, (1939), (Ed. Valentino Bompiani, Milano).
- 18- Just as example, the University of Coimbra opened an Italian library (already opened in July 26, 1928), with 3000 Italian volumes offered directly from Mussolini.
- 19- Giovannoni, G., (1939), *Lineamenti fondamentali del piano regolatore di Roma imperiale*, (Ist. Di Studi Romani, Roma).
- 20- *Architettura*, Agosto, 1940.
- 21- The general plan of the exhibition was given to Cottinelli Telmo, who also designed the Gate Foundation Gate and the Monumento of the Discoveries (with Leopoldo de Almeida). Pavilion of Honour and Lisbon, by Cristino da Silva; Portuguese Pavilion in the World, by Cottinelli Telmo; The Discoverers, by Pardal Monteiro; Portuguese villages, by Jorge Segurado; Colonial Ethnography section by Gonçalo de Mello Breyner and others; Post Office Pavilion by Adelino Nunes; Pavilion of Brazil, Raul Lino; Pavilion of Colonization, by Carlos Ramos; Pavilion of Foundation, Training, Achievement, and Independence by Raul Rodrigues Lima.
- 22- Castro, A. de, “Roteiro da Exposição do Mundo Português”, Lisboa, 1940; in *Colóquio Artes*, n. 48, Março 1981, pp. 10-11.
- 23- *Revista Oficial do Sindicato Nacional dos Arquitectos*, Agosto/Outubro, 1938, p.163.
- 24- *Ibidem*.
- 25- *Quinze Anos de Obras Públicas 1932-1947*, Livro de Ouro, 1º Vol., Comissão Executiva da Exposição de Obras Públicas, Lisboa, 1947, p.177.

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Integrated Approaches

Although the conference proposals and research papers organised under the theme - 'Integrated approaches' include a wide range of theoretical and practical interests and purposes, they are primarily concerned with urban form analyses and their planning and design implications. The study of urban form relies on the identification and analysis of structural elements or a combination of structural elements of the urban landscape. Different disciplines and professional groups have developed their respective research ideas and concepts for describing and interpreting urban form. For example, architects use building type areas and urban tissue to understand the configuration of urban form; planners and urban designers are concerned with land-use zones, ecological areas and historical precincts. There have been efforts to develop an integrated approach to urban form. In particular, geographical urban morphologists, argued that the urban landscape comprises three morphological elements: the ground plan (comprising streets, plots, and the block plans of buildings); the building fabric; and land and building utilization. The idea of urban morphological regions is a key tool for distinguishing and characterizing urban landscape divisions and the relations between them. Morphological regionalisation can be used as a basis for prescriptions in which future changes are incorporated harmoniously into the existing landscape. Recent research on an integrated approach to urban form includes Swedish researchers' Place Syntax and Vitor Oliveira's *Morpho*. The use of computer tools and integrating physical and socio-economic elements are increasingly important for spatial data analysis and synthesis. Research papers under this theme are expected to contribute to the exploration of urban form analyses which are fundamental for creating and managing urban landscapes.

Kai Gu

Study on regeneration of downtown area through infrastructure development as urban catalyst. case study of Tokushima city's regional resource: Shin-machi river's frontage development

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Abstract. *"Urban Catalyst" indicates "Project where the catalyst was applied to stimulate the metropolitan environment for the improvement of an existing city". Conceiving of urban design in terms of architectural actions and reactions, the elements to act as a catalyst are defined physical elements such as buildings, open spaces, and the temporary buildings in various scales, and broadly non-physical elements such as festivals and events could be considered also. In this paper, the downtown area of Tokushima city was chosen as a case study and discussed about the Shin-machi board walk along the River, and its effect to the city. Community has been developed to utilize open spaces along the river. The essence of Urban Catalyst is to create a new space within a city while maintaining an existing context. In addition to that, this method is quite different from the redevelopment such as "Scrap & Build" approach.*

Key Words: Urban catalyst, urban transition, water front, event, management, infrastructure.

Introduction

Background and Purpose of the Research

The decline of the central area in the local cities is brought into discussion for such a long time, but there are some cities with which original regeneration schemes brought their life back, or regained their vitality. In addition, Central City Revitalization Law was revised in 2006, and it pointed out of the needs of "Regeneration Plan underutilization of Local Resources", therefore, the movement of regeneration of the downtown initiated by the local governments or shopping mall's association is quite active recently in nationwide^{1) 2) 3) 4)}.

Recently, the method of urban regeneration, called "Urban catalyst"^{5) 6) 7)}, draws more attentions in Europe and America. In this paper, "urban catalyst" is defined as a catalyst promoting the chain development and regeneration in the city and places it with something like catalyst in the chemical reaction. Unlike the development methods such as "Scrap and Build" in the period of economic growth, it is a significant characteristic of urban catalyst which promotes changes and chain effect to the surroundings beyond the boundary of the development site. It should be an extremely effective method such as Japan, which is in a mature phase, not growing, rather declining and shrinking. The point unlike the conventional development method, urban catalyst make effect to the surrounding neighborhood like chain effect which is the strong characteristic whereas the conventional method limited in the change of the target site itself. There could be lots of examples to be observed as a result of "urban catalyst", even if they are not recognized as is, which exactly influenced positively around its surroundings and most likely regenerate the area.

The central area around the Shinmachi River in Tokushima City is the place where the decline is the big issue. However, it is remarkable that city regeneration advances significantly by the citizen lately, authorities, collaboration of public and private sectors, it would be beneficial to understand the current situations and to find out the physical influence

on to the built environments, clarify the individual activity and its relation to each other, and then applying these knowledge to establish the Japanese oriented urban catalyst theory. At a glance, it seems that there could be a certain rule, regularity, even type or pattern for these successful regeneration exist, even if it happened randomly without any order, or just by accident. Not only restraining indiscriminate developments, but also enabling the selection of the strategic catalyst, and effective places for intervention, envisioning its regeneration, would be effective way of development without spending enormous amount of investigation. Urban catalyst could be an optimize solution for urban regeneration. The objective of the research is to analyze the cause and evidence of declines of the city center, Shinmachi district, and also to clarify the chain effects of catalyst to the urban context, built environments and community development chronologically.

Precedence Research

There are some papers which focused on the Shinmachi River for the research in the past. Those are by Akihiko Higuchi, “Riverfront Development for Community Revitalization”⁸⁾ and by Yoshitomo Deguchi, “Study on Improvement of Shinmachi Riverside Park and its Influence to Surrounding Environment”⁹⁾, and both of them are describing about the role of the urban river in the viewpoint urban design, but most of other research is limited in the engineering aspect such as quality of water resource and construction and maintenance of infrastructures along the river, thereby there are very few research dealt with the collaboration among community leaders, or community development for urban regeneration, or cause and effect related to the related field, moreover the emphasis on the chain effect of the methodology in urban regeneration.

Summary of the Research

Method of the Research

In this research, to obtain a general and background information on the research area (Tokushima City Center), chapter 3 clarifies it based on various documents^{10), 11)} including statistics data and documents about urban transformation. Chapter 4 refers the previous research of the urban transformation and forces on Awa Dance Festival. Chapter 5 focuses on the transformation around the Shinmachi River successively and effects of chain type catalyst around the Shinmachi Boardwalk construction, recent activities by the residents and community, several hearing survey had conducted to the local Government and event organizers to clarify the present conditions and issues. Chapter 6, summaries and analyses each chapter for the establishment of the Japanese type urban catalyst theory.

Summary of Tokushima City and Downtown Area

Tokushima City is developed on a delta located at the mouth of Yoshino-gawa River, and 138 rivers flow across the city, which is quite rich. The most of Tokushima City were located on the Tokushima plains, forming city blocks in a flat part, and the downtown developed between the symbolic Mt. Bizan and the former Tokushima Castle (Figure 1) since 16th century, feudal period.

The core of the central city is constituted with two districts; Shinmachi district and Uchimachi district. Particularly the Shinmachi district was flourished by its port activity, indigo products and sugar are the main trading products, and it became the most prosperities commercial district in Tokushima. However, large commercial districts are concentrated around the JR railway station, and now younger generations recognize the station area is the city center, not the Shinmachi district. This research's study area, Shinmachi River Neighborhood is around the border between Shinmachi district and Uchimachi district.

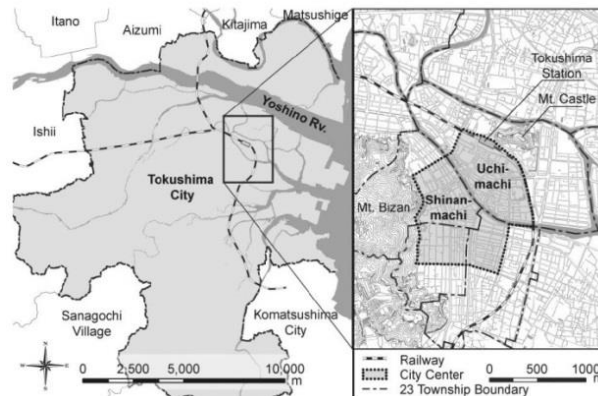


Figure 1. The Shinmachi District located in Tokushima City Center.

Transformation of the City Center

Statistics and maps of about 30 years are collected and these data organized and analyzed for visualization to clarify the transformation of the city.

Analysis by Statistics Data

Statistics data such as national census, establishment company statistics, and commercial statistics are obtained from the Tokushima municipal government office and visualized it. Additionally, 23 administrative sections which Tokushima City was divided into 23 districts, is analyzed, however, as shown in Figure 2, only Uchimachi district and Shinmachi district was visualized, while invested to see the transformation of the city every five years from 1970 through 2005.

Transformation of Buildings (Large Commercial Facilities, Movie Theaters, Parking Lots)

Through visualization of the collected map-data every in five years of Tokushima Center, locations and transformation of the buildings such as large commercial facilities, movie theaters, and parking lots is conducted. Based on Z-map of 2009, Zenrin map information is plotted on the GIS map with every 5 years and the plot area of the parking lots is calculated particularly to verify the urban transformation on GIS (Figure 2).

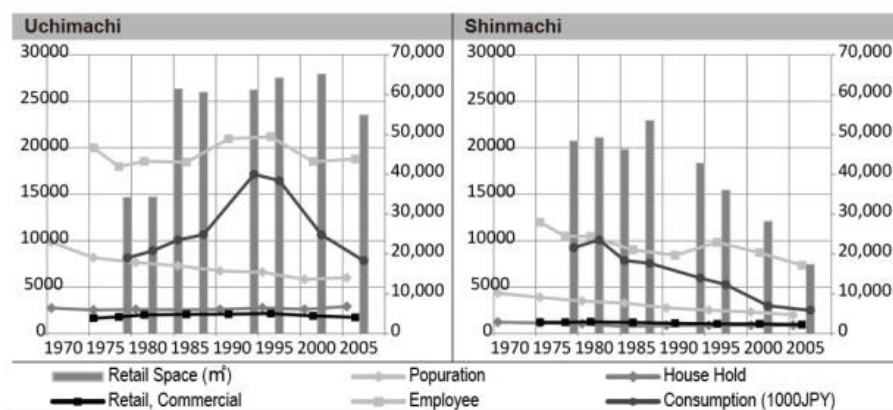


Figure 2. Transformation in Uchimachi District and Shinmachi District.

It is confirmed that parking lot plottage (proportion designated in parking lot) increased from 66,335 square meters (5.5%) to 129,936 square meters (10.8%), more than double within 1,206,000 square meters of the target area. This explains buildings are demolished, or converted into parking lots, hollowing out phenomena in the downtown is remarkable (Figure 3, Figure 4). Comparison with the tendency of increases of large commercial facilities in Uchimachi district, decreases of large commercial facilities in Shinmachi district is sharp, and rather serious. As for the shopping arcade (shopping mall) around half is driven into the closing a shop by the aging of the storekeeper, the issue of inheritor, and, unoccupied situation and ended up being the parking lot, this increase tendency is remarkable in the Shinmachi district. Furthermore, it accelerates a “Shuttered Street” literally.

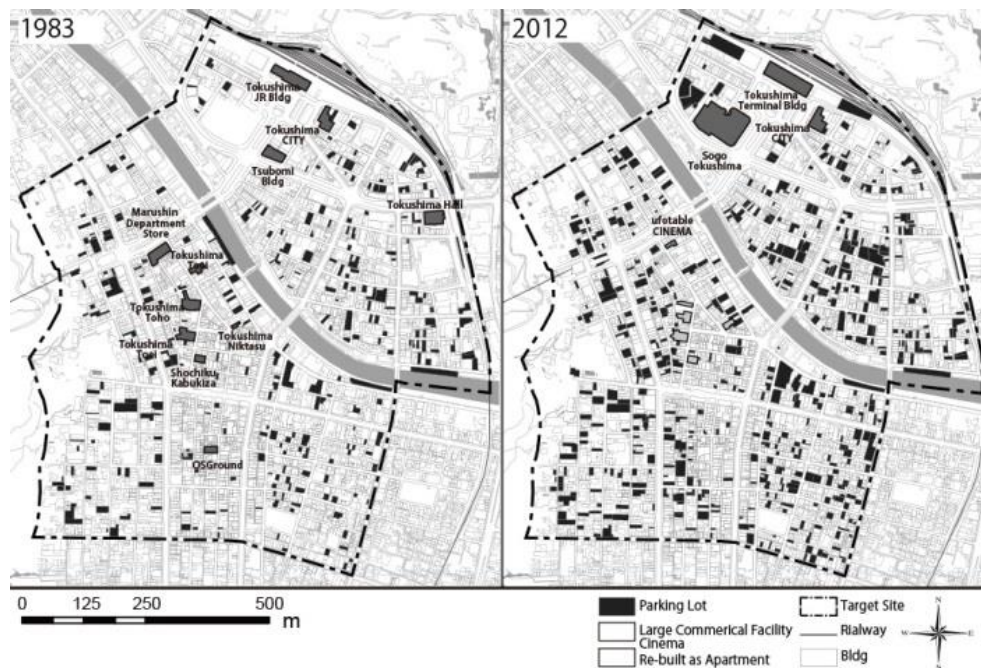


Figure 3. Transformation of parking lots and buildings in the city center (1983 and 2012).

Furthermore, the movie theaters in the downtown got damages severely, due to the ground opening of suburbs type large shopping mall, Fuji-Grand Kitajima (2001) including the cinema complex. As a fact, the movie theaters in the city center closes chronologically; OS Ground (2002), Tokushima Toei (2003), Tokushima Toho (2005), Tokushima Hall (2006) and, with an advance of acceleration in decrease of the number of customers to the Shinmachi district. After 7 years of Zero movie theater in the downtown, a movie theater (ufotable CINEMA) showing mainly on animated cartoons opened in March, 2012 as a dynamo of regeneration

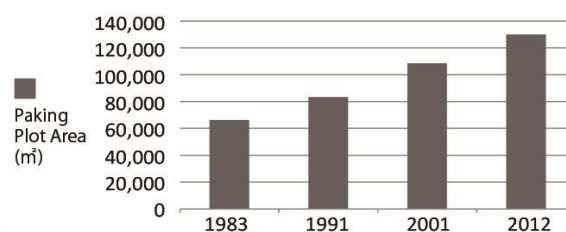


Figure 4. Transformation of Parking Lots Areas (1983 – 2012).

The most of the abandoned sites of large commercial and cinema facilities, which drew large number of customers turned into large-scale high-rise apartments in the Shinmachi district, the aspect of the shopping mall underwent a complete change (Fig. 2, Fig. 3). The opportunity to visit the Shinmachi district became less and less, because the large commercial and cinema facilities which drew customers from the city or even from prefecture level closed down. In fact, people except a neighborhood resident and t commuters to the school and to work rarely visit the Shinmachi district. As a result, the walker route (pedestrian route) with excursion characteristics of Shinmachi Bashi → Higashi Shinmachi Shopping Arcade → Konya-machi & Ryogoku-cho → Ryogoku Bashi from the JR Tokushima Station diminished.

Assessment from Transformation of Transportation Network and Facilities

The construction of the bypass road (National Highway No. 11 & No. 55), the opening of the expressway (Kobe-Awaji-Naruto Expressway) under the opening of Akashi Great Bridge (1998) promoted the express bus services and enabled easy access to Osaka and Kobe for approximately two hours in one way. It was the trigger of the many people of Tokushima travelled out to Kansai Area for shopping (Figure 5). Ironically, it caused the straw effect to draw large number of customers to the outside metropolitan area, and ended up causing the acceleration of the decline of local industry, business, and the emptiness in the downtown area by a transportation network enhancement.

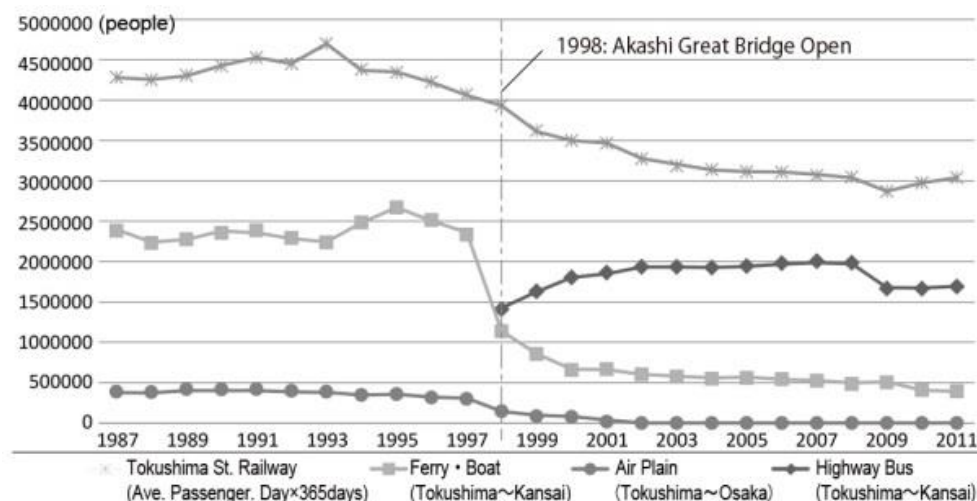


Figure 5. Transformation of the number of users in different transportation system.

Assessment from Transformation of Retail & Commercial Facilities

Figure 6 classified the opening and closing of retails such as shops and stores, and commercial facilities categorized by a radius of 1 kilo around Shinmachi Bashi, 2 kilos and 5 kilos zone. Retail floor areas suddenly increased by Sogo Tokushima (27,000 square meters) to be built into the abandoned elementary school in the Uchimachi district in 1983. The amount of product sale increased gently, but is suddenly depressed in 2000.

On the other hand, the amount of product sale gradually decreased in the Shinmachi district after 1980. As for this, the bankruptcy of the two biggest commercial facilities of the Shinmachi mall created a major negative impact, they are called Marushin department store (7,898 sq. m) in 1995 and the Daiei Tokushima shop (4,097 sq. m) in 2005. Moreover the advance of the suburbs type large shopping centers, called “Suburbanization of Commercial and Shopping Facilities” made a significant impact to the closing down of retails and commercial facilities in the downtown.

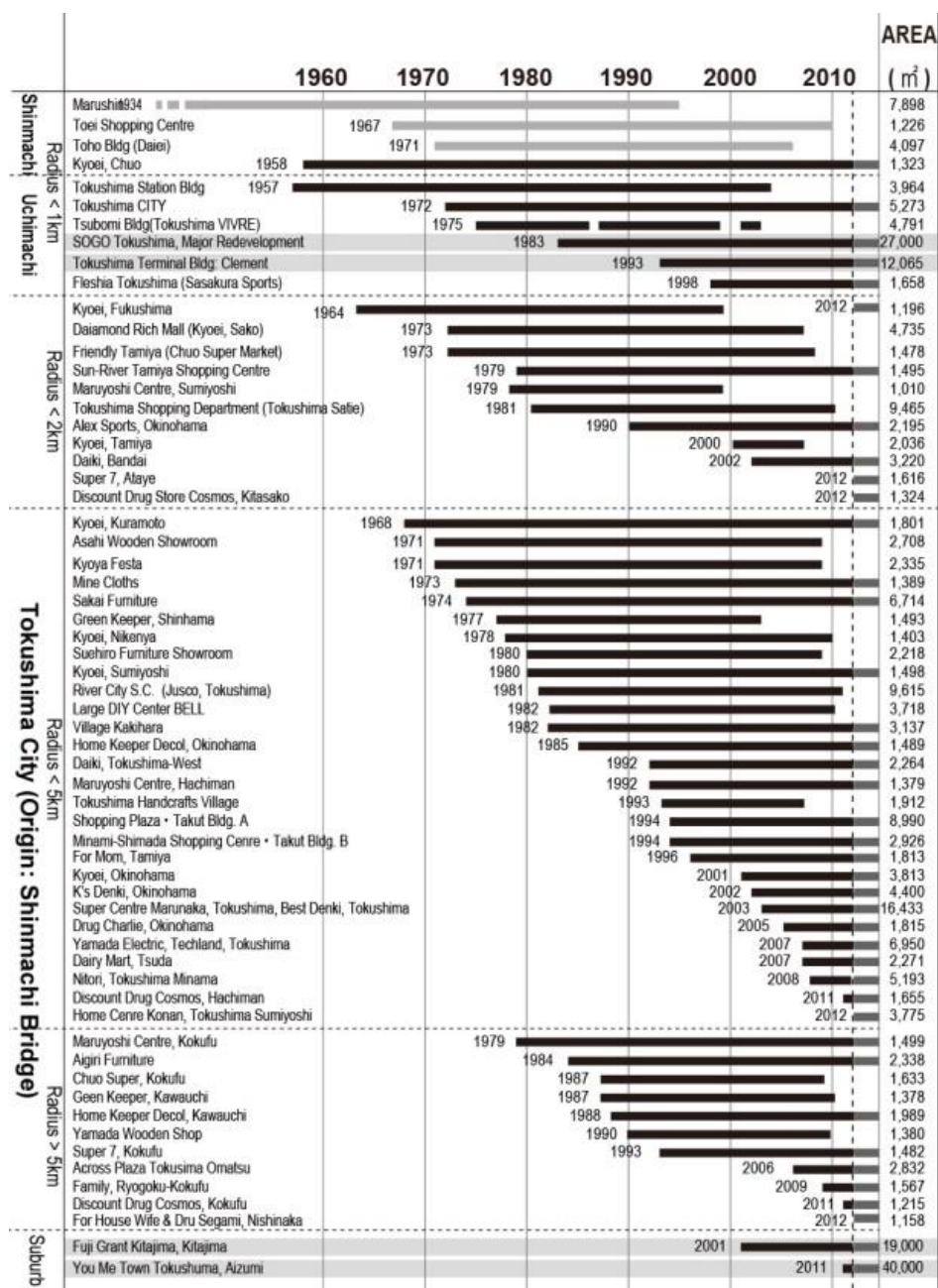


Figure 6. Opening and Closing of Retail & Commercial Facilities.

Tokushima City Centers Urban Transformation

Case of Awa Dance Festival

Tokushima is well-known as Awa-Dancing Festival. It is originally developed in the region of Tokushima, and now a big attraction for the tourist in Tokushima. Despite its religious aspect, the parades by the group of dancers and musicians along the streets draw peoples' attentions, and it developed as a tourist attraction. It grew one of the largest dance festivals in Japan, and it attracts over 1.3 million tourists during 4 days in August¹²⁾.

Performance Places and its Transformation

Type of dancing and performance spaces is divided to four periods¹⁴⁾ according to Bando's

research. Lately, two distinctive performance types could be defined, one is regular & organized, and the other is irregular & dis-ordered.

Period 1 (Icho-Mawari: Edo Era - 1955)

The group of dancers is formed based on the community areas such as towns and districts. The areas for the performance are rather limited to the community neighborhood.

Tokushima City is the castle town that the lord Hachisuka constructed from 13 to 15 years by utilizing large/small seven islands scattered in the delta zone, the mouth of the Yoshino River (Figure 7).

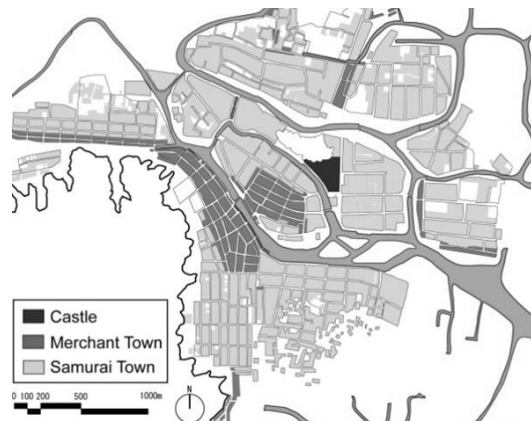


Figure 7. Samurai and Merchant district (16th Century).

Period 2 (Sajiki and Contest: 1929 - 1971)

Sajiki is temporal wooden structured seating facilities where people can watch the performance of dancers. Contest was conducted to access the level of performance. Through the time, the area got larger in scale.

The castle town was divided into the samurai district where the castle located in the center, and the merchant district for commercial and trading along the river. The railway station was built in 1899. The station became an urban center in the downtown, however as a result the center area had been divided into parts (Figure 8).

Narrow roads were changed to the urban roads authorized in city plan of 18m and 12m. After the war, damage-recovery plan was made in 1955, a new axis from the station square to the Bizan Mt. was planned as a symbolic street, and the extra width road of 50m was constructed. A lot of performance spaces were able to be installed along/on the widen road, as well as along the city planning road (Figure 9).

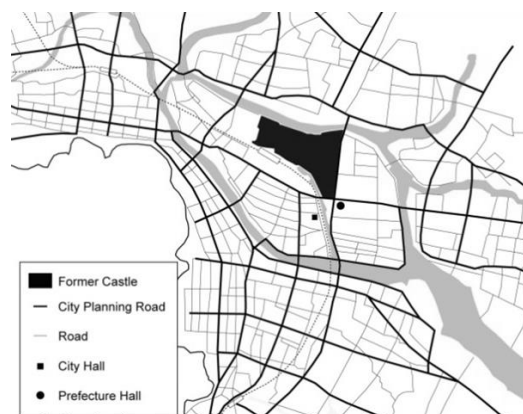


Figure 8. City Planning Map (1937).

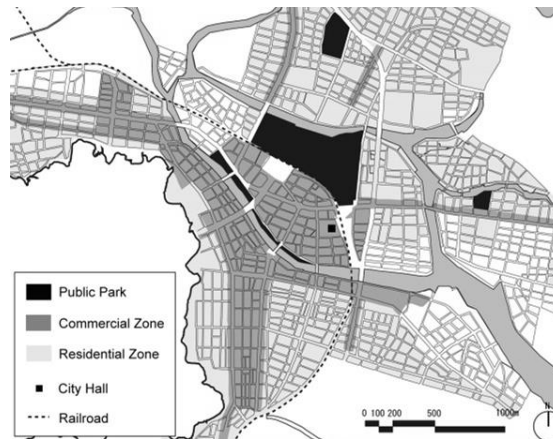


Figure 9. City Planning Map (1957).

Period 3 (Street Theater: 1965-1995)

Street theater is further developed version of Sajiki. Structure was transformed from wood to steel to accommodate more audience. Organizers define the area where people are allowed to dance and play the music. This can be seen in nowadays.

Period 4 (Street Theater and Street Corner: 1992-Current)

Steel made seating is carried on and remained as a designated dancing performance area. On top it, the dancers began dancing around the corners of the streets, open spaces where the organizers did not designate as performance areas. This is a strong character of Tokushima.

During the Festival (Surveyed in 2012)

Figure 10 shows the temporary installation (gallery seat, electric spectaculars, signboard, toilet, and garbage box, etc.) set up for the festival was investigated, which could affect dancers and audiences navigation, as well as overall trace of dance teams' traces (17:00-23:00) to clarify the relationship between those.

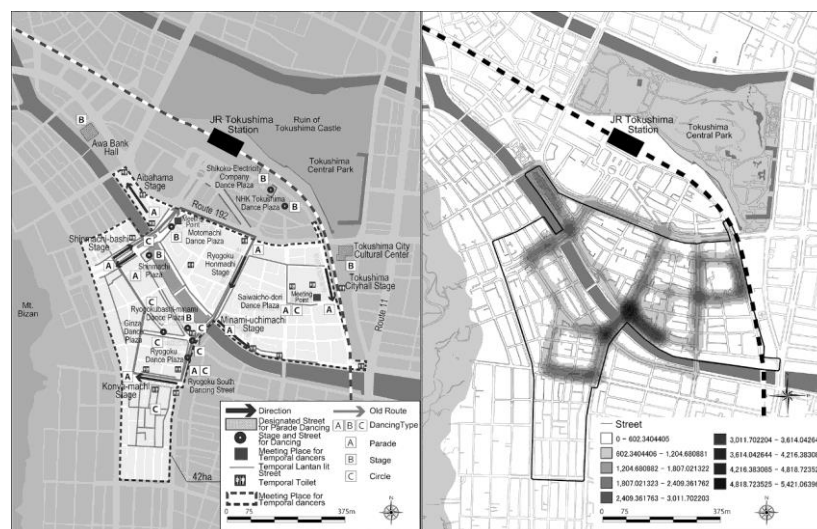


Figure 10. Downtown of Tokushima during Awa Dance Festival (Left: Temporarily Installation, Right: Trace of Dance Team Route).

Catalyst Analysis

Urban transformation originated from the development of Shinmachi Board Walk and a Parasol Shop for the inflow from the Uchimachi district for the purpose of the activation of the Shinmachi district. And analyzes was conducted focusing on community development for town planning almost acting like a chain effect, the connection and networks of human relations are well related to the regeneration of the area afterwards.

Situation before the Shinmachi River Restoration

The hearing interview to the president of Shinmachi River Saving (NPO), also the publication by this NPO, the evidence was told that the river bank was totally reinforced by the Concrete Parapet for disaster prevention, after the extremely strong typhoon hit the area in 1961, the area was suffered from the serious damage.

The decline of the means of transportation by water, taste of the less human being, out of scale, etc. ended up the life of citizen apart from the river, and the river bank was shifted to the parking spaces for the auto mobiles. Then, the river front became the back side of citizen's daily life, another word, demoted from the main stage of the life to the backyard of city, people's place. When the water pollution of the river worsened by an inflow of factory effluent and the home drainage, and the river became the place where the bad smell occurs and no fish could dwell, obviously people will be away from the river even seriously, and caused less human activity, transformed to un-attractive and lonely place. In fact, nobody likes the river at all.

Shift of the Shinmachi River Restoration

The citizen group including the NPO (Non-Profit Organization) called "Saving Shinmachi River," started up to clean a polluted river once again, triggered a local governmental support both in prefecture and municipal to initiate a project to revitalize it for citizen's life and amenity. Figure 11 shows the development and the sectional transition of the right-side river bank (1989-2012), Figure 12 shows the river bank's restoration situation in a chronological order (1971-2012). In the Shinmachi River, it began with water purification project, followed by the development of Shinmachi River Water Front Park on the left-side bank, and beautification of the bank surface covered by the domestic bluish stones on the both sides, and in the end the completion of the Shinmachi River Boardwalk, these chained effect of river development taken place from 1989 to 1996 as an oasis for citizens.

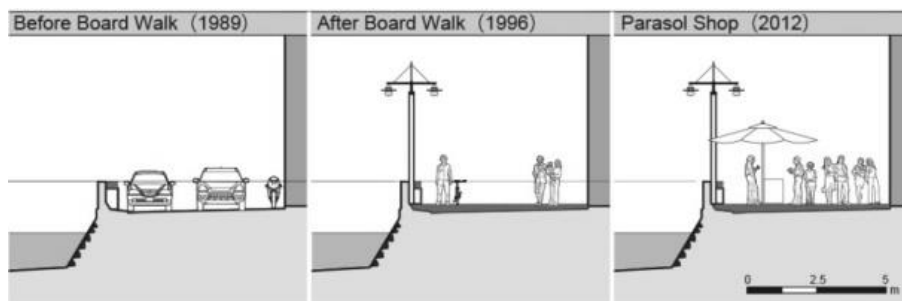


Figure 11. Development and sectional transition of River Bank.

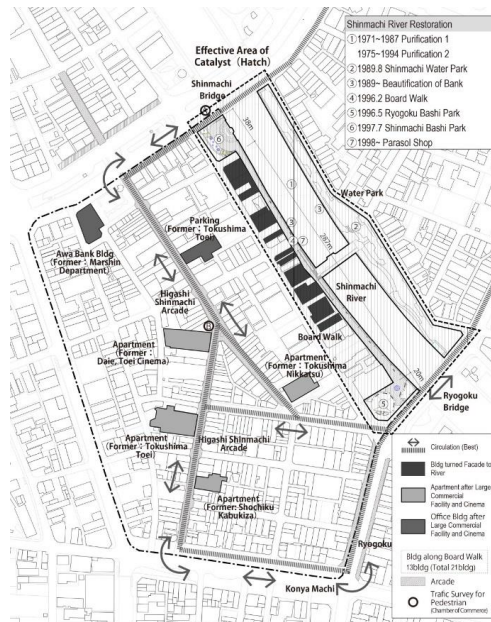


Figure 12. River Bank' s Restoration in a Chronological Order (1971-2012).

Shinmachi Board Walk

The Higashi-senba Shopping Arcade Promotion Association of the Shinmachi district promoted and executed "Higashi-senba Boardwalk Restoration Project" and successfully, the wooden decked promoted was constructed along the right-side bank of the Shinmachi River. According to the local architect, Nakagawa, "It was such a pity that most of the buildings along the river faced to the street, in another words, back side of buildings face the river front. Then, his design intention was creating a river front park with a total extension 287m consists with river bank board walk between Shinmachi-Bashi and Ryogoku-Bashi, Higashi-Zume Park of Shinmachi-Bashi, and Nishi-Zume Park of Ryogoku-Bashi all together as Urban Park.

Thanks to the Shinmachi River Purification Project, attention to the river, and the water front for the citizens had begun to revive to a citizen, and triggered the campaign of community development and town planning with the river initiated by the Higashi-senba Shopping Arcade Promotion Association. This evidence proved that purification the river water and the beautification of the river bank development brought citizens attentions and Patriotism for the further effect of utilization of river front, as well as bringing citizen's life back or co-exist with the river. Figure 13 shows the significant change before and after the completion of the board Walk. It generates accessibility to the river, and permeability to the river. Built environment along the river was dramatically changed.



Figure 13. Before (1990) and after (2012) of Board Walk Development.

Parasol shop

Parasol shop (Fig. 14) is the temporal shopping mall to sell agriculture products and processed foods along the Board Walk.

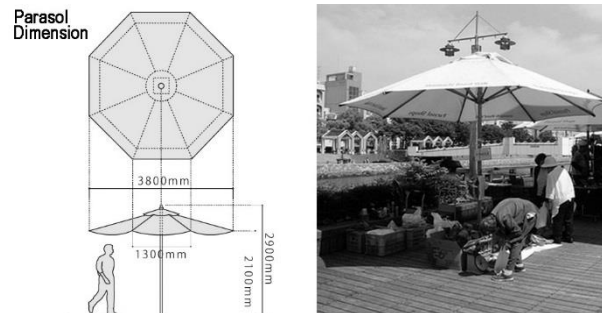


Fig. 14 Parasol shop.

After the completion of Board Walk in 1996, parasol shops started its operation, the nature of Newness, trendy movement; it brings vitality along the water front temporally. However, the turnout did not continue for a long time. The sales decreased, and, due to un-strategic opening of the shops by professionals and immature retailers, often did not match with customers' demands and needs, ended up shrining and downsizing the market.

Hyotan-jima Cruising

When the Youth group of Tokushima Society of Architects & Building Engineers, manifested "Renaissance of Hyotan Island", the idea and the nick-name of Hyotan Island became familiar with the citizens of Tokushima in 1984. The sandbank surrounded by Shinmachi River, Suketo River, and Fukushima River branches of the Yoshino-gawa River, has been forming a downtown, a center of commerce for the citizen. Only one man began the campaign of cleaning the river, and bringing fish home. Soon after, in 1990, ten individuals gathered around him, and made a slogan of "The river was contaminated by the citizens, therefore, us, citizens are responsible to clean the river, and bring it to original cleanness". It ended up a launch of NPO for "Saving Shinmachi River".

According to the hearing investigation, it began to navigate a cruise ship, one lap of 6 km regularly at the same time to begin the cleaning of the river with the boat twice a month. In late years the number of the visitors gradually increases and reaches 5,000 monthly passengers and grows up as tourist attractions steadily. In addition, the events utilizing a river are organized all through the year, as well as cleaning of the river. Moreover, the role of letting people recognize a boardwalk as an event place, almost "Landmark of the City" by planning various events simultaneously such as Tokushima LED Art Festival, Machi Asobi, an event in connection with Hana-Haru Festival.

Analysis of Catalyst Effect

Change in the Flow of the Person

The result of quantity survey of pedestrian traffic flows in the Tokushima city's downtown along the central shopping street are shown (Figure 15). The quantity of pedestrians increases in 1,999 in comparison with 1996 on the weekends and the holidays around Shinmachi River Area. It is understandable due to the effect by the completion of the Board Walk and the success of the parasol shop.

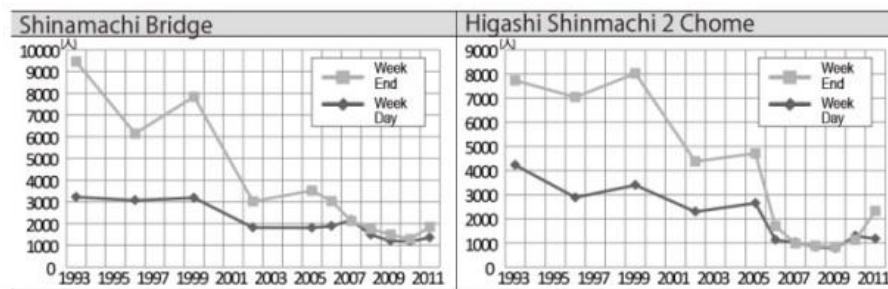


Figure 15. Pedestrian traffic flows in the Tokushima city's downtown.

Upon the completion of the Board Walk, the previous parking lots under prefectural management became the city park, and eating and drinking, the sale of the above related articles were enabled. Profit utilization spreads, but I gradually show a tendency to decrease, and it is considered that the effect was temporary, but the increase is again observed after 2009. It should deserve high attention.

Chain Effect to the Neighboring Facilities

Transformation was observed in neighboring facilities like a chain effect by the construction of the Shinmachi Board Walk after the completion of Water Front Park. The buildings which turned the face to the river side increased. Original expectations was realized, the ratio of more than 50% of the building, in fact 13 buildings out of 21 buildings along river front turned the façade and face to the river. Although there are still issues remains such as less harmony of the buildings as a whole, each buildings' design quality and integration remained still very low, etc. The building was refurbished to arrange permeability to the Higashi-Shinmachi shopping arcade from the river (Figure 16). These are caused by two main reasons; Shinmachi Boardwalk was considering as a road which allows "building permit" by code to the adjacent site, and a parasol shop brought the citizens attention. As a catalyst effect, expected chain effect was observed around the built environment. Parasol shop acting as an incubator, or start-up shops to initiate permanent stores around the downtown as a chain effect, as a result, 26 new stores opened around immediate context, 14 stores opens in the neighboring shopping malls.



Figure 16. Buildings along Board Walk.

Conclusion

In this research, the following aspects are identified and clarified to understand the cause and effect of catalyst each other: 1) before and After of physical phenomena applying catalyst, such as the number of building upgrade, amount of pedestrian traffic flow, 2) through the hearing survey to the event organizers and government officials, to understand their intention and motivation of events, and to find out the relationship developed between each catalyst effect. As a result, the following things became clear: 1) primarily, the interest of citizen began toward the river by purification work of the Shinmachi River, which is defined as the

first stage of catalyst; 2) secondary, the campaign and promotion of creating Shinmachi Boardwalk and a parasol shop emerged, because a Shinmachi River Park was restored. These two are private enterprise-based development called the Shopping Street Promotion Society and are not by the public sector like government. This is defined as a chain effect of regeneration of Shinmachi River, and categorized as a second stage of catalyst; 3) when Shinmachi Boardwalk and a parasol shop were completed and running its business, the increase of the building which face, frontage turned toward the river side are confirmed. This is the third stage of catalyst, and the influence on physical phenomenon, to the built environment are confirmed even beyond the target area.

These series of city regeneration was not originated from the governmental vision, because, by understanding a conventional development method, it assumes the change is limited in the targeted area. Envisioning chain effect to the surrounding context and neighbor are beyond the consciousness. Moreover, within the limited budget for regeneration, government tends to narrow down the scope of development, which is a strong character. As a good example of Shinmachi Boardwalk, it promotes the next development activity by a chain effect, and city regeneration is accelerated and realized by the synergy of all the involvement.

To conclude, it is desirable to find more successful and similar examples, and analyzing those samples to identify common aspect, generality, and tendency, to establish the theory of urban catalyst, as approaches to experience based urbanism for matured and shrinking society like Japan.

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Diaspora typo-morphology analysis: a study of post-colonial city in critical approaches

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Abstract. *Diaspora is a spatial representation of colonialism, that is also prime phenomenon of urban is constantly duplicating and reproducing urban form. Colonial city's planning often by the advanced standards of Western countries equitable distribution of the overall planning in order to erase the gap between the local and construct the hypothesis of a homogeneous city by ignoring the people's "sense of place". In fact, during the process of spatial practice, standardize modification would be impossible to complete, and only highlight the complexity that populations and societies possess in colonial cities. In recent years, development in Taipei is dictated by the economics of space, creating competition between builders and politicians. Many new plans for the redevelopment of industrial sites show how global capitalism has resulted in a homogeneity of architectural types. Such implementation often contradicts local traditions, resulting in a discrete landscape, a grafting of modern and traditional urban forms. It's not only show the "practice of social behavior" and "spatial practice" to simultaneously, but also combine with each other or resistance to each other. In order to analyze the diaspora phenomenon, we attempt to explore the historical changes that took place along the city's borders and explore Taipei through morphological analysis and narrative scenes in order to understand the Diasporas typo-morphology. The study combines urban form weaving together a complex web of relationships, analysis and dialectic relationship between buildings, open space and social practices in order to critical the local traditions meaning and contradictions of modern city, that as a reference for future development of urban space.*

Key Words: *de-construction , post-colonialism ,typo-morphology ,diaspora, hybridity*

Introduction

Diaspora is a spatial representation of colonialism, a migration of people or communities, voluntarily or by force, temporarily or permanently. That is also prime phenomenon of urban is constantly duplicating and reproducing urban form. During this dynamic process, a variable is constructed through new examples that can be highlighted spatially. More like approaching modernity "diaspora space".

In the context of Taiwan's development, there were three major migrations: the early settlements of the Han Chinese, the Japanese colonial immigrants, and the large-scale postwar retreat of the Nationalist Chinese. They symbolized the end of traditional society and the coming of modern world. Railways weakened symbolic society and gave rise to spatial rationality.

Taipei's urban environment in the twentieth century has had to confront the contradictions of imperialism and modernism. As such, the economic-oriented urban culture arose from a grafting of colonial modernity to the growing influence of the post-war United States, which extended to the development of today's neo-liberalism as manifested in "product building" and the "instant city". Therefore, the structural collapse of the traditional urban landscape and architectural type threatened to disappear, along with a "sense of place" in the historical context. In the face of consumerism and globalization, we have been unable to grasp the urban artifact.

This article discusses the transformation of Taipei's urban form from 1880 to 1945, and how the natural result of its expansion is an artificial outgrowth of the modern nation state's authority mechanism. Examples include the walls of the late Qing Dynasty- the railways of the Japanese occupation, avenues, Nationalist government buildings, fairs, illegal buildings,

shopping malls, etc. These different forms created space and shaped the landscape over a few decades, constantly creating new patterns that appear and are later replaced. This process of change is the object of study in urban space, and reflects the unique growth trajectory of Taipei city.

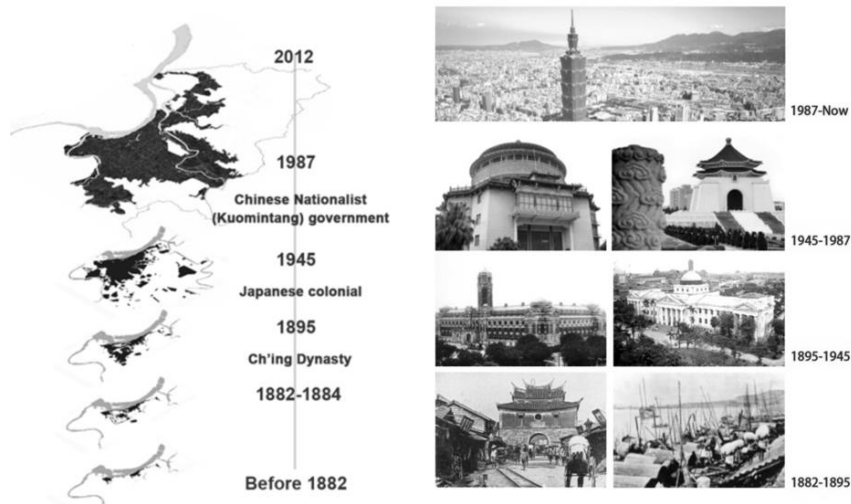


Figure 1. In the context of Taiwan's development, there were three major migrations: the early settlements of the Han Chinese, the Japanese colonial immigrants, and the large-scale postwar retreat of the Nationalist Chinese.

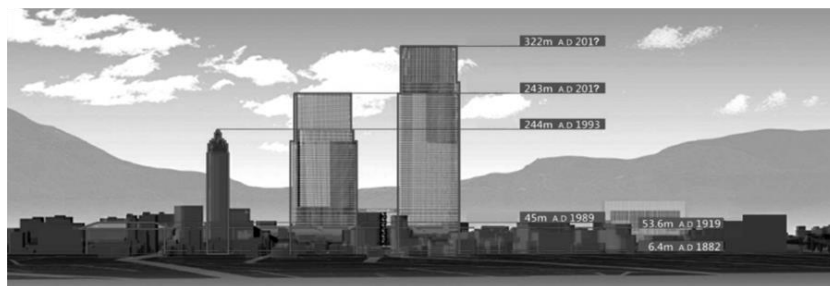


Figure 2. In recent years, development in Taipei is dictated by the economics of space, creating competition between builders and politicians. Many new plans for the redevelopment of industrial sites show how global capitalism has resulted in a homogeneity of architectural types.

In order to analyze the diaspora phenomenon, we attempt to explore the historical changes that took place along the city's borders and explore Taipei through morphological analysis and narrative scenes in order to understand the Diasporas typo-morphology.

Such implementation often contradicts local traditions, resulting in a discrete landscape, a grafting of modern and traditional urban forms. It's not only show the "practice of social behavior" and "spatial practice" to simultaneously, but also combine with each other or resistance to each other. The study combines urban form weaving together a complex web of relationships, analysis and dialectic relationship between buildings, open space and social practices in order to critical the local traditions meaning and contradictions of modern city, that as a reference for future development of urban space.

Weakening of "local community": edge and enclosed lay the foundation for the unique characteristics of diaspora

In the Man-Ga and Twa-Tu-Tia districts between 1882 and 1884, the late Qing government's construction the city walls of Taipei Fu created an administrative settlement with other two ethnic groups not strongly associated with an enclosed regional urban landscape. At the same time, belief that the introduction of the modern western rail system risk of would open late Qing China to the Western colonial powers led to the first railway (1893) not being built in the cities of the Chinese mainland, but on the island frontier, specifically in Taipei.

Two projects of walls and railway were designated for the late Qing Dynasty Taipei city, but the presence of both common to feudal cities created a challenge. Planners were presented with a conflict of modern and traditional ideas, with the city wall adopting the periphery to imperial order, whereas the modern railway improving the development to modern world. Though the two ideals are in conflict, they did develop a symbiotic relationship in the beginning.

At the second half of the 19th century, the Qing government shifted its policies from "passive governing" to "active governing," however, it's governance of epistemic rationality (Foucault; 1970) different from the conservative views of local society restricted Taipei to the three segregated settlements layout, rather than a single unified modern urban landscape. Nevertheless the relationship between government and society was not one of tense isolation and confrontation, but rather isolation with cooperation, contributing to the unique nature of diaspora, one that accepts and tolerates differences.

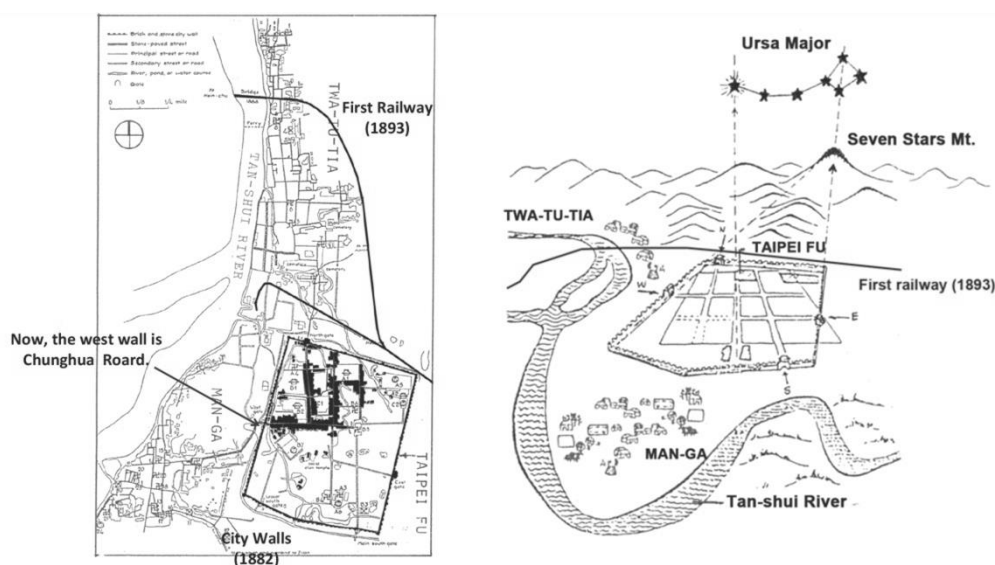


Figure 3. Planners were presented with a conflict of modern and traditional ideas, with the city wall adopting the periphery to imperial order, whereas the modern railway improving the development to modern world. Though the two ideals are in conflict, they did develop a symbiotic relationship in the beginning.

Rising of "new community": urban planning highlights the spatial differences

Edward Said in the book *Orientalism* (1978) pointed out that the reality of colonial rule is not how it is manifested in the West, but a representation. In addition to being a colonial power and more than a reflection of the West, Japan has learned the true value of description, calculation, and analysis, becoming an important engineer of change. For Japan, urban form provided the tool that empowered the imperial government to achieve its goals.

After the 1895 Sino-Japanese War, Taiwan became the first colony of the Empire of Japan and as such was a symbol of the empire's vision for modern urban development and infrastructure improvement. The stretches of railway and supporting infrastructure meant significant changes for Taipei and Taiwan. The importance of the island's traditional harbor cities in Taiwan's economic development was superseded by rise of the industrial cities that sprang up along the new mountain line. With the transformation of the island-wide regional production space, many cities within this new urban landscape faced unprecedented change. This resulted in a "space compression" era in which the sense of distance disappeared with the growth of personal mobility and transit speed (Lardner, 1968).

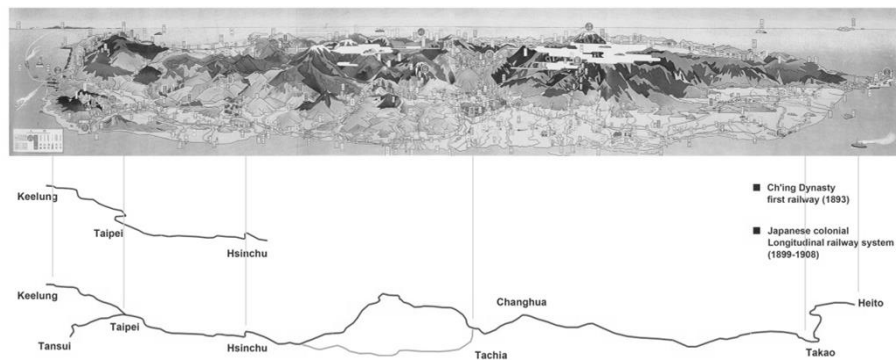


Figure 4. The stretches of railway and supporting infrastructure meant significant changes for Taipei and Taiwan.

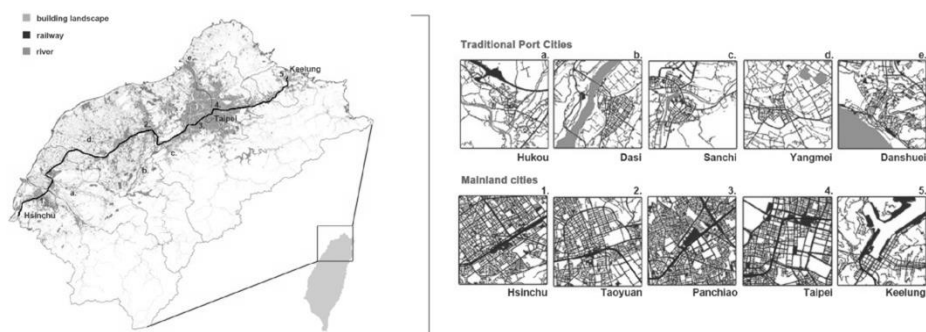


Figure 5. The importance of the island's traditional harbor cities in Taiwan's economic development was superseded by rise of the industrial cities that sprang up along the new mountain line. With the transformation of the island-wide regional production space, many cities within this new urban landscape faced unprecedented change.

A major flood in northern Taiwan in 1912, the colonial government took the opportunity to implement urban renewal in connection with three settlements of Taipei, that processing of planning attitude is guidance rather than spontaneous. For viceroy authority to have an impact, the concept of "place" must be eliminated. There can be no spatial differences; the original differentiating characteristics have to be forgotten. After the integration of three settlements, the residents no longer enjoyed a sense of togetherness (place), and began to experience feelings of metropolis, separation and anonymity.

In the Japanese period the empty space among three settlements was developed as Seimoncho new district, which would include Japanese shops, residential gathering areas, and Seimon Market on the east side of boulevard (i.e. Chunghua Road), which serviced

mainly Japanese residents. Late at night, shops and street vendors remained open and the area buzzed with the sights and flavors of a Japanese night market.

The railway and urban renewal are new urban morphology in the Taiwan. And railway station is a new typology introduced by railways. It is the most conspicuous spatial transformation relating to the fading of localized society and the transition towards spatial universality. Anthony Giddens stated that “spatial planning has only become necessary after the emergence of modern nations; it means to take away the ‘place’ meaning of the land so it becomes a space with nothing to hold it back, a tool of governmental authority.” (Giddens, 1991:16)

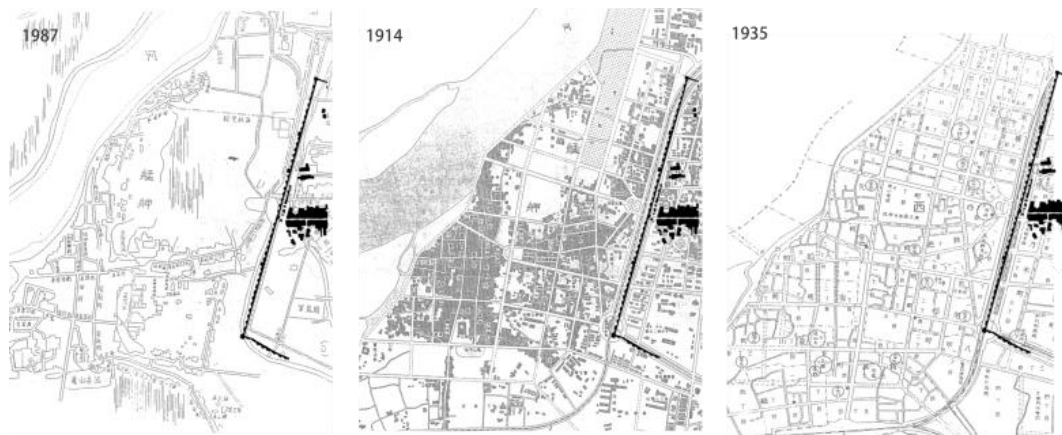


Figure 6. After a major flood in northern Taiwan in 1912, the colonial government took the opportunity to implement urban renewal in connection with three settlements of Taipei, that processing of space engineering attitude is guidance not rather than spontaneous.



Figure 7. The railway and urban renewal are new urban morphology in the Taiwan. And railway station is a new typology introduced by railways.

The rise of Taipei: precipitated of spatial and social creative a new city layout

The periphery of three settlements began to create a new morphology. For example, the creation of law enforcement institutions (colonial administration, prison, police stations) established constitutional politics, while the emergence of banking (e.g. Imperial Bank of Taiwan) introduced economics into the equation. Next, consider the establishment of numerous elementary and middle schools (e.g. Lao Song Elementary School) aimed at ideological indoctrination under the colonial power structure. And other building types

developed, such as industries (distilleries, tobacco factories, sugar refineries) and healthcare facilities (e.g. Imperial Taiwan University Hospital and Public Health Bureau).

The colonial government expanded the role of spatial power with its new system of knowledge and ruling institutions. Nevertheless, to combine and distinguish the self from that which is alien or the other, reconstruction of spatial order was attempted from “periphery”. In practice, however, deconstruction had begun. Of course, urban morphology made a difference under the new order. The Japanese attempted to introduce the imagery of Western colonial imperialism to Taiwan’s urban spatial system, mixing elements of two (or three) very different lands and people. Such imagery had to be combined under one state system, while also attempting to eliminate social factors through spatial segregation. This contradictory relationship resulted in the complexity of Taipei’s urban space.

With the conclusion of World War II and the defeat of Japan, 50 years of colonial rule in Taiwan came to an end. However, the retreat of the Nationalist government in 1950 brought a flood of people to the Chunghua Road area. This prompted the construction of temporary refugee housing to accommodate fleeing soldiers and civilians from the mainland. Suddenly, the beautiful boulevard transformed into a refugee camp, a home to mixed ethnic groups of different lifestyles and cultures. In order to improve the quality of life for these people, President Chiang Kai-shek ordered the renovation in 1961 of eight three-level shope-houses to create a new typology — China Mall.

This appeared to reflect the simple form of the modernist-style buildings. The complexities of the modern urban space meant that buildings were crowded with various forms of signs and advertising. A pedestrian overpass connected the previously Japanese side of Chunghua Road with the newly developed zone and within a very short time Taipei became important conduit for modern life. China Mall integrated the concept of Chinese culture with all variety of local traditions, rather than focusing specifically on Fujian, Guangdong and Japanese colonial culture. It became a miniature hybrid city center of post-war Taipei, and the best representation of the city as a whole.

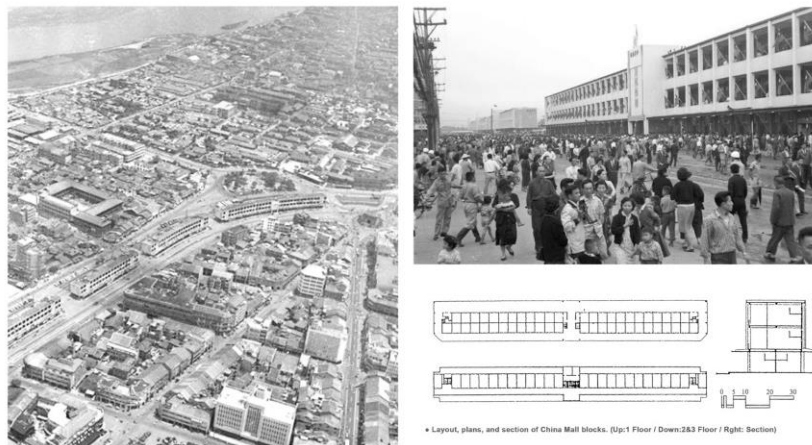


Figure 8. President Chiang Kai-shek ordered the renovation in 1961 of eight three-level shope-houses to create a new typology - China Mall.

In nature a hybrid is not a single species or breed but a combination. Similarly, hybrid culture is not a single culture. When one’s attention is not focused on pure culture, one is less prone to be influenced by so-called cultural purists. From another perspective, tolerance opens the way to hybrids. The hybrid is a deep cultural mix, not just the juxtaposition of different cultures, and it focuses on the parallel coexistence of different cultures in an area along with a different culture’s right to exist and develop its identity.

The impact of capitalism: lack of counteractive to the development of space in globalization

After the 1980s, with Taipei's commercial center shifting eastward and the emergence of globalization, development focused on modernization. However, Taipei is an extremely dense city in which land is difficult to obtain, hampering development. With the moving of the city's rail lines underground and the demolition of colonial industrial sites, land developers and politicians competed for access to newly available open space. The China Mall was demolished in 1992 after standing for a short span of just 31 years (1961-1992).

Along the railroad many industrial redevelopment projects illustrate the homogeneity of architectural forms within global capitalism. Building types such as department stores, shopping malls, and skyscrapers conflict with the traditional local urban landscape and sometimes result in a grafting together of disparate elements with chaotic results.

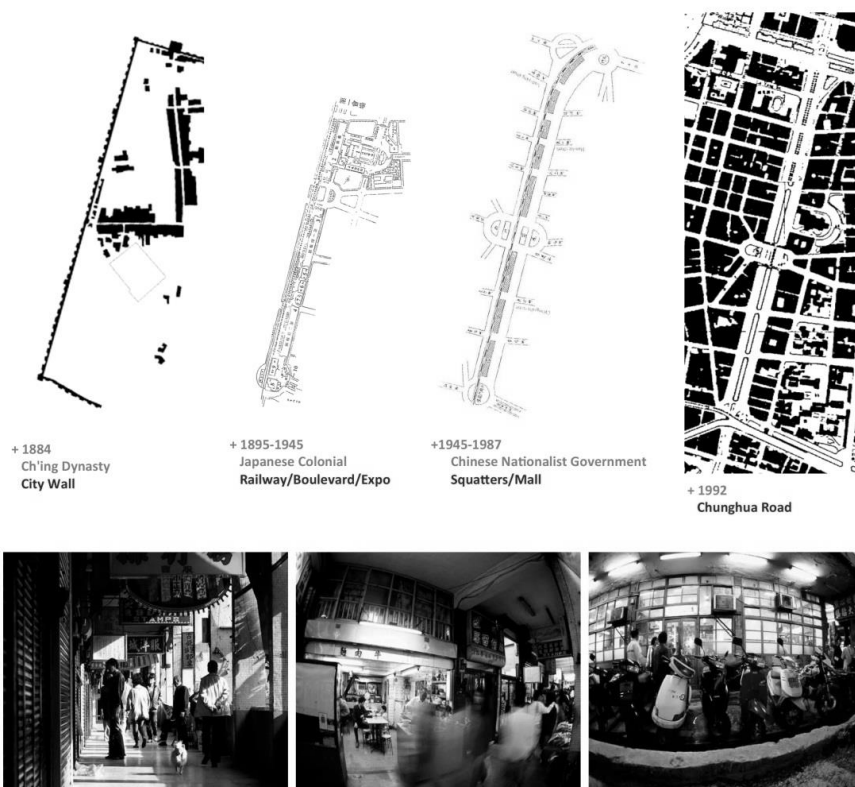


Figure 9. The hybrid is a deep cultural mix, not just the juxtaposition of different cultures, and it focuses on the parallel coexistence of different cultures in an area along with a different culture's right to exist and develop its identity.



Figure 10. After the 1980s, with Taipei's commercial center shifting eastward and the emergence of globalization, development focused on modernization.

Local city planning by the advanced standards of American and European countries pursues equitable distribution of the overall planning in order to erase the gap between the local and construct the hypothesis of a homogeneous city by no longer ignoring the people's "sense of place." By creating uniform benchmarks for spatial distribution in urban construction rather than focusing on integration with local character, excessive emphasis has been placed on modernity. This has resulted in a confounding disconnection between residents, society and the urban landscape in the colonial city.

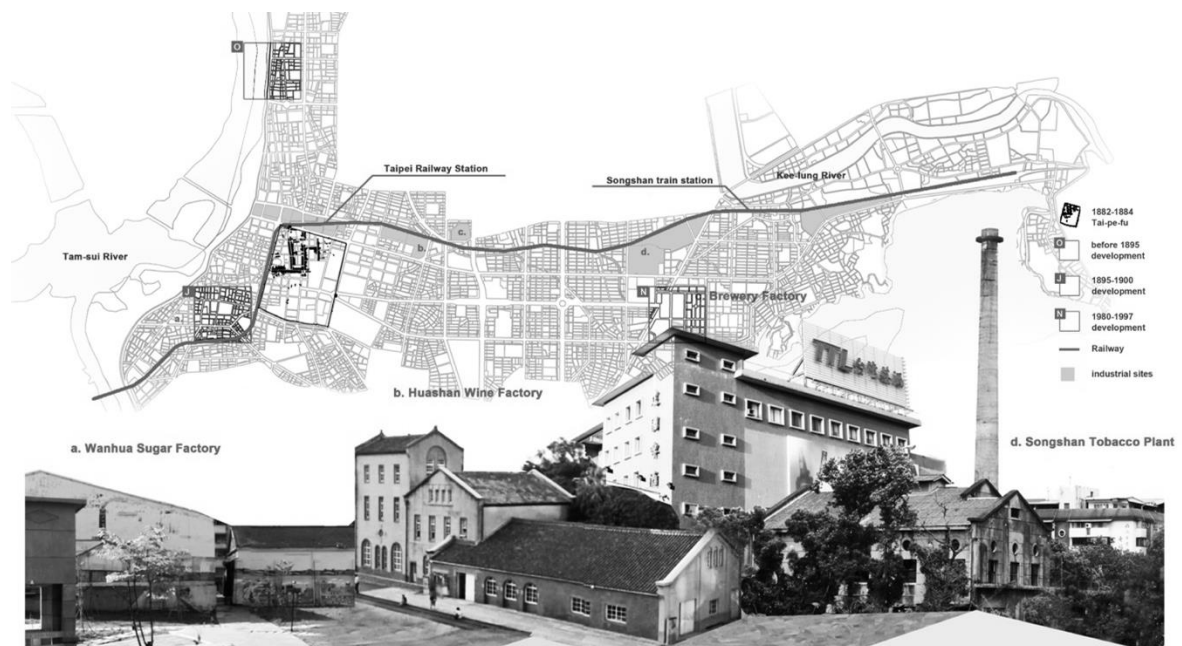


Figure 11. Along the railroad many industrial redevelopment projects illustrate the homogeneity of architectural forms within global capitalism.

Conclusion: each city must develop its own space on the counteractive of typomorphology by critical approaches

During the process of spatial practice, standardize modification would be impossible to complete, and only highlight the complexity that populations and societies possess in colonial cities. Looking at large-scale urban adaptations from a spatial point of view, one clearly sees new urban blocks generally mixed in with old alleys. Space is still diverse mix, but the standard was implicit in the era of the moment, which is a spatial structure is also a process of deconstruction.

In this hybrid landscape, include those who homogeneous space generated by centralization, there are a number of heterogeneous edge of space in the city. They may accept the change, perhaps to resist change. These are panting for a chance to face major rule era, but in terms of the city is very important. Rich and interesting city, because the production of different social identity through every hybrids space, and even the creation of a different culture. Therefore, the production of space can also be the production of new social relations, space is social.

How to see the counteractive of hybrids space? Planning scholars Nihal Perera said 'clarify the relationship between the resistance or institutional behavior and rules of the system, he pointed out rebel action is not exist independently, but often entangled together with the formal system, making the space to do the cutting becomes almost impossible. He stressed: "These vulnerable people in society created by the edge of space and can not

completely replace the hegemonic narrative space, but the presence of these narratives can be localized and contextualized.'

As stated by Paul Ricoeur (2007): "I shall call for the time being the creative nucleus of great civilizations and great cultures, that nucleus on the basis of which we interpret life, what I shall call in advance the ethical and mythical nucleus of mankind." This space can be defined as a "living space" where the inhabitants or users have some degree control over it. Therefore, emphasis should be placed on the fact that though planners follow a narrow ideal of scientific and architectural standards, residents have the power to reshape the space and give it new meaning. However, space is liable to be eroticized and restored to ambiguity.

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Morphological analysis of the Informal City. The 'Villa 31' in Buenos Aires. Argentina

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Abstract. *This research comes from the idea that the tools of urban morphology can be applied on 'informal' contemporary city. Informal fabrics are basically spontaneous fabrics, but 'spontaneous' are a large part of the pre-modern urban fabrics on which urban morphology developed as a discipline, let us recall the studies of MRG Conzen on Alnwick and those of S. Muratori on medieval Venice. It is possible then to find some interesting morphological analogies between the urban processes of pre-modern historical cities with those of the major slums in many contemporary metropolises. Starting from this assumption it was taken the case study of the Villa 31 in Buenos Aires. This fabric is of great interest for the purposes of our work. It is located in a strategic position with respect to the historical and economic centre of the Argentine capital, between the harbour, the railway station and the compact fabrics of the consolidated city. It is crossed by a main motorway overpass, the Autopista Presidente Arturo Illia. It has already a first social and building stratification that makes it a very useful example to extend to other similar cases. The application of the urban morphological tools to contemporary slums should, in our opinion, make it possible to critically understand the transformation processes of these kind of neighbourhoods (often considered chaotic, illogical and so 'unreadable'), either from the urban point of view and from the social-economic aspects, in order to consciously design the regeneration of its fabrics. This is the direction of our research on Villa 31 and the approach taken on other similar situations on which we are still working.*

Key Words: informal city, urban morphology, social and urban transformation, urban design.

Introduction

This research comes from the idea that the tools of urban morphology can be applied on 'informal' contemporary city. Informal fabrics are basically spontaneous fabrics, but 'spontaneous' are a large part of the pre-modern urban fabrics on which urban morphology developed as a discipline, let us recall the studies of MRG Conzen on Alnwick and those of S. Muratori on medieval Venice. It is possible then to find some interesting morphological analogies between the urban processes of pre-modern historical cities with those of the major slums in many contemporary metropolises. Starting from this assumption it was taken the case study of the Villa 31 in Buenos Aires. This fabric is of great interest for the purposes of our work. It is located in a strategic position with respect to the historical and economic centre of the Argentine capital, between the harbour, the railway station and the compact fabrics of the consolidated city. It is crossed by a main motorway overpass, the *Autopista Presidente Arturo Illia*. It has already a first social and building stratification that makes it a very useful example to extend to other similar cases. The application of the urban morphological tools to contemporary slums should, in our opinion, make it possible to critically understand the transformation processes of these kind of neighbourhoods (often

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The typological process

In the informal city, the rules of urban morphology are often based exclusively on economic issues and behaviors related to lifestyle culture. The occupation of the lots and the absence of laws makes the urban expression a text devoid of contamination superimposed in which the researcher is able to analyze the social and cultural needs that cause the urban changes. However the study of these phenomena is often not a simple exercise: governments tend to ignore the problem and, in the official documents, these areas simply do not exist and it is impossible to find any evidence of urban transformation. So the only analysis workable is the direct one and the urban transformations can be deduced only through the stories of the inhabitants, limiting the scientific nature of the study. In this respect it was considered very useful to analyze the dynamics of formation and growth in the 'formal' context of the urban fabric. In this case, it is possible to trace the reasons for the development and transformation of contexts both by direct analysis of the urban organism, either by the use of documents able to demonstrate the changes in the analyzed fabric. The dynamics of development of the 'formal' city, however, are based on a series of data that depend on the legislation and the need to control the transformations in addition to the economic and cultural problems. So in this case, the analytical tool compared to the contexts 'informal' contains a number of variables that require further interpretation in order to free it from the data are not strictly cultural. This operation is made possible by considering the feature of the building organism generator of the urban fabric. In fact these features contain within them the logical development of the analyzed context and allow evaluating the transformations irrespective of any external variables that come into play from time to time. In the analyzed case, the basis of the urban structure of Buenos Aires consists of the derivations of the development of the *Casa Colonial de Patios*. This courtyard organism is based on a predominantly longitudinal dimension along which develops a series of *patios*, which distribute around the various rooms of the house. The short side is the one that is directly related with the public way and in which is located the entrance on the longitudinal axis of the building. This structure, whose size (20 for 100 varas: 1 varas = 86.6 cm) is practically constant, becomes the generating element of the whole urban fabric: the urban block is formed by aggregation of basic architectural organisms that give rise to the *cuadrícula* mesh, typical of the colonial Latin American cities. The transformation process of this type is developed from the demographic growth of the early nineteenth century. The typological transformations, aimed to respond to the increase in housing demand, define units with an area ever smaller, without big changes to the buildings structure and the urban fabric to allow accommodating a greater number of inhabitants. The first important transformation of the type is developed in the second half of the nineteenth century, with a body that measure 10 *varas* and which is called *Casa de Medio Patio* o *Casa Chorizo* (1870-1915). Its plan is the result of a virtual division along the longitudinal axis of the Casa de Patios and its dimensions arrive to a limit which represents the minimum acceptable for the health and livability: 4m to the covered part of the unit and 4 meters for the *patio* and the area of distribution. In most cases the *Casa de Medio Patio* occupies the whole lot and it going to be a type formed by a sequence of patios, which distribute two or three rooms, up to a number of five consecutive, depending on the size of the lot. This type will remain stable for more than 40 years and become the basis of a large variety of multi-family types. The great housing demand within the city, further compresses the housing units and the new small lots are transformed to accommodate a greater number of inhabitants. This operation is defined by F.E. Diez densification for 'reduction-multiplication' and will become the basis for the establishment of multi-family homes. This

process will lead to the formation of *Viviendas en Hileras* (1890-1940), consists of a sequence of small houses along the longitudinal dimension of the lot. In this case, each *patio* corresponds to a housing unit that conceptually contains in itself the compositional features of a *Casa de Medio Patio*: an access from the path that comes to a courtyard that distributes the various rooms of the house; the served area has a transverse dimension of 4 meters as well as the height, instead the serving area has the first floor of 2 metres in order to obtain another service environment of the same height upstairs which is accessed through a metal stair that starts from the patio. The access to each dwelling is made by a passage on one side and is separated from the *patio* of each unit through a low wall which allows a greater lighting for the small size of the open-air space that lost surface because of the connection path. Parallel to the densification for 'reduction-multiplication' begins the process of vertical development, the process by which the one-story buildings are starting to gain the upper floors. This growth begins with the overlap of the ground floor plan on the first floor while maintaining virtually unchanged distribution. The superposition of several floors leads to the establishment of multi-family organisms as the *Casa Chorizo de Altos* (1880-1925) and then *Casa Chorizo Superpuestas* (1885-1940). During the same period it developed a type defined as *Conventillo Chorizo* that, with the same structure, is a type in which each family occupies a single room, sharing the serving areas. The morphological difference with its mono-family referent is given by the presence of stairs located in each patio which distribute the upper floors that work thanks to a gallery configuration. The *Casa Chorizo Superpuesta* contains the main features of both types: the repetition of the ground floor distribution to the various levels and the presence of stairs in each patio. In this type are accommodated a family in each floor and for each patio and this morphology causes problems of introspection on the ground floor and the upper floors only keeps a visual relationship with the courtyard. From this moment on, the courtyard loses its meaning of center of the house to becomes a space with a just distribution role.

A parallel process concerns the development of *Vivenda en Hileras*. During the first forty years of the twentieth century this architectural organism use an horizontal extension of two lots (*Vivienda en Hileras doble*): the ground floor is mirrored in the next lot to generate a building structure that defines a number of housing units 'in line' with access from the path generated by the recast of the two already existing entries. The combination of the two-mirrored plans allows the formation of a secondary path perpendicular to the public street, which replaces the narrow passage of the *Vivienda en Hileras* and configure a semi-public path. The new path has greater exposure to the sun, as well as patios that in this new configuration, not confine more with the built but with the next *patio*, separated by a low wall. Soon you will begin to open windows facing the new path which links the units and this fact will lead to change the position of the housing units in order to respect the value of new passage which is comparable to a pedestrian public path. The largest change, with respect to the new structure, refers to the location of the *patio* that regains its typical placement on the bottom of units. This defines the type called *Pasaje* whose structure determines units with a distribution more suited to the needs of contemporary society and consists in the rapprochement of the kitchen to the dining room and bathroom to the bedrooms. Further developments are related to the progressive loss of significance of the open-air space that on one side will generate compact architectural organisms, able to use on several levels a significant area of the lot and on the other will develop multi-story buildings (Diez, 1996). This process refers to developments in the 'formal' city of Buenos Aires and defines a structure whose expression derives from dynamics influenced by economic, social, regulatory and formal problems. Therefore, before setting up a comparison between developments of the 'formal' and the 'informal' environments in the analyzed area, it is very important to underline a very important aspect: beyond the procurement of construction materials more or less appropriate, the most important differences between the results of the processes are related to economic issues linked to conditions of occupation of the lot, strongly influenced by the need to optimize the space, even at the expense of a clear division of property, a distinction between public and private or the health housing and the fabric. The starting

hypothesis was born from the analysis of the two distinct urban expressions and identifies the type of the *Casa de Medio Patio*, such as the common denominator of the two fabric; this architectural organism, which is strongly linked to the ways of life of local culture and identity, is systematically used within informal contexts to create mono-typological fabrics or nearly so. The developments of this type, in the two distinct environments, contain some differences but the logic of the growth results, in both cases, are linked with the basic features of the organism.

Starting from the beginning, the first phase of development of the architectural organism and its urban fabric, is realized in the subdivision of the area with the formation of lot of about 200 square meters for each family. Lots occupied measure about 10 x 20 m, size corresponding to the minimum area of a *Casa de Medio Patio*. The main problem is the safety of the propriety and the demonstration of the possession of his lot. A property title cannot be obtained in any legal form or in a short time and the previous show that, once installed on a plot of not important commercial value, rarely there are possibilities of displacement, therefore the safest form of defending the property is to build a strong structure with good foundation. For this reason, the occupants are forced to build on their lots as quickly as possible. The first building is the fence which defines the area of the property. At the same time it forms the first housing unit built with precarious materials because the urgency of defining the occupation. As the *Casa de Medio Patio*, even the makeshift shelters, that form the first expression of informal fabric of the Villa 31, refer to the features of a courtyard organism. The closed fence is the main structure and the covered living space is located on the perimeter, so as to create a distribution open-air space that links each room. Compared to the courtyard type, the main difference you notice analyzing the urban organism of the Villa 31 corresponds to the tendency to open the enclosure with direct openings on the public path. In the urban fabric analyzed, the commerce space is closely related to the house, often to solved safety problems. In this sense *los kioscos* (shops) are part of the homes and have direct access to them. In these cases, the sale space is external and the contacts between customer and seller are held on the threshold of an opening which, in most cases, corresponds to a window or even a door. Therefore the openings on the street are often made in anticipation of a commercial use, because the exchange of goods is one of the main means of subsistence in these contexts. Another very important aspect to take into consideration for the analysis is the concept of courtyard and his use.

We have seen how the Latin-American process, is not only a very short process, from a duration point of view, but also immediately defines a multi-family organism that, if at first tries to keep protected the privacy of the courtyards, then surrenders to the demographics pressure of the surrounding urban fabric, by sacrificing the private use of the open-air space. Actually this part of the house does not lose importance, because becomes the distributor space of more housing units that form a new community that replaces the concept of family, both from a social point of view and from the point of view of architectural and urban organism. In effect, it can be said that until that time the courtyard type had been the matrix of the urban fabrics of the American Spanish colonies but once scaled the demographic problem, the basic type specialized by acquiring a feature that caused the reorganization of both the society and the basic structure of the urban organism, whose last element, continues to maintain the structure of the basic type but enriched with a data son of a social dynamics, which represents the transition from a society based on the family to one whose constituent element is represented by communities that share the same problems and the same means to address them.

The next phase of development of the 'informal' dwelling in Villa 31, corresponds to the consolidation of existing buildings and the overlapping to the precarious house (which will be demolished then) with a frame of reinforced concrete that will form the basis for the next superelevation organism. At this point the possession of the lot is a certain fact and the architectural organism can develop and contribute to the economic growth of the family that is occupying it.

The first two elementary cells built are positioned almost always on the roadside and placed on one side of the fence. In this way it is possible to enable a passage that from an access both to the courtyard space and to the covered rooms of the house. The housing unit, at least in a first phase, not expects, for safety reasons, the direct opening on the public path.

The second phase sees the doubling of the previous structure so as to define a more private space directly facing the courtyard, and the other part of the housing unit open on the roadside. This area of the house will be allocated to trade or laboratories and workspaces.

The third phase corresponds to the moment in which the housing unit becomes a multi-family building through the building of a unit on the bottom of the fence, with the purpose of obtaining a house to lease or to give to sons who form new families. In the more populated areas, the internal division of the lots may continue until the establishment of units result of further internal split of the lot that uses a single elementary cell on the front and defines organisms similar to row house structure. In these cases the housing requirements exceed the problems related to the housing health forming organisms in part or totally devoid of external openings. The transition, from single-family lots to housing units able to accommodate more families, is possible thanks to the main feature of the organism: the courtyard type lives thanks to the open-air space around which are distributed the various environments of the dwelling. When the architectural organism is transformed into a multi-family unit the environments that previously belonged to a single unit, are connect so as to constitute areas of life for several families that share the distribution space of the previous mono-family house. As in Pasajes of Buenos Aires, also in the informal fabric these paths form semi-public or public spaces that distribute the units in the bottom of the lot. In cases of strong housing demand the described process generates such a pressures able to constitute connections between the public path and the inner housing units through private spaces, often open-air, making very important problems of privacy. In analogy with what happens in the 'formal' fabric process, the development of basic architectural organism, on one hand provides multi-family houses and on the other a vertical growth especially in the most populated areas. New stages of development, often contemporaneous with the described process, depend, as always, by the growth of the surrounding fabric and the increased housing demand. In this case, the unit will develop upper levels, starting from the elementary cells on the road, with a direct distribution from the street which avoids the use of the courtyard for the distribution of housing units on the upper levels. The vertical development also continues inside the patio, but only in cases of high-density urban fabrics and in this case the stair will be placed inside of the courtyard space.

Today walking the streets of Villa 31, but probably in the area of Guemes ten years ago, the constant element, main feature of the architectural organisms, matrix of the analyzed fabric, is the presence of winding staircases, or in some cases rung stairs, along the street in correspondence to each housing unit. These stairs represent one of the signs of the transformation in multi-family houses. Once you have defined the structure on the ground floor, it doubles the height of the reinforced concrete frame (ready for the raising of the structure) and builds more housing units on the upper floors which are generally used as houses to rent. Today the Villa 31 is one of the more established informal fabrics of the whole Argentine Republic, with buildings that come to have up to 5 levels (Amato, 2014).

From morphology to urban regeneration

Regeneration, renewal, revitalization, are just some of the concepts used to define an extremely complex topic as that of the transformation of strongly degraded contexts, in terms of physical, economic, social and cultural development, into proper urban neighbourhoods.

The interdependence of socio-economic factors with those more specifically architectural-constructive is indeed one of the crucial aspects of spontaneous settlements and, above all, one of the basic elements to the understanding and transforming of and contemporary informal city. Do not understand this aspect means to put our self at a 'different' level, far

from the reality that we want to regenerate. On the contrary, especially within spontaneous organisms the understanding of the socio-building logics that led to the formation of these tissues is crucial to achieving the same success of the project: the urban fabric is first and foremost expression of many other social, economic, cultural, 'tissues'!

The Villa 31, like so many similar realities, lacks of a network of sub-services: no running water, no electricity, no adequate sewers, it lacks of the minimum health standards. There is no road paving, actually it often lacks a clear distinction between vehicular and pedestrian spaces, as well as a clear distinction between public and private is not always evident. In short, it lacks all the elements that characterize a contemporary urban neighbourhood. Think of those elements according to a functionalist and technicist approach only makes us fall into the error previously mentioned, that of 'take the distances' from the reality that we want to enhance paving the way towards a likely failure. On the contrary, all these elements must fit within a 'socio-morphological' framework traced starting from the understanding of the strategies that have led, up to that moment, the formation of these tissues. In this way, each new element is able to 'tune' itself with the community living in that given context and which, in turn, is able to 'make it their own', being responsible for its functioning. It's always the community of inhabitants to have in its hands the fate of its district, especially in contemporary informal and semi-urban slums. Do not involve it, do not understand its settlement logic means to fail in our intent. These fabrics possess, in fact, a strong social density and an incredible building dynamism, both aspects of great importance when designing an urban 'regeneration'. These are the dynamic, vital, elements on which to build the new district. These are the 'forces' to use to actually regenerate an urban setting. Forces that, if misunderstood, will lead to the probable failure of any urban initiative but, if well understood, they may also constitute its foundation.

Paths, polarities, fabrics

Our first task was therefore to understand the socio-morphological structure of the Villa 31 in order to design its conscious regeneration. Paths are the tool that, perhaps more than others, allows us to understand and read the processes of anthropization of a given territory according to their 'structural aspects'. The more an environment is anthropized, the more the logics driving the formation of routes are accurate and precise. The less it is anthropized, the less its routes have a 'form' scientifically readable remaining in the boundaries of the subsistence routes and of immediate functionality. Paths that belong to the same logics of settling and therefore constitute a good basic structure on which to consciously read (and design) urban transformations. In Villa 31 is possible to identify three interrelated systems of routes. The first, most important, that we have called *matrix path* as the main route structuring the whole neighbourhood. It has a longitudinal trend, parallel to the railway tracks, which arises from the Buenos Aires Bus Station and, a little farther, from the Retiro Train Station. It is the only path characterized by the noticeable presence of commercial activities that characterize it as the backbone of the entire neighbourhood. Substantially orthogonal to the latter there is a secondary matrix path connecting the first one with the eastern tissue. This too presents small commercial equipment along its margins. The two main routes, structuring the new settlement are therefore the two major connection arteries with the existing context. This is not accidental because as we said, we are in a settlement phase where the 'streets' are paths of immediate functionality. It is along these two axes that the heights of buildings are over two floors above ground and it is along these axes that we find the greatest concentration of non-residential uses. A second system of paths, which we call *building paths* arise mainly from the Bus Station square and from the main *matrix path*. These are the routes along which the neighbourhood builds its urban structures. They are characterized by the dominant presence of the residence with commercial activity concentrated at the points of connection among the building paths and between them and the matrix paths. A third and final routes system concerns that broad network of lanes (*pasajes*) generated directly from the consumption of the courtyards of the first plant, when the patios

turned itself from a private family area to a collective semi-public ambit. They are paths deeply rooted in all courtyard fabrics when the increase of demographic pressure and the finite amount of building space leads to a need to increase the population density through the occupation, the clogging, the superfetation of all the available space. For this reason, this third routes system is of fundamental importance in the understanding of the 'socio-urban' tissues of the Villa 31 constituting the lifeblood of the entire building structure. It is in them that the daily life of the district take place, it is to them that the functioning itself and the identity of the informal settlement defer. At these paths corresponds a dimension purely residential except for some craft activities that can take place in what remains of the original courtyards and that are spread patchily across the fabric without a real urban logic.

"A city is a system in which all life, including the everyday life show a tendency to be polarized, that is to take place in terms of social aggregate, public or private. More polarization is exercised and closer is the exchange ratio between the public and the private and more 'urban' is the life of an aggregate from the point of view of sociology". (Bahrddt, 1966). It is not a coincidence that the vast urban historical iconography presents the city as an object enclosed by walls and exalted within towers and domes, sharply contrasted to an 'external' rural undeveloped, although often carefully organized. The view generally tended to identify the essence of the place fixing its special features in a high-quality 'characteristic image'. Those towers, those walls, those steeples, those domes, minarets and so on are what comes of urban polarities. They are responsible for coordinating the urban fabric; they are responsible for identifying the different urban communities by giving all citizens a sense of belonging to a single civil individuality. Polarities can thus be 'centralizing' or 'delimiting' an urban organism. In particular, civil and social most representative buildings were located, in the heart of the city or its neighbourhoods (the cathedral, the parishes, the Bishop's Palace, the Broletto, the market, the stock market etc.), while buildings with a specialized function (the city walls, the lazarettos, monasteries, military barracks, etc.) because of their higher dimensional space and because of their sectorial role within the civil fabric, tended to sit on the side-lines of the city, to occupy those urban fringe belts defining both the urban boundary and its points of exchange with the territory. There are two key elements that emerge studying the concept of urban polarity. The first is the dynamic relationship that is established between the polarities. The second is the relationship that develops between the polarity and the urban fabric. It is a relationship of reciprocity: tissue indicates the various possibilities of polarization available within itself, but it is the physical construction of the latters to allow that potential to materialize and the fabric to be realized. Like many other spontaneous contemporary reality, however, even in the Villa 31 we look at the total absence of urban polarities, of special buildings carrying out some recognizable public function within the tissue. Beyond the two major polarities formed from the Bus Station and Railway Station from which, we said, originates the same Villa 31, the district is, in fact, in a pre-urban settling condition in which the maximum level of specialization is given by commercial ground floors along the matrix route and the major connection points between the different road systems. This does not mean that they lack places with a strong polar vocation. On the contrary, the still directly utilitarian characterization of paths makes that along the latters those conditions of nodality and anti-nodality cited in the construction of a building fabric, are conducted freely and spontaneously. Conditions that lead to the identification of areas of higher (or lower) polar vocation in which it is possible, at a later time, to realise those public buildings around which to consolidate and identify the urban organism. Specifically, in the Villa 31 we can see how all the significant spatial dilatations of the tissue occurs along the main matrix path to connote an embryonic system of public spaces of unequivocal evidence. A system of 'squares', one might say, placed to enhance the role of the main matrix path as a great 'linear polarity' as a common threads that is a system of urban polarities able to structure and prioritize dynamically over time the whole neighbourhood. No coincidence that the only exceptions to the rule are characterized by whitespaces at eminently anti-nodal position with respect to the fabric of the Villa but directly related to the urban context according to a settling ratio typical of the 'peripheral polarities' whose specialist

function play a role in defining the building organism but, then, determining its exchange points with the territory.

The city is an organism made up of fabrics. Social, economic, cultural, environmental, fabrics leading the correct functioning of an urban structure. The more they are interconnected, the more that organism will be dynamic, versatile and able to answer to citizen needs and aspirations. To understand their 'form' means to understand their relational logics. The way in which these tissues interact with each other, in fact, expresses the way in which citizens live the city, expresses the way in which citizens transform the city through their daily actions. Understanding these logics, or rather, to understand the logical basis of these relationships and above all to understand their role in the definition of the urban fabric can be of considerable interest when studying the informal city. The reasons that support the formative process of its building structures, its tissues, are to be found within the dialectic 'nodality/anti-nodality' where the condition of nodality does not coincide necessarily with that of the centre and the anti-nodality does not necessarily correspond to that of the suburbs in the strict sense. It 'a matter of basic behavioural priorities and then of the hierarchies that are derived from these priorities. To these conditions of nodality correspond a greater specialization of the urban fabric that will go reducing as the distance from the nodality will increase until it will reaches the opposite condition of 'anti-nodality'. To the latter will correspond the absence of any specialization and the progressive fall of urbanity. The first is 'centre' and the second is 'periphery', the first is 'axis', the second is 'border' and so on. Through this dialectic urban fabrics will develop an integrated system of hierarchies, the more complex the more it will be the society of which they are an expression. In the case of the Villa 31, as explained before, urban fabric is characterised by the *Casa de Medio Patio* building type and its variations. Changes that follow the parallel system of hierarchies put in place by the urban fabric according to a dialectic of nodality and anti-nodality. So it is along the main matrix path that we find the greatest non-residential specializations of the ground floor. It is along this route and on the 'squares' that buildings implement, first, that process of multi-family transformation and that development in height of the type resulting from the rapid increase of population. A process of clogging and superfetation that, by now, involves most of the central areas of the villa but that gradually moving away from the 'centre' loses in specialization, characterising itself as a predominantly residential area, loses in number of stories, leaving the traces of original fences re-emergence with greater force, loses urbanity, blurring the transition between public and private, between built-up areas and open spaces. Putting together all these elements it has been possible then to come to the definition of a first draft 'structural (morphological) map' of the Villa 31. On this map we finally started to found our regeneration project of the villa.

The regeneration project

The most urgent problems of the Villa 31 regard the basic services of the everyday life (water, electricity, gas etc.), the drastic health conditions (no adequate sewers, no wc etc.) and the retrofitting of the buildings from both the structural and environmental point of view. For this purpose the rudimentary morphological map drawn in the analytical phase of the work has proved of great methodological utility. The vast array of open spaces, previously analysed and broken down into their urban potential, were thought as vocational areas for the distribution of all the sub-services networks. Spaces for which has been laid down the paving and the hierarchization according to their more or less nodal position within the urban fabric. So in the squares of the central spine was planned to build all those public buildings necessary for the everyday life of the neighbourhood. So in the two polar areas around the perimeter of the settlement, to the Port and to the Bus Station, two specialised public building were predicted to better connect the district to the urban context. So, finally, the green has been hierarchized following the same nodality/anti-nodality system according to a progressive decreasing of urbanity until to become a public garden or a sports equipment

(football field) in the most peripheral locations of the tissue. For the urban fabric have been planned the optimization of its spaces through the densification and the structural and environmental regeneration of its structures. Regeneration that must be done, however, according to the processual logics of the the *Casa de Medio Patio*, with the advice of engineers and building companies identified initially by the Municipality and through the activation of mechanisms of public-private financing. Apart from the services of first necessity, the fabric of Villa 31, in fact, must continue to grow and change autonomously according to the processes already started and clearly legible and where public intervention must be limited to a work of normalization. It's always the community of the Villa primarily responsible for the transformation of its district and its *civitas*.

The neighbourhood, however, is in constant and rapid expansion. For this reason it has been identified an area already partially occupied, towards the harbour, as the scope of a future expansion of the settlement. Expansion that, too, must take place according to the settlement logics already analyzed: starting from the hierarchical system of routes and public spaces. In particular, the second (building) and the third system of paths (local) are entrusted with the construction of the new fabric on which two new transversal paths (taking the role of secondary matrix paths) are interposed to connect the Villa 31 with the new context. Similarly, two new public spaces are planned in as many key positions to characterize the new building fabric. In this case needed more than ever because of the strong break of the district carried by the Autopista Presidente Arturo Illia of which we suggests undergrounding in order to permit the full conversion of the Villa 31 into a proper urban neighbourhood. The new fabric is then set according to the typical lots of the Casa de Medio Patio leaving the implementation of the process (building-superelevation-clogging) to private initiative with the advice and control of the municipality and through systems easy-access to credit.

Conclusion

La Villa 31 in Buenos Aires has been a good test to start a research project designed to assess the usefulness of the urban morphological tools in the regeneration processes of the contemporary informal city. Its location in a strategic position with respect to the historical and economic centre of the Argentine capital, between the harbour, the railway station and the compact fabrics of the consolidated city, its basic social and building stratification made the Villa 31 a very useful example in this direction. In particular, it gave us the opportunity to identify some key concepts, exportable to other case studies, around which to start building a morphological methodology for Urban Design.

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Urbanization in the Ave Valley region: more than a sum of building projects?

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Abstract. *In the diffuse urbanized pattern of the Ave Valley region (NW Portugal), a dominant urban morphology is absent. The fragmented and discontinuous urban form is a result of a layered urban landscape with a big variety of urban patterns. In contrast to compact urban settlements, this region has a very dispersed urban image. Not only have the physical and social conditions determined a relative small development grain, but also the planning system. In VN Famalicão – despite the availability of urban or project planning instruments (PU, PP) which have been the exception – the urbanization process has been highly determined by the sum of small loteamentos (since 1994, when the overall spatial municipality plan – PDM – was approved: one PU and one PP – global and detailed urban plan types - and 510 loteamentos). These are private urban developments regulated by a simple procedural regime almost without a specific urban regulation. The autonomous character of this urbanization mechanism has led to an uncontrolled or unplanned urban pattern for the whole, without a leading role from public administration. Central question is what is the result of the total of all individual building projects, which patterns and structure can be mapped? What is the spatial contribution to the public space structure (streets and roads) and public facilities (schools, sport, etc.), which design rules or urban regulation are applied? What kind of instruments are used to guide building projects, within the framework of the loteamentos? And what kind of instruments are included into the licence process of building projects for future use and maintenance?*

Key Words: loteamentos, private urban development, planning system, urban pattern, street

Introduction

“Facing the evident mismatch, it was needed to put aside the idea – typical of planning technicians – that the world is wrong when compared to abstract models which are right; instead of thinking that the problem may be that our theoretical and technical tools are not adapted to reality.” (Portas, [1986] 2006)

In the diffuse urbanized pattern of the Ave Valley region (Norwest of Portugal), a clear dominant urban morphology is absent. The fragmented and discontinuous urban form is a result of a layered urban landscape with a big variety of urban patterns. In contrast to compact urban settlements, this region has a very dispersed urban image. Such image is determined not only by specific physical and social conditions but also by the planning instruments and established daily practices that shape common urbanisation processes.

Although the diffuse urban landscape and the fragmented urbanisation process are since long recognized and studied (Secchi, 1984; Portas, [1986] 2006; Sá, 1986; Indovina, [1990] 2004; Neutlings, 1990), certainty is that there are still missing the means, models and instruments capable of guiding action in these territories, based on their own logics, in order to improve their legibility and intelligibility (Sieverts, [1997] 2003). Furthermore, Cavaco (2009) emphasises the existing of a mismatch between the planning system and the urbanisation processes.

In a context of vast and diffusely urbanised areas, where urban transformation is made by the sum of small autonomous private interventions the main question is: how to articulate such individual operations in order to create a coherent and intelligible larger urban structure?

The answer seems to point towards a planning essentially based on management (Bourdin, [2010] 2011), resting on a more continuous, procedural and reflexive practice (Ascher,

[2001] 2010), able to involve all willing actors (Jessop, 1998; Forester, 2008). Such practices will necessarily be the result of a bottom-up process, based on learning experience of local agents (Sanderson, 2009) and on a profound knowledge of the existing reality.

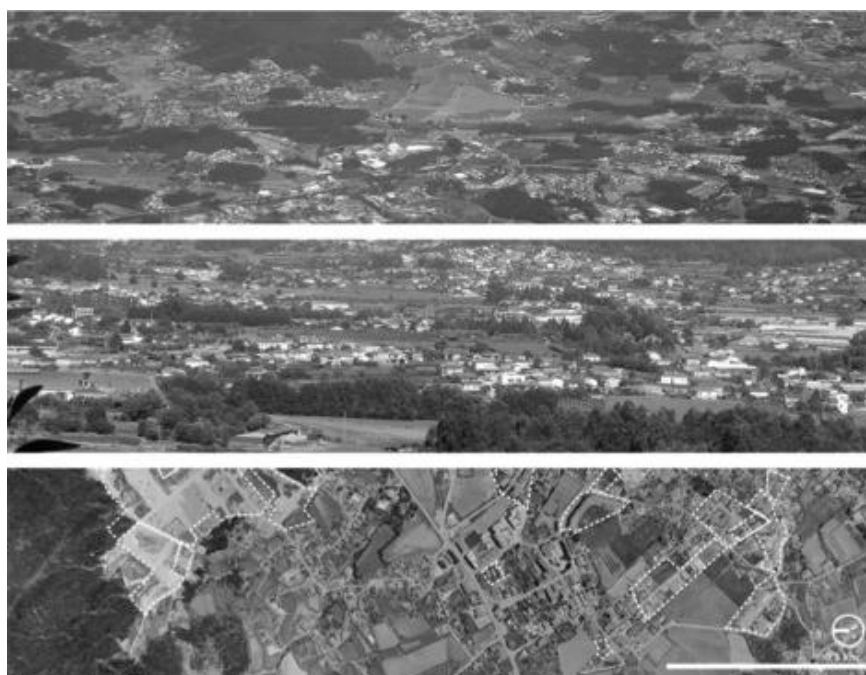


Figure 1. Urbanization in the Ave Valley region: more than a sum of projects?

More recent studies – namely in the field of urban morphology – seek such knowledge, by identifying and analysing the main elements that compose the complex structures of diffuse urbanisation (Boeri, Lanzani and Marini, 1993; Viganó 1999; De Rossi, 2009), and by understanding how they relate to each other in multiscale networks (Oswald and Baccini, 2003), and what are the logics and processes that shape each one of those elements (Mangin, 2004).

Following such path, this paper looks at the *loteamentos* of Ave Valley Region. These are private urban developments regulated by a simple procedural regime, and one of the main elements of this region's urbanisation.

Taking the municipality of V.N. Famalicão as a case study, *loteamentos* are analysed both as a process and as an urban morphology in order to better understand their role in the definition of this urban structure. Central questions are: What is the result of the total of single individual building projects to the overall spatial structure? What are the planning instruments, procedures and actors behind this process?

Urbanization in V.N.Famalicão

Adding fragments

During the last five decades, the Ave Valley Region has undergone an enormous urban growth, mainly shaped by the sum of small autonomous fragments, namely private urban development projects. Although this process followed an existing diffuse urban pattern²²⁴, it shows a *trend break* on the urbanization process, which is expressed by the transformation

²²⁴ The extensive diffuse urban settlement of this region has ancient origins. It has been referenced in 1762 by Castro, who described this whole region as a *continuous city* (I, 48).

speed, the type of operations, the building typologies and the planning procedures. The creation of *loteamentos* in 1965 is a key factor in this shift.

In the period 1970-2011, the population of V.N. Famalicão increased 49,2% and the total housing units rose 178,7% (Figure 2). This growth was caused by several reasons such as: internal migrations induced by new industrial jobs, improvements of living conditions and mutations on household types. Simultaneously, between 1976 and 2003, private house ownership was stimulated by a public program of subsidized credits and a series of fiscal benefits.

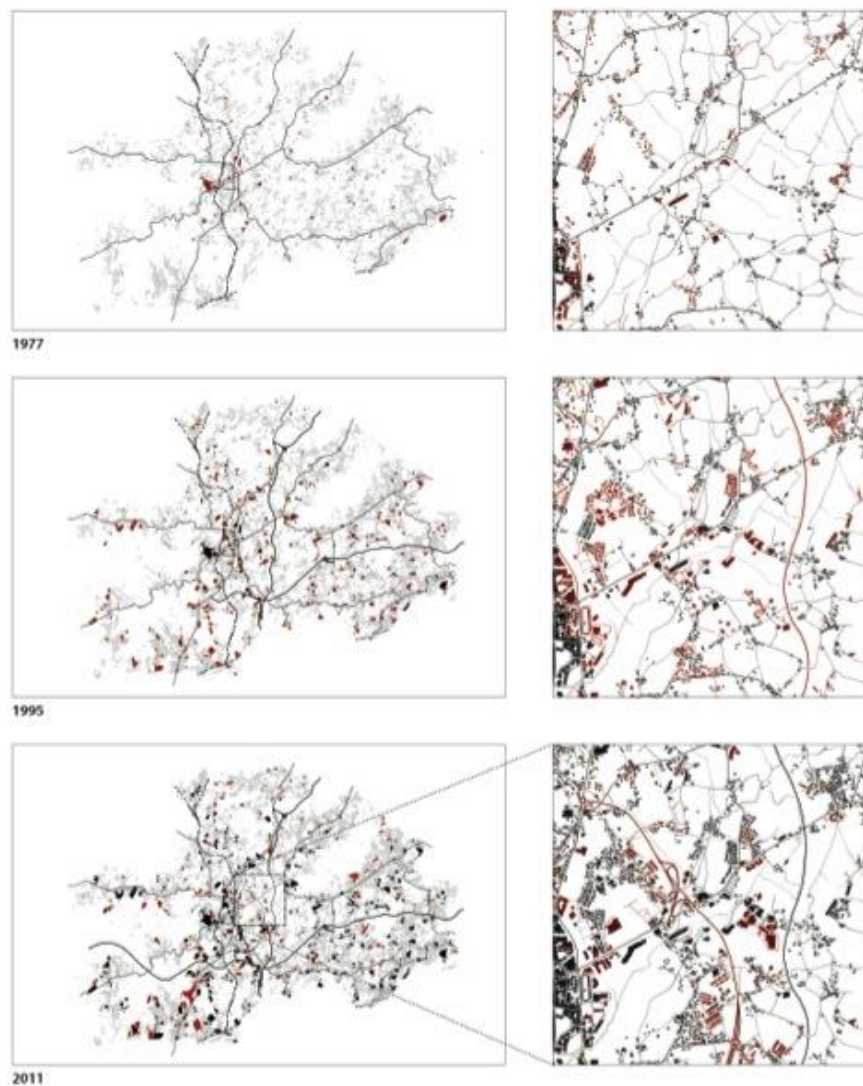


Figure 2. Evolution of the urbanisation in V. N. Famalicão.

The existing planning instruments and institutions were unprepared for such a sudden growth. In V.N. Famalicão, the existing plans were limited to the central town area and essentially linked to the design of specific public spaces and facilities.

The first comprehensive plan covering the entire municipality's territory – the PDM, *Plano Director Municipal* – was published in 1994, and it is still valid today²²⁵. This long or mid-term spatial plan established zoning (land use), generic rules (procedures, taxes, land use, typologies), new mobility lines and some special projects (as the town park). The plan

²²⁵ Presently, the PDM revision is in process. According to the national law, this should be updated every ten years.

enables large building possibilities in a vast area²²⁶, which was a common practice in Portugal. The logic was to provide excess of building area, to ensure low land values and, in this way, controlling housing prices, considering that housing production was completely dependent of the private market²²⁷. The plan does not go further in the creation of mechanisms to steer the urbanisation process, such as the definition of a yearly housing quote, target groups and their necessary housing demands, or a public housing policy. Furthermore, it does not include an implementation or execution programme

More detailed urban plans – such as PU, *Plano de Urbanização* and PP, *Plano de Pormenor* –, which, according to the Portuguese planning system, were expected to detail and shape the generic rules of the PDM (art. 87th, art. 90th, RJIGT), have shown to be the exception (Portas, Sá and Cardoso, 1998).

It is important to underline that, due to limited financial and technical resources, the municipality has no leading role in the urbanisation production, at least as a developing agent. Even more, it has no instruments to directly control land value (Correia, [1993] 2002). In practice, this means that the municipality has a restricted capacity to impose specific land uses or urban design²²⁸. Therefore, its key role becomes essentially to regulate and control individual private urban interventions.

In fact, the urban structure of this region is not the product of any overall design, but the consequence of a process of successive addition of autonomous private urban development projects. Even though these operations have been created through different procedures, the standard legal instrument is the *loteamento*. In V.N. Famalicão it is possible to recognize the major impact of this mechanism in the urbanization process (Figure 2 and 3). There, we can count a total of 1090 approved *loteamentos*²²⁹. Since the PDM was published, in 1994, while only one PP and one PU have been approved, a total of 488 permits for *loteamentos* have been issued. These correspond to more than half of all housing units licensed during the same period.²³⁰

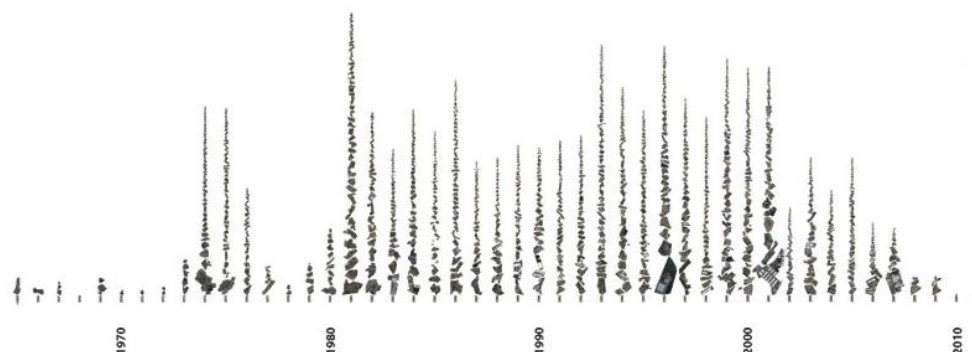


Figure 3. All loteamentos of V. N. Famalicão.

²²⁶ This included the already urbanised territories in 1994, plus an important share of contiguous areas for future urbanization.

²²⁷ Controlling housing prices was one of the main purposes of planning laws and practices of this period, due to the fast urban growth and housing shortage, especially considering the almost absence of public housing.

²²⁸ This was particularly true in a context where urban growth was an objective to cherish. Not only because it was understood as a device and a sign of local development, but also because it was an important source of income for the municipality.

²²⁹ Although the large majority of these *loteamentos* are held by private developers, they include 17 initiated by the municipality, 15 of which for public housing.

²³⁰ Between 1995 and 2011 there have been licensed 16813 dwellings in new buildings (data: Instituto Nacional de Estatística). The *loteamentos* licensed during the same period comprehended 8662 dwellings (data: Municipality of V.N. Famalicão), which corresponds to 51,5% of the total licensed dwellings.

In this region, *loteamentos* are based on a small grain and historical irregular parcel structure. The overall image *loteamentos* have in common, is their significant autonomy or independence of developing logic (Figure 4), which is directly related to ownership and small grain of this urban territory (89,3% of the *loteamentos* are smaller than 2,0 ha). In general, the possibility to urbanise a certain area is always approached from the logic of one-entity-one-area. Though, in certain situations, the ability to develop larger areas through the collaboration of different landowners would probably increase spatial quality and economic value, this is not an established practise. By enabling building in such a vast area, the planning strategy made it impossible to create enough urban pressure to lead to bigger interventions. More than spatial reasons, the urbanisation is led by other factors such as economy, employment, demographics, public policies (taxes, subsidies), and the trends and dynamics of housing market.

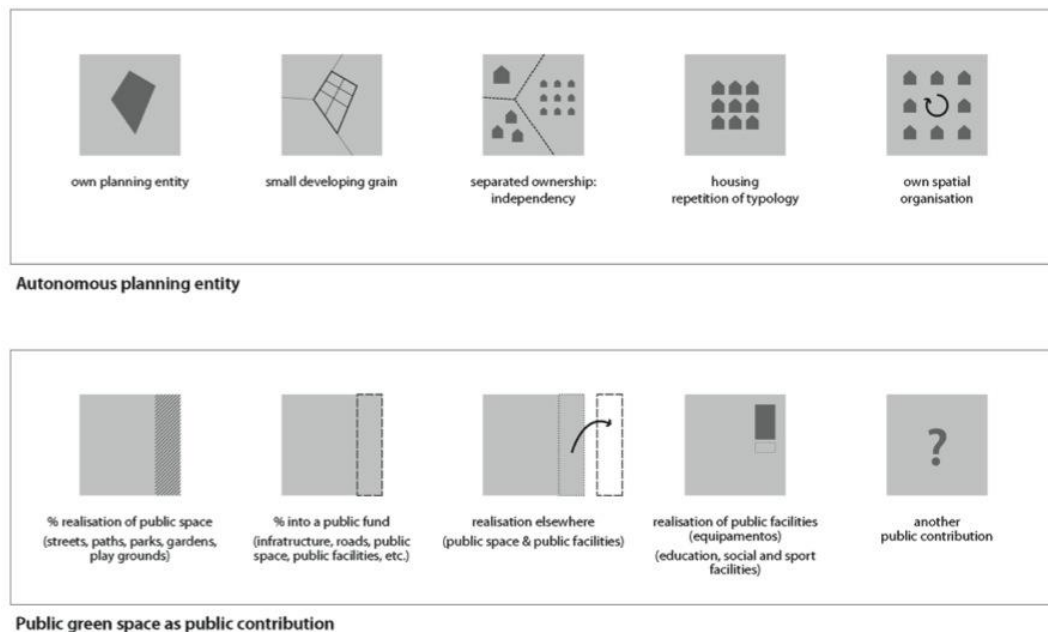


Figure 4. Planning logics of loteamentos.

Planning instrument

Loteamento: The creation of the legal instrument

In legal terms, *loteamento* is an urban operation that implies the division of the land in plots to be subsequently built (art. 2nd i), RJUE). It was created in 1965 (Decreto-Lei nr 46673) as a reaction to the proliferation of private urban development projects held outside any planning instrument or legal framework, which was a reaction to the fast growth of that period. By then, existing regulations were only applied to the few areas covered by urban plans; as the possibility of relevant urban developing outside central town areas was generally not considered, although common practise. In order to control these kind of private developments, the government created the *loteamento*, as a new legal instrument. For the first time, it was recognized to private agents the ability to urbanize the territory, and, in this sense, private developers were considered as substitutes of public entities, in their duty of urban developing.

Since 1965, the legal framework of *loteamento* has changed several times, pointing towards the creation of a simple and fast procedure. Such changes followed three main axis:

(i) Simplifying the procedure – Initially, obtaining approval for new *loteamentos* outside planned areas was difficult, time-consuming and uncertain, as it was decided directly by the central government. Hence, the tendency for developers to use other legal or illegal mechanisms in order to obtain the same effect. Seeking to oppose such practices, the government tried to ease and clarify the approval procedure. Nevertheless, the main change came with the implementation of PDMs, with which approvals of *loteamentos* became dependent only from municipalities. (ii) Limitation of alternative mechanisms – In order to escape the requirements of *loteamentos*' procedures, developers found other legal instruments that enabled land division, which became common alternatives. Several changes were made to the legal framework in order to abolish or limit those alternative mechanisms. (iii) Collective space – In order to guarantee a minimum quality of collective space and prevent the common practice of selling parcels before the completion of the needed infrastructures and public spaces, seldom left undone, new regulations have been created, defining minimum areas and conditions for such spaces and determining that parcels can only be sold after the completion of all collective spaces and infrastructures.

The legal procedure

Loteamentos made it possible that the urbanisation process is mainly based on individual operations, held directly and autonomously by private developers. Prerequisite for this is that they follow the general legal framework, and that their parcels are comprised *within* urban or *to-be-urbanised* areas according to the municipal plan.

The *loteamento* is a simple administrative procedure that can be initiated by any landowner by presenting to the municipality an urban scheme proposal for the intervention (street layout, public green space, parking, plot divisions, building footprints and typologies, functions and number of dwellings, etc.). In this process, the municipality has mainly a controlling role. It verifies the compliance of the presented proposal with the legal national framework and with the municipal plans and regulations. If the intervention is smaller than 4 ha, has less than 75 housing units²³¹ and is previewed to increase the population of its parish by less than 10%, no public consultation is needed.

After approval, the developer has to present detailed design proposals for all collective spaces and urban networks (water supply, sewerage, electricity, ICTs, roads, etc.). These are examined by the municipality, which consults all the responsible external entities. When these are approved and all due taxes are paid, the permit is emitted and the developer can start the construction of public space, including all the urban networks. Only after their completion and transfer to public domain is the developer able to sell the created plots or built units. The principle is that the municipality will be responsible of the maintenance of the public space.

Besides the needed streets and infrastructures, developers are required to create public green areas (Figure 4) and areas destined for public facilities. The needed dimension for this depends on the number of housing units or building area, according a general national regulation (Portaria nr 216-B/2008). However, such spaces are not always created. According to the municipality regulations, developers may compensate the public domain by creating similar spaces in other areas or by paying an equivalent financial contribution. This contribution should enter a public fund destined to invest in new public spaces and facilities, which in practice, is not a common practice.

²³¹ 75 housing units, according to municipal regulation (art. 10th §1 b), RMUE) which, in this particular point, is stricter than national general law, which considers a maximum of 100 housing units (art. 22nd §2 b), RJUE). The remaining conditions are similar both in municipal and national regulations.

Loteamentos and urban plans

Apparently, this simple and fast process came to substitute what was expected to be the role of PU and PP. Unlike *loteamentos*, those plans imply a fairly long and complex process, not only because of the needed steps to complete the procedure, but also because of the number of actors involved – namely several landowners, central government guidance, sectorial entities and mandatory public consultations. Changes to already approved plans are equally long and complex. Furthermore, whenever one landowner disagrees with the plan or does not wish to participate in its execution, all the process may simply block. Compulsory purchase is the established mechanism for solving such cases, but it implies financial resources public entities normally don't have.

More exactly, it is not relevant to compare the two processes – plan vs *loteamento* – as two possible alternatives (Figure 5). The *loteamento* is also the common mechanism for execution of urban plans. Therefore, it is possible to say that, in normal urbanisation processes, PU and PP are simply dispensable. PP and PU are only necessary if changes to the PDM are required (functions, building volumes or urban structure) or whenever the PDM explicitly states that a certain urban plan type is mandatory for a specific area. But these are clearly the exceptions²³².

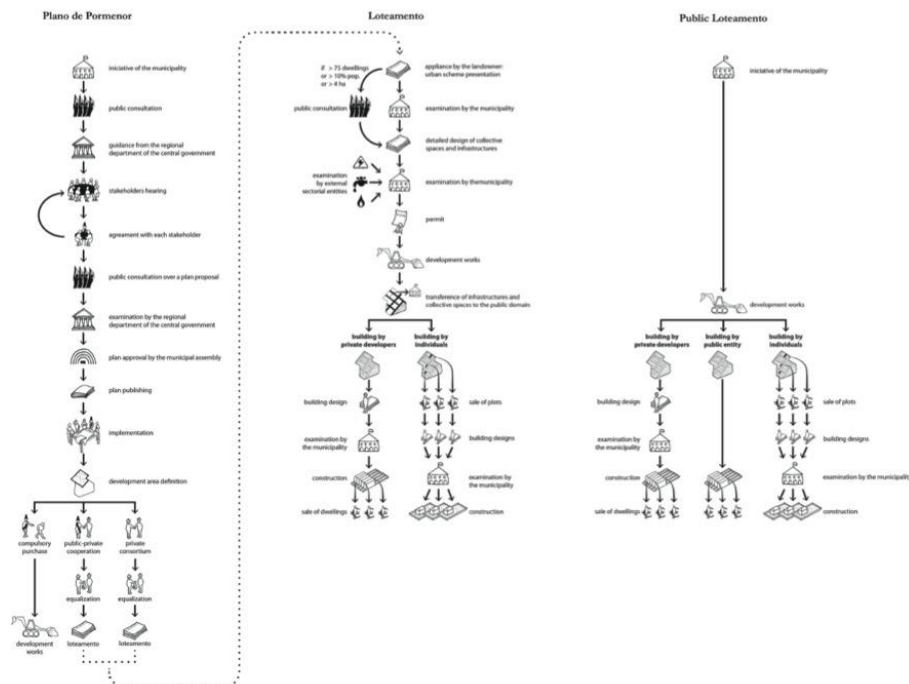


Figure 5. Comparison of planning processes between ‘urban plan’ (PU, PP) and loteamentos.

A procedural paradox

In principle, *loteamentos* are not recognized as a planning instrument²³³. According to the law that regulates *loteamentos* (RJUE), all urban structure and design should be determined by

²³² An on-going revision of national planning legal framework has the intention to change this condition. However it is still not possible to realize the real consequences of such revision.

²³³ This position is clearly stated in the on the law that regulates *loteamentos*: “*loteamentos should stop being understood as a mechanism for substitution of public administration by individuals in the functions of planning and urban management.*” (preamble, RJUE).

urban plans. Consequently, the *loteamento* should be understood as mere mechanism for their execution, with no relevant interference on urban structure, similarly to regular building licences. Such is the reason why the same law now regulates both *loteamentos* and individual building operations. This is a significant issue, as it points towards the idea that public entities have mainly a verifying and approval role²³⁴, instead of an active planning position. According to this stance, local public administration should not have the instruments or the ability to guide or affect the design of each private urban development, in order to make it a logic part of a coherent wider urban structure, for which the municipality is responsible.

This leads to an apparent paradox. On the one hand, the lack public financial resources and the absence of urban pressure – particularly on a context of diffuse settlement such as the one of Ave Valley – makes it impossible for public urban plans to establish as a standard mechanism for urbanization. On the other hand, the municipality has no means to interfere on the design of each of the fragments that, in practice, compose the overall urban structure without any clear coordination.

Daily practice

In spite of law intentions, the daily practice shows that the municipality has means to interfere. In reality, the actual law gives necessary margins. As mentioned, during the approval procedure, the municipality has the duty to examine if the presented urban schemes comply with municipal plans and regulations (art. 24th, RJUE). Such examination allows some room for interpretation²³⁵; especially considering that such plans and regulations are created by the municipality. Other mechanisms are at the municipality disposal. For instance, in V.N. Famalicão, in the case of larger projects, the urban management department of the municipality – responsible for the licensing procedure – usually asks the planning department to pronounce itself on the relation of the proposed development with its surroundings. The position of the planning department may then be presented as an external sectorial consult, and, in this way, reason enough for veto.

However, it is not as much a question of legal power, as it is of recognized legitimacy. In fact, from the analysis of several dossiers of licensing procedures in V.N. Famalicão²³⁶, it is possible to affirm that developers, in general, do accept municipality changes and suggestions in order to improve the urban scheme, without questioning its authority – obviously, after a process of dialogue and informal negotiation. Actually, this ability to directly negotiate with private developers has often been pointed out as one of the main instruments of the so-called *informal planning*²³⁷.

Nevertheless, this is the exception. Municipality's interference on the urban scheme proposals is usually very limited and restricted to the correction of clear and quantitative

²³⁴ RJUE clearly states the specific reasons for possible non-approval (art. 24^o).

²³⁵ The law that regulates the procedure clearly identifies the specific reason for possible non-approval (art. 24th, RJUE). However, it creates room for some interpretation. For instance by stating that an urban operation may be denied whenever it “*negatively affects archeological, historical, cultural or landscape heritage*” (art. 24th §2 a), RJUE) or by stating that “*The analysis by the municipality of loteamentos' proposals [...] should focus on its compliance municipal spatial plans, national spatial plans, [...] as well as on its uses and urban and landscape integration.*” (art. 21st, RJUE)

²³⁶ The presented conclusions result from an on-going systematic and detailed analysis of licensing processes of *loteamentos* in V.N. Famalicão. This study is part of the PhD research of one of the authors.

²³⁷ *Informal planning* is the common designation for the series of planning practices conducted by municipalities which are outside the established legal framework, such as negotiations with private developers or the development of urban design studies to guide urbanisation process which are not approved and have no value as plans. Several authors have studied such practices considering that, despite their lack of legal value, they tend to reveal higher effectiveness than formal planning system (Portas, Sá and Cardoso, 1998; Morais, 2006)

regulatory issues. In the few cases in which the municipality took a more active stance, the arguments supporting its suggestions were generally not evident, showing the lack of a clear, comprehensive and supported strategic vision for the spatial development of V.N. Famalicão. In this sense, it is noticeable the lack of municipal instruments based on spatial criteria, principles or qualities, than could be used in this phase, such as public space design guidelines or an overall maintenance strategy for public space. It was also possible to identify the absence of an established negotiation culture between the involved actors (no clear procedures, mistrust).

It is then possible to claim that, as João Ferrão (2011) argues, the main issue is not a legal one. It is mainly a question of *culture*. It is the way in which all involved actors understand and relate both to *spatial planning* and to the *territory* itself that determine the daily practices which shape the urban landscape.

Impact of Loteamentos in V.N. Famalicão

Looking at loteamentos

Acknowledging the impact of *loteamentos* in the urban landscape of V.N. Famalicão, it is clear they have contributed to the creation of a very dispersed and fragmented urban pattern (Figure 6). Analysing their spatial distribution there is no evident concentration related to any period or type, apart from a certain prevalence of collective housing typology in the central town area. *Loteamentos* are spread all over the municipality, following the existing diffuse pattern distributed along the valleys of the region and main road infrastructures, to which urbanisation is mainly linked. At a smaller scale, it is evident *loteamentos* have contributed to the creation of complex, discontinuous and fragmentary structures.

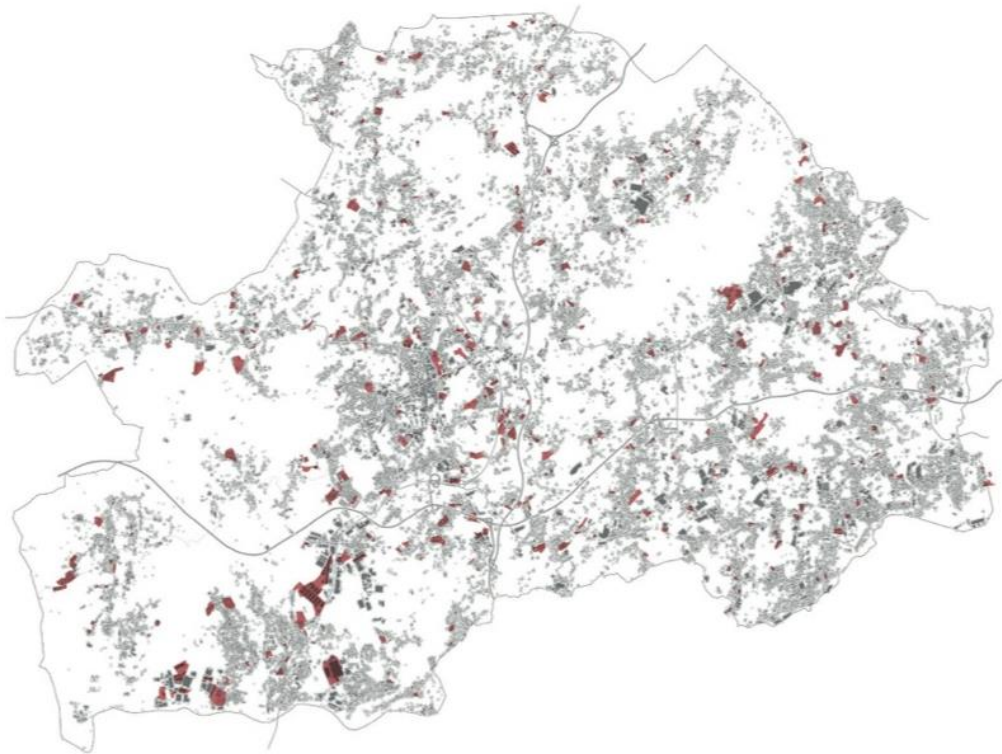


Figure 6. The sum of all loteamentos in relation with the urban areas of V. N. Famalicão.

Dynamics

As stated, urban growth of the Ave Valley Region directly follows market dynamics. Until the implementation of democracy in 1974, *loteamentos* had little presence in V.N. Famalicão. In 1974 there was a first production peak, corresponding to a total of 926 housing units²³⁸, followed by a profound depression in 1978 and by a second peak in 1981 (1027 housing units). From 1985 it is possible to identify a continuous and sustained increase until the year 2000 (1252 housing units), after which the number of processes clearly falls. From 2008, with the sub-prime crisis, the market has basically paralysed.

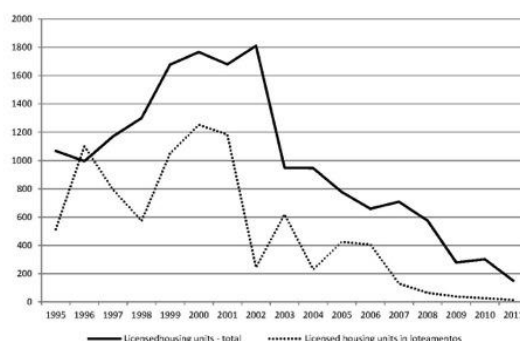


Figure 7. Licensed housing units, in numbers.

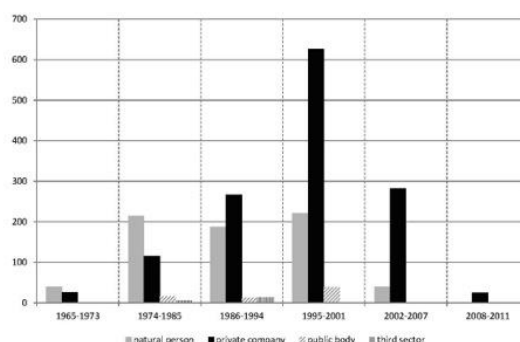


Figure 8. Housing typology in loteamentos (average housing units per year, for each period).

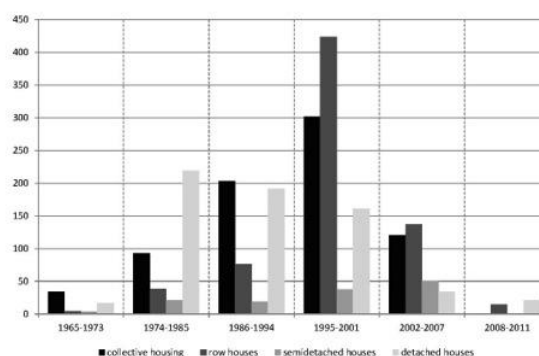


Figure 9. Developer category in loteamentos (average housing units per year, per each period).

²³⁸ Number of housing units contained in the approved permits for *loteamentos*.

During this period (Figures 7, 8, 9), different trends – related to typologies and procedures – can be identified. Key factors are the approval of the PDM and the introduction of professional developers. Before 1994, the most common projects were the ones initiated by individual landowners, who, most of the times, limited their interventions to plot division (with or without the creation of new public space and infrastructure) leaving building for future buyers. In such cases, single housing was the most common typology.

After 1994, the share of row houses increased enormously, becoming the most common typology for *loteamentos*. From 1994 to 2007, row houses and collective housing clearly dominated the growth process, which had a relevant impact on the urban landscape of the region, until then mainly dominated by the small grain of detached and semidetached houses. Such trend is correlated with the evident preponderance of private professional developers during this period. The introduction of this kind of developers had an effect on the dominant typologies, as they were normally responsible not only for infrastructure and plot division, but also for the buildings. It had also an impact on the scale and network type of the operations. Also, more non-residential *loteamentos* were initiated in period, because of the industrial zones established by the PDM. These *loteamentos*' types show a completely different urban design and morphology, primarily because of the different building typology and heavy road network destined to trucks.

In the last years, the involvement of professional developers has gradually decreased. Though private companies are still responsible for the major part of *loteamentos*, they are now a minority when considering the totality of permits for new housing units in the municipality – something that happens for the first time since 1998. Such mutation will probably have noticeable consequences on housing typology and on the processes of transformation of urban landscape.

Loteamentos: morphological typology

Case-study selection

For a more detailed morphological analysis of *loteamentos*, an East-West strip covering the whole length of the municipality is delineated to select a representative sample for residential *loteamentos* (209 *loteamentos*, ~19% of the total *loteamentos*) (Figures 10, 11, 12). It is a 1500 m wide strip along the axis of the regional road N206, covering different contexts: a more rural and dispersed area to the West, the central town area in the middle, and a more intense and diffuse settlement to the East.

The presented results are based on this sample. Main focus is on the contribution each *loteamento* has to a larger structure. In this sense, two scales were essential to map: the *loteamento* unit and the impact to a bigger area (sample). For this analyses GIS data is used combined with map and aerial photograph information. The base source for this research is the GIS database of the municipality of V.N. Famalicão. This database is further developed and extended by the authors for this article. In the last year, several fieldwork visits were made.

Relation of loteamentos to the overall structure

Essential *loteamento* aspects are: ownership, own accessibility, series housing types, and one single planning process. Therefore, *loteamentos* tend to present certain independence in relation to their surroundings: an autonomous spatial entity. Each *loteamento* introduces its own urban type (Silva, 2005) without clear or significantly transforming, adding, improving or adapting the larger existing context. However, the sum of all creates small and larger disruptions in the existing spatial structure, due to the introduction of big building volumes

and new typologies, clearly identifiable building clusters, or larger street space standards (Figure 13).

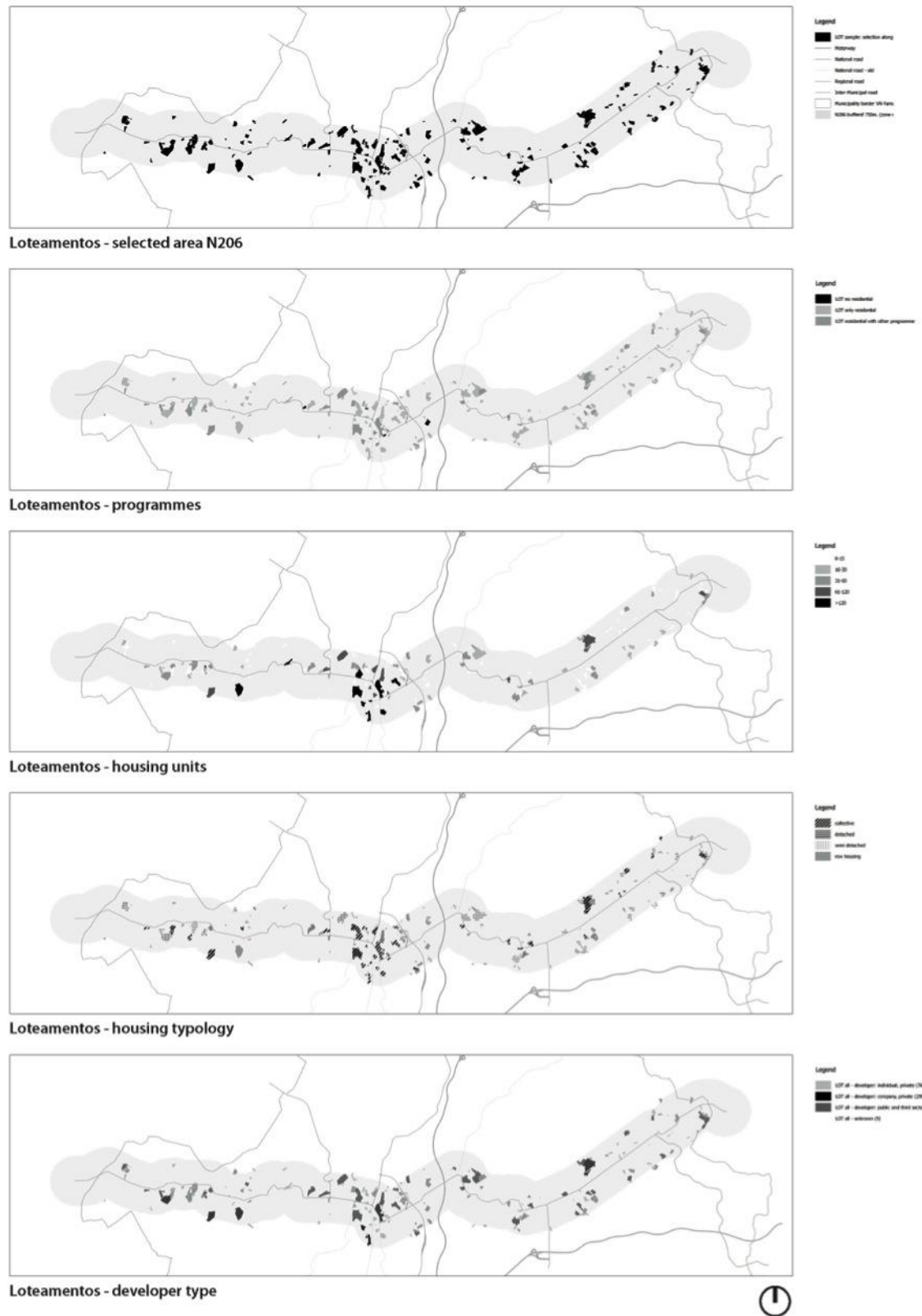


Figure 10. Sample of loteamentos 1 – programme and developer type.

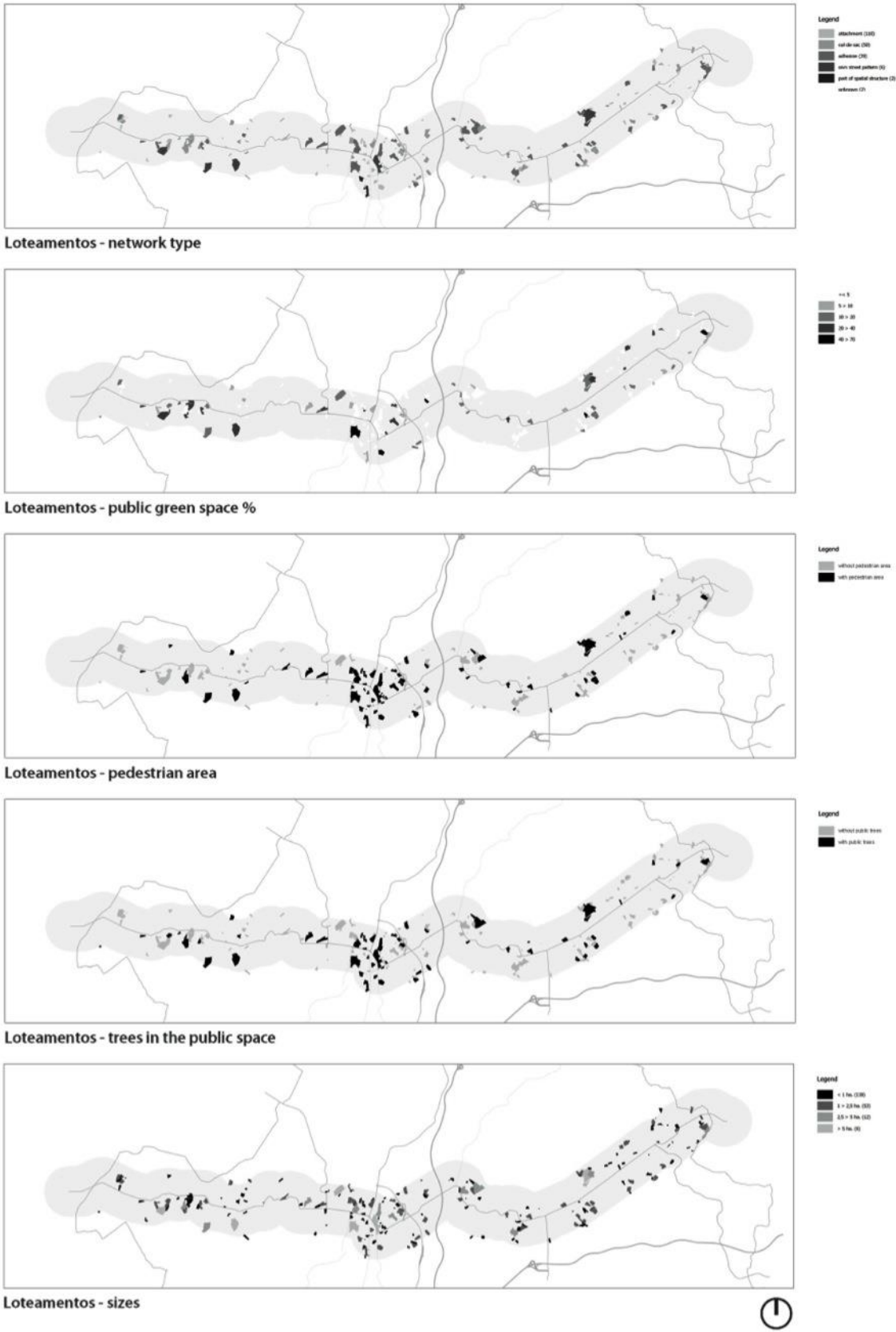


Figure 11. Sample of loteamentos II – public contribution.

Loteamentos with residential programme (205)

	Housing units (fogos)	Plots - units (lotes)	Construction	
mean	41	14	4,310	
median	10	7	1,764	
std dev	126	19	7,550	
sum	8,438	2,836	900,786	61.7 %

	Public space (=total plot, minus plot area)	Green public space (cedências)	Plots - area in m2 (lotes)	Area of loteamento
mean	3,152	1,205	6,989	10,161
median	1,005	0	4,416	6,001
std dev	5,730	3,371	8,505	12340
sum	658,855	251,658	1,460,734	2,123,642
	31.0 %	11.9 %	68.8 %	100 %

Geral data of sample

Programmes 1)	Residential	Developer type 2)	Public green space typology cedências 1)	Network typology					
residential, only	163	detached	149	individual, private	760	on the edge, street	25	attachment	110
residential + other prog.	42	collective	24	company, private	299	'end' of interior street	24	cul-de-sac	50
commercial	37	both	23	public & third sector	22	interior, street	25	adhesion	39
industrial or storage	6	no housing/unknown	13	unknown	9	central	3	own street pattern	6
services	9					part of larger structure	2	part spatial structure	2
sport	17					no public green space	132	unknown	2

Public green space	Pedestrian area	Trees in public space	Sizes				
=< 5 %	143	specific area (36,4%)	76	with trees	62	< 0,5 ha.	91
5 > 10 %	15	nothing (62,2%)	130	without trees	147	0,5 < 1,0 ha.	47
10 > 20 %	24	unknown (1,4%)	3			1,0 < 2,0 ha.	48
20 > 40 %	19					> 2,0 ha.	23
40 > 70 %	6						
unknown	2						

1) combinations are possible; 2) for all loteamentos in V.N. Famalicão

Daniel Casas Valle, Nuno Travasso - CEAL/FAUP, 2014

Figure 12. Sample of loteamentos III – data.



Figure 13. Two examples of loteamentos – introducing new public space characteristics and building typology.

In order to better grasp in which way *loteamentos* participate on the construction of urban structure, the analysis focused on the *public contribution* given by each operation, namely looking at the proposed public space design.

Public contribution

In principle, each *loteamento* is a unique and autonomous 'urban product'. However, the ability to urbanise involves certain responsibilities towards the community and/or the direct surroundings. As mentioned before, developers have the obligation to execute all needed infrastructures networks and public space – namely public streets, a certain amount of public green space and areas destined for public facilities. After completion, these are transferred to public domain, shifting the maintenance task to the municipality. In this way, an important share of the public urban structure is created by the sum of private interventions.

Nevertheless, these are mainly quantitative demands – often even with a paid-off possibility – which do not take in consideration local spatial characteristics. Despite existing regulations, it is noteworthy the lack of public green space (only 37% of *loteamentos* sample), specific pedestrian areas such as sidewalks or squares (only 36%), or the use of trees in public space (only 30%). This gives an indication of the relative minor public contribution of the sum of all *loteamentos*.

Due to the lack of spatial, urban design or morphological municipal regulating instruments or guidance, the design is shaped by generic rules²³⁹, independently from specific contexts. Such rules determine the existence and dimension of elements such as sidewalks, parking lots and road lanes, creating new urban design standards that contrast with the existing thinner and more delicate structures. Public facilities are basically absent. Due to the limited dimensions of *loteamentos*, mandatory areas destined for public facilities are generally too small for buildings. Therefore, they are usually used for installing simple children playgrounds. In the few cases of larger operations, some parcels are transferred to public domain unbuilt, as developers are not required to actually build facilities. Parcels are then part of a municipal land stock, which maintain available for future necessities or opportunities of public domain. In order to include in the spatial analyses urban morphology aspects, two urban design features are distinguished: network type and public green space type. Both are key indicators of 'public space contribution'.

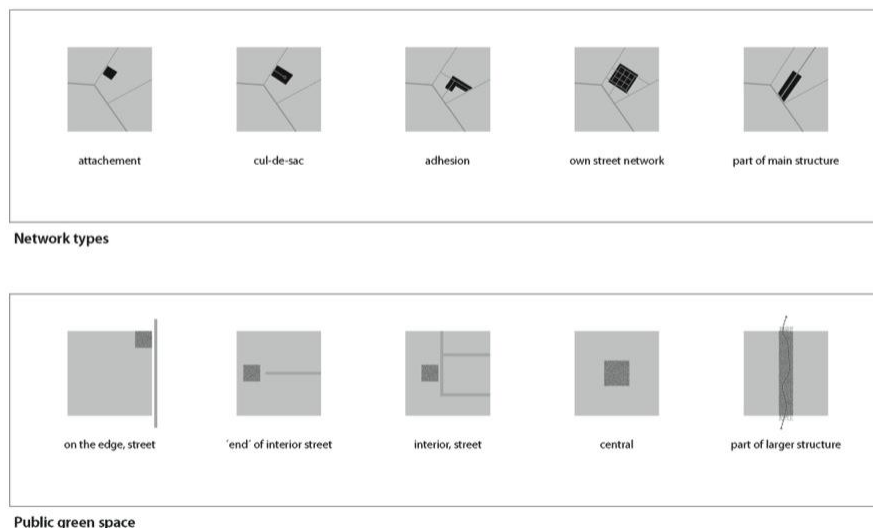


Figure 14. Network types and public green space types.

²³⁹ Portaria nr 216-B/2008 is a national regulation that determines the required areas for public green space, public facilities areas and parking, as well as the required dimensions for roads and streets. Such regulation is valid for all the country, unless it is totally or partially substituted by different rules by local spatial plans. V.N. Famalicão follows the national rules, which not include local specific aspects in order to adapt them to the spatial characteristic and qualities of each context. These regulations are further complemented by other national laws such as the accessibility regime (Decreto-Lei nr 163/06) that establishes in detail minimum measurements for sidewalks.

Network types

The relatively small size of *loteamentos* limits the possibilities of urban structure types. All *loteamentos* have a certain connection to the existing road network, also connecting to other urban networks²⁴⁰. In the selected area, five different network types can be distinguished (Figure 14, 15): (i) Attachment: *Loteamentos* that make use of the exiting street or road network; (ii) Cul-de-sac: *Loteamentos* based on new introverted streets; (iii) Adhesion: *Loteamentos* that create new streets connecting to the existing streets and roads, often improving local network continuity; (iv) Own street pattern: *Loteamentos* with a proper public street design with its own recognizable logic, normally with a specific materialisation, urban furniture and green space; (v) Part of the spatial structure: *Loteamentos* that directly contribute to the realisation of a part of the street or road main structure.

In general, *loteamentos* have little contribution to the construction of an overall continuous and intelligible street or road network. In fact, a total of 160 *loteamentos* (77%) have basically no contribution to such a structure (*attachment* or *cul-de-sac* types). 45 *loteamentos* create some local street patterns: some improving the local street network by introducing new connections and enhancing its continuity (no dead-ends), others introducing their *own street patterns*, which, in general, are embedded and connected to the existing street network. Only two *loteamentos* have a direct contribution to the main street network, both at the scale of the town of V.N. Famalicão. No *loteamento* makes a contribution to the main regional network.

Noticeable in various urban schemes of *loteamentos*, is the simple repetition of series of a housing typology, even if it does not fit easily into local spatial context or if it does not benefit public space quality. This has directly consequences to the network type layout, public and private gardens, and the connection with the surrounding. Specially, if there is no clear vision on the overall public space structure, including a maintenance framework and specific design aspects.

Public green space

Based on the position and access scheme of public green spaces – and considering their relation with different network types – five categories were identified (Figure 14): (i) Green space situated on the edge of the *loteamento*, facing a street; (ii) Green space situated at the end of an interior dead-end street; (iii) Green space situated in the interior of the *loteamento*, facing a street of the new network created by the operation; (iv) Green space as a central organizing space of the *loteamento*; (v) Green space designed as constituent part of a larger structure.

Similarly to the network types, it is here possible to observe that public green space has little contribution to the creation of an overall coherent urban structure – only in two cases are green spaces part of an existing or expectable larger structure – or even to the definition of a clear order for the *loteamento* (see example m and n in Figure 15). In the majority of the cases, they are small spaces, with no specific character or use, simply located in the areas of the parcel which are the most difficult to occupy with buildings. In this sense, they seem to bring little value to public space or to each operation.

²⁴⁰ This point is clear in the PDM, where it is stated that in order to be approved, a *loteamento* needs to be connected to the existing road and urban network by qualified links (art. 37th)

Management of public contribution?

These two features underline the aforementioned difficulty of the municipality to guide each project in order to make them part of a larger intelligible urban space. However, it is not possible to claim that this results from the lack of legal instruments.

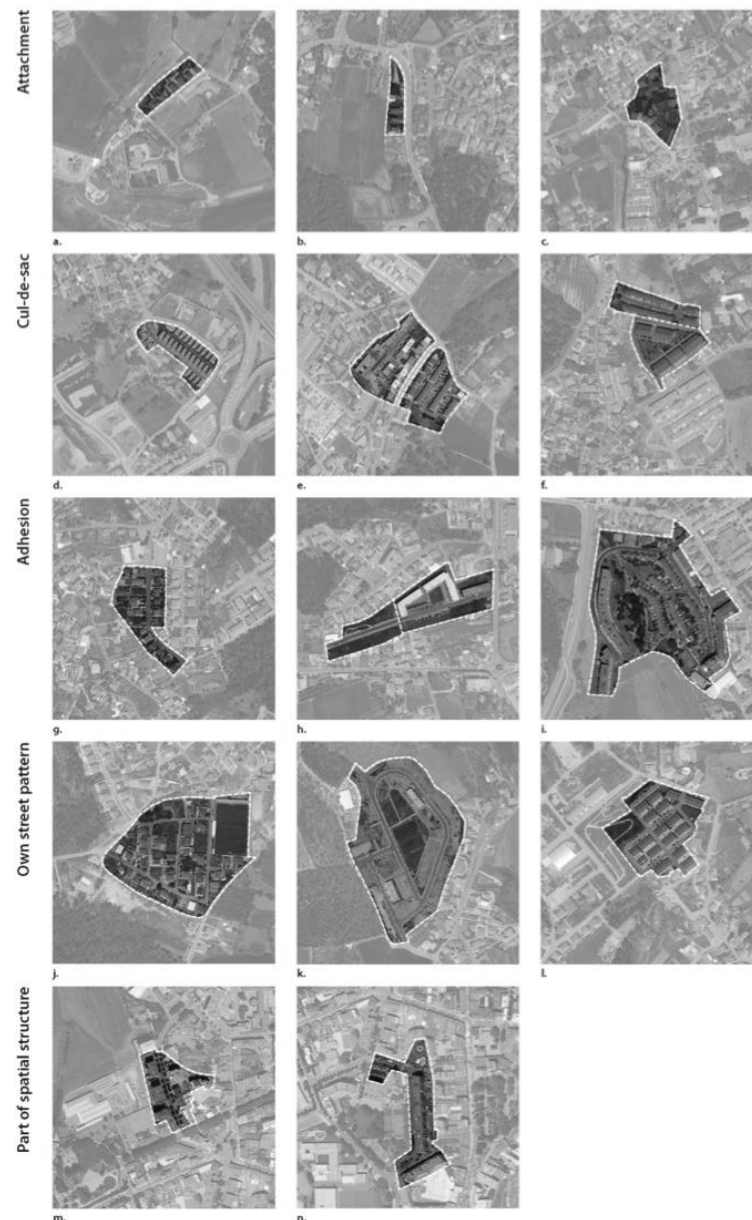


Figure 15. Network type, example of loteamentos.

Municipal regulations clearly state, “[...] all loteamentos [...] involving the creation of new roads shall be designed so that they rest on the existing network, establishing connections with unquestionable logic and urban justification and, whenever possible, avoiding dead-ends.” (art. 35º §1, PDM) They equally affirm that the “location, design and dimension” of public green spaces must “a) ensure an appropriate relation to its surroundings, enhancing the urban space where it is embedded; b) present adequate size and shape to the intended uses [...]” (art. 12nd, RMUE). However, the effectiveness of such regulations depends on the municipality’s capacity to interpret and implement it.

Conclusions

It seems clear that, in the Ave Valley Region, an urban growth shaped by the sum of autonomous small fragments has failed in creating an overall coherent and intelligible urban structure. *Loteamentos* are a key element of this process, producing various (new) urban typologies. And, in fact, generally, they do not contribute to the construction of continuous logic larger structures, mainly due to the lack of attention paid to their public space.

However, the main problem is not the existence of the legal instrument of *loteamento* in itself - although it is not an adequate instrument without overall spatial plans or visions. In reality, *loteamentos* seem to have revealed an important potential for the production of urban space, especially in a moment of a bursting real estate dynamics, and in which other planning instruments have shown to be incapable of answering to the existing demands. The problem rests mainly on the lack of efficient apparatus able to coherently connect each individual operation to other interventions and to its surroundings, in order to create logic urban structures.

Nevertheless, such lack of effective mechanisms is not primarily due to existing legislation or procedures. It is a result of the *spatial planning and territorial culture* of all involved actors, which determine daily planning and urbanisation practices. It is possible to identify a mismatch between, on one side, what different involved agents think planning and urbanization process *should* be, and, on the other side, the real dynamics, trends, logics and processes that daily shape the urban landscape. In parallel, there is also a mismatch between the planning system itself and its instruments (plans, design guidelines and regulations: formal and informal). Standardisation may have evident value when applied to large-scale integral urban plans. But when applied to scattered small urban developments, such as *loteamentos*, an incomprehensible mismatch between new small urban pieces and the existing spatial structure is produced.

In order to develop more effective planning practices, it is essential not only to recognize the specific characteristics and logics of *loteamentos*, but also to understand the impact the sum-of-all has to urban landscape. Much more important than possible changes to the formal planning system is to create an informal planning process based on local contexts and on local actor experiences. Instruments such as informal guidelines and spatial strategies – clarifying an overall vision but open and attentive to specific characteristics of particular territories – can contribute to the urban planning process in order to guide and define clear requirements in more open and transparent dialogue phase. This is not to substitute the formal planning system itself, but to give more room for local-based-solutions.

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Integration of public spaces into the urban environment in case of Perm

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Abstract. *The quality of urban environment is constructed not only with help of certain elements of it but with help of interaction between them. Historical buildings, nature elements (the river, the lake, the forest) should be integrated into public spaces of the city for the best perception of them. In this case public spaces have one more social function. The tool for planning is the a graphical method of a placement building mass (filled spaces) and open spaces. The open spaces are streets, parks, embankments, the yards inside the blocks, etc. Such morphological elements directly influence on the quality and comfort of urban environment and create the impression about the city as well. Interaction between open spaces and buildings takes place with help of facades of buildings. It is necessary to take into consideration the morphotype, condition of the facade, relation between the facade area and open space area, etc. Perm is the Ural city which partly has historical buildings of XVII-XIX centuries. The events of XX century contribute to lose historical shape and authenticity of the city. Seven rivers valley in the city are existing in bad condition and have no social and recreation functions anymore. The analysis of existing situation of Perm is occurring by the method of placement open spaces and research of facades condition for different morphotypes. It allows to find the ways of improvement of urban environment quality.*

Key Words: public space, morphotype, interaction, perception of the landscape, historical heritage.

Perm is a city on Ural Mountains of Russian Federation with the numbers of inhabitants about 1,023 millions, total area is 800 square meters. City is situated on the banks of the Kama river, stretched along it. The central part of the city has linear structure. Here are located historical centres and the main public spaces of the city.



Figure 1. The central part of Perm (Google maps).

Nowadays territory of the city crossed by 7 big valleys of small rivers, flowed to one of the biggest rivers of the Ural is Kama river. Historically, the city started to develop in the beginning of XVIII century on the banks of the Egoshiha river, where the territory of copper smelting plant was formed. To the end of XVIII - beginning of XIX century the center of the city gradually shifted to the banks of Danilikha river and continue to develop along Kama

river. Therefore the rivers are flowed in the central part of the city have not only recreational function but the historical meaning as well.



Figure 2. Perm 1910. Valley of the small river.

On the top of the valleys slopes diversity of the buildings are dominant: low-rise residential wood buildings, high-rise buildings, industrial buildings and empty spaces.

Herewith the valleys don't integrated to the city fabric, and are used for horticulture, don't connected by functions with the buildings around, are existed in abandoned condition. The accesses to them extremely uncomfortable and sometimes dangerous, or don't exist at all (Figure 3).



Figure 3. Valley of the small river.

Some watercourses of the small rivers are locked in the tubes and identify them as the water objects is not possible.

The embankment of the Kama river also is not in good condition now. Many years it had the scenic landscape and it was the adornment of the city and the favourite place for citizens walking. However, in the last time it has less popularity. Market makes faced interests of different departments and existing urban codes for railroad, river port, historical heritage (river station), electricity power line. In addition were formed the problems of bad conditions of entrances to this embankment from nearest streets: ruined ladders and subways are dangerous in the dark time of the days (Figure 4).



Figure 4. Subway led to the embankment of the Kama river.

As the result the main function of the territory to be a public space is blurred. The valleys of the small rivers and the embankment are the main and biggest components of green spaces of Perm (Figure 5).

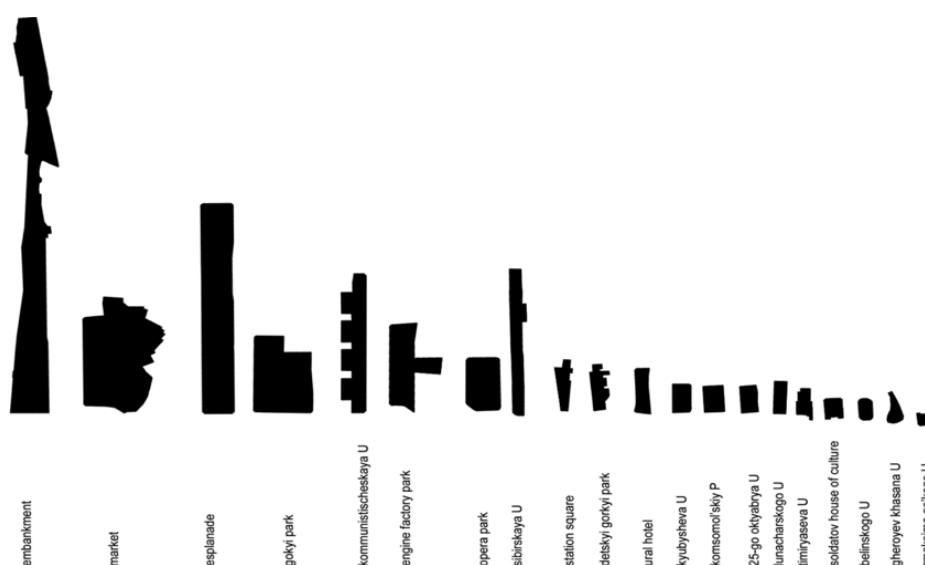


Figure 5. Ratio of the green territory areas of Perm. Source: Strategic master plan of Perm, 2010.

Thus only the part of the green spaces are filled by functions. Big number of the small green areas and green yards is characterised by low quality of accesses, don't clear function, low activity of use. There is not infrastructure for physically disabled people. There is not the full recreation function.

Figure 6 shows the use of graphical method of two main elements of urban environment placement: the mass of buildings and empty spaces to define the problems and the ways of transformation the territory. One of the first who begin describe and search the relations between built and open spaces was Camillo Sitte.

Open spaces are the yards inside the blocks, streets, embankments, etc. These morphological elements directly influence on the comfort and quality of the urban environment and form impression about whole city. Interaction of open spaces with the mass of buildings is realized with help of the facades. Here are considered the morphotype of the building, its condition, relation between the area of façade to area of open space, and other parameters.



Figure 6. Open spaces of Perm (empty spaces are marked by grey, the main recreation areas are white).

The method of open spaces placement allows to analyze urban fabric in criteria: define existing functions of public spaces; location in relation to public spaces in city and local levels; accessible; connectivity of public spaces; possibilities to form of the public spaces system.

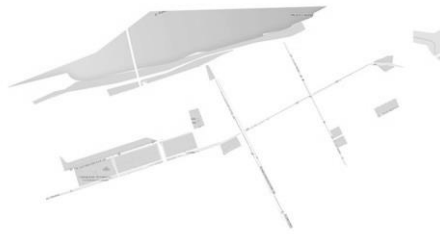


Figure 7. Placement of green spaces of the central part of the city and the main streets are connected them.

The second part of research is the analysis of facades which is allow to define presence of the visual connective between public spaces and buildings around. The visual links are created in depending the way of looking is going in between buildings and the main facades are located in relation with streets and open spaces.

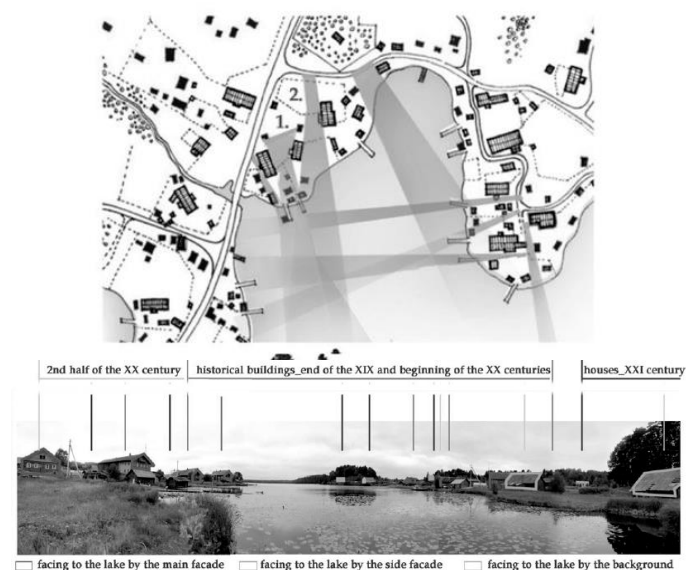


Figure 8. The example of defining of the visual links.

For example, the embankment provide good visual connectivity with the park near Art Gallery and the Gogol garden. (Figure 9, 10)



Figure 9. The view from the park near Art Gallery to the greenery of embankment

However, these territories have different quality: good condition of one territory is not continue in other green area with absent landscaping.

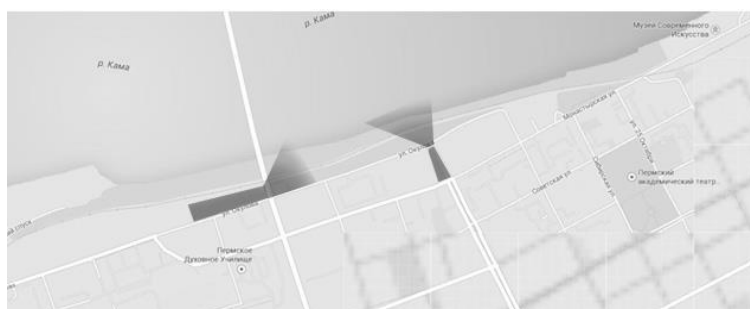


Figure 10. Parks are connected with the embankment.

Conclusions

Morphology of the buildings of the peripheral Russians cities became more blurred. Buildings and cars displaced people, nature and the public spaces.

Perm has unique resources of recreation spaces which are nowadays don't consist full functions of public spaces and recreation. In the city which has a lot territories for winter sport activity inhabitants have to go 40 km for skiing. The summer create big traffic to the banks of Sylva river (30-60 km outside the city). All these are existing in the same time the water resources in the center of the city don't using at all.

The transformation of the small rivers valleys have to starts from the back the first view of it, the nature landscaping and after has to be in harmony with the transformation them to public spaces with certain functions. Unify it in the urban net of the public spaces with help of pedestrian ways, bicycle lines, visual connectivity, providing the accesibility with help of improvement of the paths and roads, creating of places for street celebrations, open-air games, constructing of the playgrounds and grounds for the dogs. All of them will improve physical and visual links between public spaces and green areas of the city. The perception of the city will be changed in minds of inhabitants. The territories of the city which are now have a potential but don't used will be full of life.

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A planning method of identifying viewing spots and area for landscape control by utilizing spectator's experience of a Japanese traditional festival

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Abstract. *We present a practical a planning method of identifying viewing spots and area for landscape control by utilizing spectator's experience of a Japanese traditional festival. To realize these aims, viewer's favorite photographs of "festivalscape" are analyzed in a case study of Kibune festival, a traditional Japanese festival held in Manazuru Town, Kanagawa. This study recognizes three categories of "festivalscape," namely, the viewing location (Viewing spots), the viewer's target (Performance of the festival), and the wider landscape (Background). In this study, we identified three popular viewing spots examined the landscape viewed by spectators at those locations. Also, The most commonly viewed area was failed in comparison with landscape control area for festival compiled by the Manazuru planning authorities. These results located areas that should be preserved or enhanced for a more pleasant viewing experience during the festival. Our method is attractive because it can be easily implemented by non-specialists, uses data acquired from ubiquitous, low-cost digital cameras and smartphones, and is versatile. This last feature renders the approach applicable to any region with a traditional history, bordering seas or with panoramic points.*

Key Words: *Japanese traditional festival, Festivalscape, Viewing spot, Landscape control, Viewer's favorite photographs.*

Introduction

Tangible landscape control, which unifies the heights of buildings and facades in townscape or highlights landmark features, such as castles, towers, and mountains, has been embraced worldwide. In contrast, landscape control based on intangible features has remained underdeveloped. Such intangible features are rooted in tradition and local lifestyles and constitute the living and cultural landscapes. Japanese traditional festivals have been globally recognized as an intangible cultural heritage by UNESCO (2014).

This exploratory paper aims to develop a planning method of identifying viewing spots and area for landscape control by utilizing spectator's experience of a Japanese traditional festival. As a case study, the method is applied to enhancing the experience of spectators at the Kibune festival, a traditional Japanese festival held in Manazuru Town, Kanagawa.

To realize these aims, the study presents a series of viewing spots favored by spectators and landscapes that attract viewers' attention. This information is obtained to analyze viewer's favorite photographs of "festivalscape".

This study recognizes three categories of "festivalscape," namely, the viewing location (Viewing spots), the viewer's main target (Performance of the festival), and the wider landscape (Background).

Manazuru Town is located on the Manazuru peninsula of southwestern Kanagawa prefecture. The cone-shaped terrain faces Sagami Bay and projects toward the sea. With a population of approximately 8,000, Manazuru Town is a prosperous hub of fishing and stone industries.

The Kibune Festival is a portable shrine that carries a god by ship through the Manazuru Port. The origins of the Kibune Festival are intimately linked to the town's historical

background. Since the early modern period, Manazuru locals were mainly employed in fishing and in the mining and marine transportation of stone. Because the ships built for fishing and stone transportation were very small and sophisticated technologies and machines were lacking, people were regularly exposed to natural dangers. Therefore, people offered prayers for safety and plentiful fishing hauls and strongly appreciated the peace and security of their everyday activities.

From this background emerged the Kibune Festival of Manazuru Town.

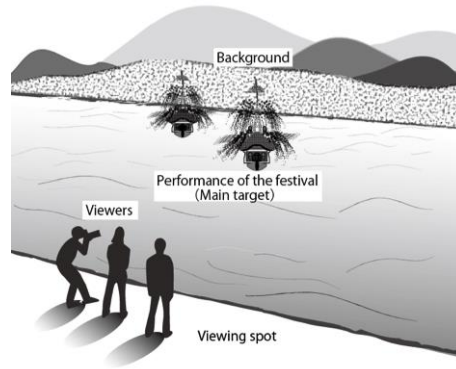


Figure 1. Spatial elements of a “festivalscape”.



Figure 2. Bird's-eye view of Manazuru Town.



Figure 3. A “festivalscape” of Kibune festival.

Landscape planning of Manazuru

This study aims to clarify the current situation and landscape planning problems of the “design code of beauty” aspect of the Kibune Festival of Manazuru.

To this end, I bibliographically surveyed the “design code of beauty” and interviewed a representative of the Manazuru Town Planning Division.

Manazuru Town was not exempt from the high developmental pressure that has altered Japan’s infrastructure since the late 1980s. Manazuru Town is a commutable distance from the Tokyo metropolitan area and is renowned for the quality of its natural environment.

In order to resist development beyond a human-scale landscape, Manazuru Town introduced the “design code of beauty” rule to promote creative urban designs and landscaping appropriate for a small town. The “design code of beauty” is based on the “pattern language” concept proposed by Alexander (1994), a positional design algorithm for representing high-quality regions. The algorithm locates suitable landscape grounds from 69 keywords. In applying the algorithm to Manazuru Town, the term “Festival” is included as a keyword.

Landscape planning in Manazuru has relied on qualitative assessments of attractive buildings, such as “design code of beauty,” for 10 years. Furthermore, after the landscape by law was enacted in Japan in 2004, Manazuru became the first township to specify administrative organizations and undertook quantitative landscape planning in January 2005.

To control its landscape, Manazuru Town has adopted a color standard that quantifies the festival by the Munsell value of the plan. During the festival, the port is dominated by vivid red ships. Consequently, the external walls of buildings in the Manazuru Port district, which define the background of the festival, are set to be brighter than other Manazuru districts to emphasize vivid red ships. Thus, an advanced landscape planning approach has been adopted for the Kibune festival.

On the other hand, a line of demarcation for color control area is obtained by utilizing land use, that is, basis for this standard is not intended to be reflecting the spectator’s perspective. It was recognized that spectators’ perspectives are dynamic, and that current measures to enhance viewers’ experience may alter in future. Therefore, the planning seeks to create favorable viewing spots for the festival and to increase the range of viewing perspectives.

Data Collecting Methods

Two surveys were conducted to obtain the required data for analysis.

In the first survey, preferred festivalscape views were derived from viewers’ favorite photographs captured during the festival. Photographs were collected from three sources.

First, 250 viewers selected by random sampling were requested to photograph the marine parade and e-mail their five best shots of the festivalscape. This approach yielded 39 photographs from 10 viewers.

Second, 13 high-quality festivalscape photographs entered in Manazuru photograph contests targeting various categories, such as historic sites and nature, cityscape, food, festivals, events, and people, were collected.

Third, we conducted a web search of the phrase “Kibune Festival space Manazuru” and selected a blog article on the Kibune Festival from the sites returned by the word search. This approach yielded 43 photos posted on 26 blog sites.

Collectively, we obtained 81 high-quality photographs of the marine parade festivalscape.

The second survey focused on the action records of Kifune Festival spectators. On July 27 and 28 in 2013, 10 investigators tracked the progression of the Kifune Festival and recorded its movements on a map. Moreover, the procession was captured by video cameras operated from three fixed points overlooking the entire Manazuru Port. To maximize the recording time, the photographing direction of the video was altered to follow the dynamic movements of the audience.

This survey revealed that almost all viewers distributed along the waterfront line moved around relatively freely while photographing the event.

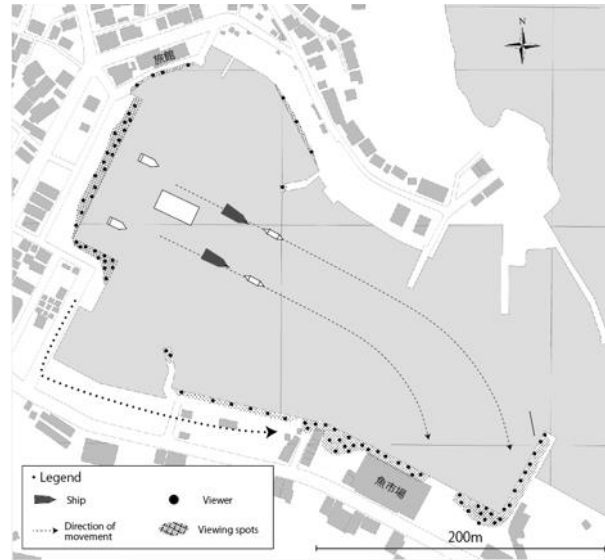


Figure 4. Results of spectator action record survey.

Best-photograph analysis of festivalscape

Favored viewing spots

The 81 photographs obtained from the photographic survey were analyzed with respect to viewing spots and cityscape.

The first analysis extracted several favored viewing spots from the landscape elements in the 81 photographs.

Process 1: The photographs were vertically bisected by a line defined as the central axis. Points of intersection between buildings and the uppermost and lowermost parts of the central axis were designated as Points A and B, respectively.

The density distribution of Kibune festival visitors, captured by the fixed video cameras, revealed that viewers remained along the waterfront of Manazuru Port. Thus, we extended a line through Points A and B in the direction toward the waterfront line. The intersection of this extended and waterfront lines were labeled as Point C.

In addition, the direction of the line joining Points C and A indicated the eye direction of the viewer, and the range between Points A and C decided the photographing area.

This process was completed for all 81 photographs of the festivalscape collected in the survey.

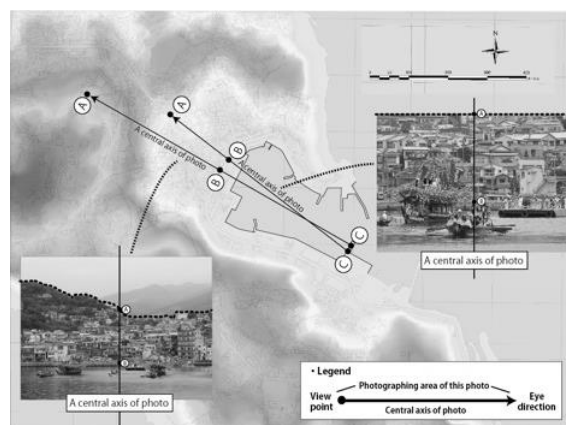


Figure 5. Implementation of Process 1.

Process 2. Based on land use and spatial continuity, the waterfront areas of Manazuru Port were classified into 10 regions and labeled Area A to Area J, each with its longest side extending to a maximum of 100 m.

Within each of these areas, the degree of the integration of viewpoints was acquired by dividing the number of photographs with viewpoints contained in the area by 81 (the number of photographs acquired).

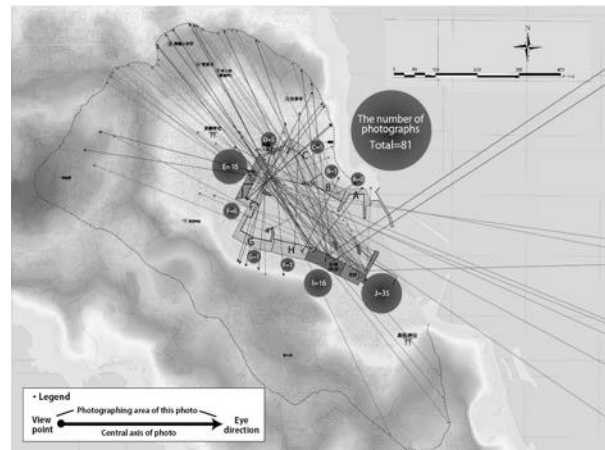


Figure 6. Implementation of Process 2.

Areas E, I, and J showed a high degree of integration, being observed in 14, 16, and 35 out of 81 photographs, respectively. Therefore, these three areas are identified as the favored locations for viewing the festivalscape in action and are expected to enhance the experience of viewers visiting the Kibune festival.

This result is likely affected by two factors: the parade route of the main target (the ship) and the visibility. The viewing values of Areas E and J may be linked to their proximity to the start and end points of the parade route, where viewers tended to congregate. In addition, the field of view in the southeast and northwest directions opens into Manazuru Port owing to the cone-shaped terrain projecting into the sea.

Extraction of important cityscape

Subsequent study focused on the backdrop landscape of the festival.

Because the festival is viewed against a background of buildings, Manazuru Town has formulated a color standard for landscape control.

However, a line of demarcation for color control area is obtained by utilizing land use, that is, basis for this standard is not intended to be reflecting the spectator's perspective.

So, to clarify important cityscapes that should be preserved, cityscapes that frequently appeared in the 35 photographs acquired from Area J were analyzed as a case study. The aim was to determine the section of cityscape most commonly encountered by viewers' eyes.

Process 3: The analysis focuses on a panoramic shot acquired on a sunny day on November 27, 2013. The panorama extends through 90°, sufficiently covering the city area from the midpoint of the waterfront line in Area J. The camera that acquired this image was affixed at 160 cm above the ground, the approximate height of a man's glance.

The acquired panorama covers almost all of the cityscape regions visible from Area J.

Process 4: In this analysis, buildings occupying the four corners of a photograph collected from Area J were extracted and labeled Building 1 to Building 4. The four buildings are interconnected by straight lines, which delineate the cityscape background of the festivalscape most commonly visualized by viewers.

The background cityscape observed by many viewers was identified by projecting the

delineated cityscape on the panorama and overlapping each area. For this purpose, Buildings 1–4 in each of the 35 photographs taken from Area J were identified in the panorama. The matching buildings in the panoramic view were connected by straight lines in all 35 photographs.

At the completion of Process 4, the most commonly viewed sections of the cityscape are indicated by dark colors.

Process 5: The obtained chart was divided into square grids of approximately $5\text{ m} \times 5\text{ m}$. The grid dimensions were based on the minimum size of the photographed buildings. If the projected areas covered 50% or more of the grid, the covered grids were counted, divided by 35 (the number of photographs acquired from Area J), and multiplied by 100. The result expressed the degree to which viewers focused on that area of the cityscape.

The numerical results were classified into four viewing frequencies ($\geq 50\%$, $\geq 40\%$, $\geq 25\%$, over 0%). Process 5 reveals how a background is observed from a viewer's elevation. Landscape planning, such as designating landscape preservation area, requires a ground plan. To solve this problem, buildings included in areas of high visual interest (40% or more) were extracted by the visual observation of the locale and painted on the residential quarter chart.

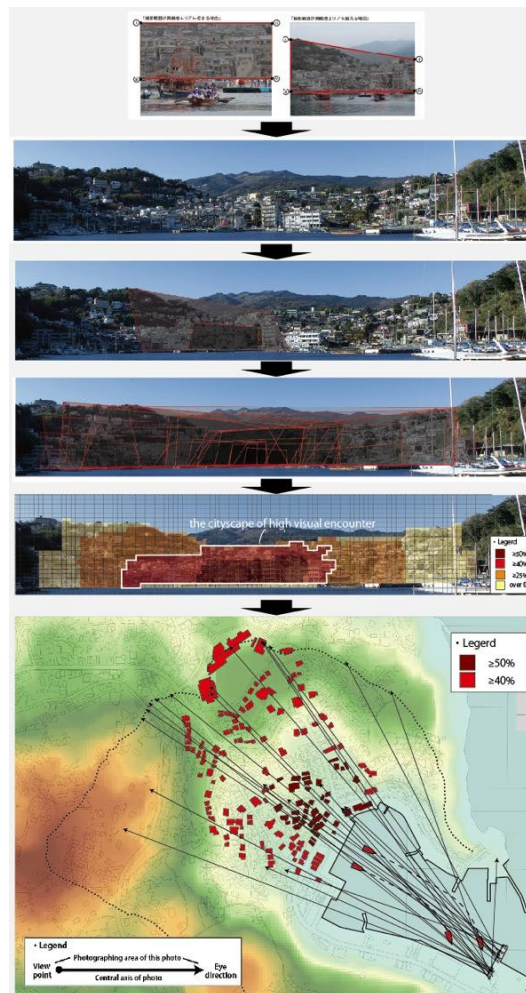


Figure 7. Implementation of Processes 3–5. The thick white line in the central panels delineates the cityscape of high visual encounter.

The chart with the painted buildings presents a symbolic landscape of the Kibune festival, revealing the background cityscape most commonly viewed by festival spectators. Thus, these buildings should be earmarked for landscape preservation.

Conclusions

This paper presents a method of identifying favored viewing spots from photographs of the festivalscape, based on landscape features along the central photograph axis. By dividing the number of viewpoints contained in designated areas by the total views of the festivalscape, three areas of favored viewing (Areas E, I, and J) were identified.

We consider that cityscapes most commonly viewed by festival spectators should be preserved because these areas frequently appear in spectators' photographs. These results can guide the current situation of landscape planning in Manazuru Town.

The most frequented viewing areas, I and J, should be maintained as favorable viewing spots by improving the land use of their backdrops. This is especially relevant to Area J, whose background encompasses a vacant "no entry" zone.

In addition, the extracted buildings mentioned in subsection 4.2 were compared with the color-controlled cityscape rendition of the Manazuru festival clarified in Section 2.

The comparison highlighted the need to accommodate more of the spectator's perspective in district planning. In particular, the Manazuru primary school situated high above the Manazuru port should be included as a landmark in the controlled district.



Figure 8. Areas I and J should be maintained as viewing spots.

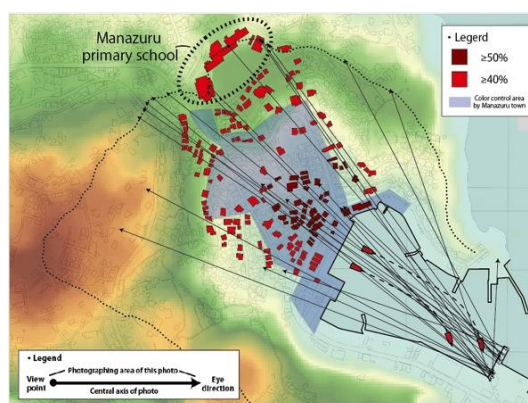


Figure 9. Extracted buildings mentioned in subsection 4.2 superimposed on the color-controlled cityscape version of the Manazuru festival.

The proposed method makes three useful contributions to district planning.

First, the method is easily administered in practice. High-quality photographs that provide the underlying data are easily retrieved from photograph contest archives. At present, anybody can capture images on digital cameras and mobile phones. With these technologies, which have become ubiquitous, viewers can essentially capture events, such as festivals in action, providing a wealth of data reflecting the viewpoints and needs of numerous viewers at

low cost. To narrow the data sources, photography contests on themes, such as “Landscape and Festival,” could be held.

Second, the analytical procedure is easily implemented by non-specialists, as it requires no specialized equipments or analytical techniques that must be learned beforehand.

Finally, because traditional festivals are held throughout Japan, this method provides an effective support tool for landscape planning around regional characteristics. Moreover, the method is applicable to any region with a traditional history, such as sea-facing bays or slopes that provide ideal panoramic points.

In summary, we present a versatile and practical approach to landscape planning that identifies both important viewing spots and area for landscape control. Such planning will certainly enhance the viewing experiences of spectators at Japanese traditional festivals.

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Urban form and orientation in urban space

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Abstract. *The question is about developing research disciplines based on human abilities of perception in the spatial reality of a city and referring them to urban morphology and typology. This also means posing a question about human orientation abilities in urban space nowadays. Urban structure and spatial legibility relation is extremely important. It is possible to formulate orientation codes of the urban form (the own codes of a form, signaling codes, mass transmission codes and other codes incorporated in culture) and find determinants which could define the notion of orientation of the balance in the urban space as a criterion of Urban Form.*

Key Words: urban space; space orientation; codes in urban space; urban meaning; urban signs

Thinking of spatial orientation as a significant aspect that determines the form of a city is obvious and yet very often neglected when it comes to the designing of the form and its content and implementation decisions.

The book "On Orientation in The Space of The City"²⁴¹ deals with the realities of the urban form perception nowadays. It develops the theme of orientation in the space of a city as a stage of developing such awareness of the city and acquiring such habits or skills of purposeful movement that would make other activities possible. Thus the quality of orientation plays the role of a determinant of other aspects of the life of man and the community.

Urban space and, in particular, public spaces realize a variety of types of information transmission and are targets of many information providers. The process can be called a struggle for efficient information transfer and an incessant play for the attention of users – the city residents and visitors.

A short summary of the conclusions and results of the above work "On Orientation in The Space of The City" is given below.

According to the definition of orientation in the space of a city " ... orientation in the space of a city is the whole of man's psychophysical and spiritual abilities to define his place in the physical space of a city in the face of the meanings it carries. It should be treated as the basis for intentional movement, activeness and being in an urban space as well as the establishment of values and meanings.

Orientation in the space of a city: is fixed in space-time; binds and facilitates man's other relations in the environment; concerns what is included in space and perceptual but may be associated and identified with non-spatial meanings and values; is environmental (Gibson); concerns values and potential actions (Lewicki); is aware to various extents; in the broadest depiction, it remains under the influence of elements from the area of consciousness, including knowledge and abilities, and from beyond this area, including hidden memory, while a certain range of environmental monitoring is the constant, unconscious labour of an organism involving it at the level of reception as well as an initial selection and the valuation of stimuli; is related to various degrees of attention engagement in spatial orientation processes in relation to people's direct contacts or expression and concentration on non-spatial values and contacts (D. Broadbent, A.M. Treisman, U. Neisser and others) as well as man's emotional and cognitive disposition (K. Obuchowski); is connected with the

²⁴¹ The study was published in 2008 (Kantarek, 2008), and its abbreviated and revised English version was released in 2013.

characteristics of a manner of staying in a space (a kind of movement, objectives, the knowledge of the space); is based on the concrete, generalization or abstraction to various degrees (Obuchowski); is of local character; is of adjusting character, uses the most expressive elements, in a sense it accepts the state of things; so, it results in a kind of adjustment; is rooted in culture and uses the temporary knowledge of a city whose sources are diverse. ²⁴²

Typology	Examples Of Types
according to a place	place of residence, house, neighborhood places of work, education places of relaxation, recreation, destination places of motion characteristic places – Centre, regions, areas
according to motion in time	every day every several days, monthly yearly festive untypical
according to traffic – kinds of motions and vehicles	on foot by bike by car /driver, passenger/ by bus by tram
according to person – age, psychophysical condition, culture	child adult elderly person disabled person
according to person – relations to the city	inhabitant visitor – tourist, guest, employee
according to the degree of the cognition of space	

Figure 1. Situations related to orientation in the space of a city. A register of typologies (by the author) (Kantarek, 2013) p. 94

Attention should be drawn to several general determinants.

Firstly, orientation abilities are specific to a particular person – this includes individual perception abilities, cultural background, intrinsic values, interests, habits, age which make up a person's unique profile.

Secondly, orientation is dependent on the extent of the knowledge about the space.

Thirdly, orientation depends to a great extent on the manner in which one moves or stays in a particular space and hence on the kind of attention that is triggered (Fig. 1.)

Fourthly, it is a fixed ways in which a space is being used by a man, a group and a community.

A look at the space around man is one aspect of the issue. While asking about urban form we are concerned with another aspect – it is a reflection on the structure and dynamics of the changes in the anthropogenic environment.

There is a question about such a description of urban form and its elements that will help determine the best possible conditions of orientation in the space of a city.

²⁴² (Kantarek, 2008) p. 125, 126, (Kantarek, 2013) p. 91, 92.

This purpose is served by the orientating codes of urban form. There are four kinds of such codes²⁴³ (Figure 2.).

A *The own codes of a form*. U.Eco's definition of a code through an architectural sign can by analogy be extended to refer to an urban sign and subsequently a distinction can be made between inherent codes of urban form (semantic – denotation or connotation through form) and syntactic (the structure of the form). It is important to bear in mind that the codes operate on various scales and within various ranges – from the scale of a single object, interiors and their details, architectural forms, their complexes to any extended image of the whole of a city, region or the world. These are aesthetic codes.

B *Signalling codes*. These codes are based on the form but speak a different language. They are mainly signals defining the principles of movement around the city but also informing about the content of particular elements of the form – including designations and proper names of places. Their basis are written language or conventional signs (pictograms).

C *Mass transmission codes*. These codes in urban space use primarily pictorial and written language. Pictorial narration and linguistic message firmly embedded in culture create an attractive means of communication that captures attention. Basically, these are advertising messages – public sphere is involved in private messaging that works for the benefit of small groups of sponsors rather than the residents. The message, whose strengths lies in the application of repetitive elements of slogans and pictures, obscures the image of the city and makes identification impossible. It is a confusing element. Nowadays, the subject matter of the codes is extended from solely commercial to a wide range of political and cultural persuasion. More and more tools of transmission are being used – architecture and animated events in urban scenery become advertising banners.

It is worth noting that the message is external in relation to the space in which it operates. It uses the space and destroys it.

D *"Other codes incorporated in culture*, including information and events. All the other codes used by the city dwellers as the entire process of communication exist in the space of a city in an obvious way. They include both personal codes, related to the story of a life, based on subjective sensations and diversified, and many conventional codes built anew. Their coexistence and co-creation with an urban form is self-explanatory, unusually dynamic and elusive. They also include various manners of looking for a destination, e.g. asking the way or using GPS." ²⁴⁴

A diagnosis of urban space perception under contemporary conditions shows mass transmission and signalling codes to prevail. In the case of signalling codes this means that coding through form is too weak to satisfy the need for comfortable movement within the space or reflect the dynamics and complexity of connections. As for mass transmission codes, we are faced with unjustified interference with the urban public space of the content which has nothing to do with this space and affects recognizability of the site since it conveys a typified message.

Another question to be asked is what relations there should be between the elements that carry the particular codes in the city space to ensure optimum conditions for good orientation.

Orientation called *the orientation of balance*²⁴⁵ is in fact a postulate addressing urban form. To make possible the operation of other codes incorporated in culture (D), the own codes of a form (A) synthesize all the others. The composition of codes is based on the composition of the form of the city. (Table 1)

It is worth pointing out to what extent the above concept of orientation in the space of a city differs from K. Lynch's views on orientation in space.

²⁴³ Cf. (Kantarek, 2008) pp. 85-87, (Kantarek, 2013) pp. 63-65

²⁴⁴ (Kantarek, 2008) p. 86, (Kantarek, 2013) p. 65

²⁴⁵ (Kantarek, 2008) p. 129, (Kantarek, 2013) p. 96, 97



Figure 2. The orientation codes of an urban form – The Main Market Square in Kraków (by the author) (Kantarek, 2013) p. 66.

Urban Form	Conditions Of Compositional Legibility	Conditions Of Orienting Perception		Man
<i>The Own Codes Of A Form</i> <i>Signalling Codes</i> <i>Mass Transmission Codes</i> <i>Other Codes Incorporated In Culture</i>	Composition Of Form As A Whole And Partial Compositions Of An Urban Form	Rules Of Composition	Reception Of The Composition Of Volumes	All Conditions Of Physiological, Psychological, Spiritual, Sociological, Semiological And Cultural Nature
	Open Public Spaces As A System Of Orientation	Relations Of The Zones Around Man And An Entire Form	Reception Of The Zone Around Man	
	Perceptual Zones	Rules Of The Reception Of Meanings	Reception Of Meanings	
	Meanings According To The Own Codes Of A Form			
Composition Of Codes		Composition Of An Urban Form In Accordance With The Requirements Of The Orientation Of Balance		

Figure 3. The composition of an urban form in accordance with the requirements of the orientation of balance (by the author) (Kantarek, 2008) p. 130, (Kantarek, 2013).

According to the definition given by Lynch in his book of 1953 (K. Lynch, *Notes on City Satisfactions* (1953), [in:] (Lynch, 1991, pp.135-153): orientation is "... the sense of clear relation of the observer with the city and its parts, and with the larger world around it. In the simplest sense it may be taken as knowing where one is at any time, and how to reach any other part." (p. 135). Although the concept is restricted to direct spatial relations and being aware of them, it is part of a more general definitione given above.

However, orientation is treated here as one of the seven areas of City Satisfactions(beside: Warmth and Attachment, Stimulus and Relaxation, Sensual Delight, Interest, Movement, Shopping and Entertainment). This means that it is in no way general in nature. It is one of the elements of satisfaction generated by a good form of a city; it does not determine other activities of a man or a community.²⁴⁶

K. Lynch regards orientation as way-finding, by which he means organization of a body monitoring the environment: "... it now seems unlikely that there is any mystic "instinct" of way-finding. Rather there is a consistent use and organization of definite sensory cues from the external environment. This organization is fundamental to the efficiency and to the very survival of free-moving life."²⁴⁷

And yet it is just the systems of orientation that form the basis for classifying the main elements of the image of the city. "The systems of orientation which have been used vary widely throughout the world, changing from culture to culture, and from landscape to landscape. (...) examples of many of them: the abstract and fixed directional systems, the moving systems, and those that are directed to the person, the home, or the sea. The world may be organized around a set of focal points, or be broken into named regions, or be linked by remembered routes. Varied as these methods are, and inexhaustible as seem to be the potential clues which a man may pick out to differentiate his world, they cast interesting side-lights on the means that we use today to locate ourselves in our own city world. For the most part these examples seem to echo, curiously enough, the formal types of image elements into which we can conveniently divide the city image: path, landmark, edge, node, and district."²⁴⁸

The question about Lynch's concept of orientation comes back while reading his "Good City Form" (Lynch, 1984). It seems to play a marginal part here, too.

Lynch presents the elements that constitute the basis for the spatial form of the city - Vitality, Sense, Fit, Access, Control and two complementary ones

– Efficiency and Justice. They should be regarded as requirements of a good urban environment.

The category defined as *Sense* (Lynch, 1984) pp. 131 – 150 includes: *identity, structure, congruence, transparency, legibility, unfoldingness and significance*.

Depending on the size of the urban system Lynch distinguishes two situations concerning orientation (within *formal structure*): "The next element of sense is formal *structure*, which at the scale of a small place is the sense of how parts are fit together, and in a large settlement is the sense of orientation: knowing where (or when) one is, which implies knowing how other places (or times) are connected to this place. " (Lynch, 1984) p. 134.

The concept of orientation is interpreted differently, depending on the extent of knowledge of the urban environment. Lynch points out that in a small and familiar place our awareness and attention are not engaged since our intuition and habits are sufficient to make use of the place.

In conclusion, the author's approach to orientation in city space presented in the paper differs from K.Lynch's theory. It seems rather to concern the level which Lynch defines as

²⁴⁶ The ways of such orientation thought of as self-location are defined by Lynch (pp. 135-137) as follows: directed lines, sequences, landmarks, spaces or areas, grid system, diffuse ["... compass orientation only, from various effects: streets which run in one or two general directions, though not on a grid (Bologna); large topographic features visible outside the city (Udine, Chicago); sunlight, etc." (p. 137)], topographic and symbolic.

²⁴⁷ (Lynch, 1960) p. 3

²⁴⁸ (Lynch, 1960) pp. 7, 8.

Sense (of settlement): "By the sense of settlement, I mean the clarity with which it can be perceived and identified, and the ease with which its elements can be linked with other events and places in a coherent mental representation of time and space and that representation can be connected with nonspatial concepts and values."²⁴⁹

The wide scope of the concept of orientation in the city space brings to mind the opinion of K.Obuchowski who wrote that " (...) we are taking into account all the levels of orientation – from an instinctive backward movement of a burnt hand to the definition of the meaning of one's own life."²⁵⁰

The presented concept of *The Orientation of Balance* based on the concept of *The Orientation in The Space of The City* as an explication of the relations between man's orientation abilities implemented in the city space makes many things clear but does not provide tools for action. Many urban practices nowadays ensure effective solutions to shape urban space properly in this respect²⁵¹ but many situations are still out of control.

The above remarks were made from the point of view of visual perception and in relation to the anthropogenic environment.

The reality is much richer than that. Perception comprises all the senses and the life of a city is the phenomenon of life of all of us and various personal relations on a myriad of levels.

The problems outlined in the book requires a broader perspective nowadays.²⁵²

First, it concerns looking at perception as a whole – through all the senses. Orientation is formed by various stimuli and received information and although the visual sphere prevails it is to a varying extent complemented or co-created by the other senses.

There remains the question about the ways of perception. Between the associationist and Gestalt perception theories there is a wealth of others (e.g. Reed's theory of pattern recognition, Gibson's theory of features, Marr's computational theory, Gibson's ecological theory) and each one highlights significant elements of the process.

Another important aspect of orientation is the manner in which the knowledge about the possibilities of moving around is gathered consciously and deliberately. This is not only investigation or asking the way but also using modern tools (GPS, the Internet).

Manipulating our attention is an increasingly important question these days. Not only do we live in the world of information overflow but also we are subjected to various scenarios that engage our attention. The scenarios employ more and more sophisticated measures and mainly concern advertising but can also be of a more general nature through promoting a particular lifestyle or simply a way of spending time.

²⁴⁹ (Lynch, 1984) p. 131.

²⁵⁰ (Obuchowski, 1967), p. 104

²⁵¹ In (Kantarek, 2008) pp. 132-154 examples of such solutions have been presented: comprehensive regulations, creation of new key sites for orientation and the redefining of the city space.

²⁵² In 2009 and 2011 surveys on orientation in the space of a city were carried out.

The surveys were carried out in Evora (Kantarek, 2009) (Kantarek, 2012) in 2009 among a group of students and tutors who had come there to attend a two-week workshop. The questionnaire was filled in on the arrival and its purpose was to show the knowledge of the space of the city among the people who had not been to Evora before. At the end of the stay, another questionnaire was filled in to show the knowledge of the city the respondents were already familiar with. An interesting finding was the fact that in the second survey, topographical features of the city were much more appreciated as *Elements of The Structure in Support of Orientation* (even though the respondents had learnt about the specific location of the historical city centre before); another point of interest was the appreciation of the venue (Giraldo Square – the city's main square) in the *Landmarks* category. Both elements were also appreciated in *The Most Important Elements of The Urban Structure* category. In 2011 first year students of the Faculty of Architecture were surveyed (Kantarek, 2011). In answer to the question: "What spaces do you associate with Krakow? Name several." they enumerated sites, regions and specific elements of landscape (edges, nodes, roads, dominants or accents did not count among significant answers) Significant elements listed in answer to the question: "Which elements help good orientation in the space of Stare Miasto" included nodes, accents squares and gates.

All the above questions are concerned with urban form. The reality of the three dimensions of space and time can synthesize other, more elusive dimensions of life.

Nowadays, defending the form of the city is essential. It is one way to defend the dimensions of the reality of our lives against the illusion that we can only live in virtual dimensions and that the fragmenting of the physical space and time is justified and possible. It is neither possible nor does it give grounds for seeking beyond them the earthly basis for the coherence of man as a person²⁵³ and hence of the life of a community.

We are concerned with a conflict, a clash or the situation that requires urban form to be defended.

The concept of codes composition (Fig. 3.) explains a lot – it says that composition in aesthetic terms is part of composition or harmony in a broader sense. Within the codes of the form we deal with a composition of volumes, requirements of open spaces where we move and a scope of meanings. The other codes transfer information (also through their form) which can help or hinder orientation in space.

Can we control the arrangement of space so as to facilitate orientation to the maximum extent? We seem to have reached the level of explaining and ordering notions rather than possessing pragmatic tools.

How can we define the mutual requirements of urban form and life activities going on in its dynamic and changeable contemporary reality to obtain such pragmatic tools? What tools should they be – of monitoring, control, prohibition or injunction?

This is, of course, the sphere of urban space management and there is a number of good practices in this respect. They should be promoted and inspire further regulations.

How shall we fight for the form of the city, its typological clarity and good orientation within it?

Since the city is, by definition, built on consensus, agreement – it is the agreement that is the means. This implies a regulation that is enforced as well as sensitivity to the dynamically changing needs of urban life and the stabilizing force of the built form of the city.

How can we build a kind of the *Map of Orientation in the space of the city* or a visual information system that would be based on the form of the city, on the message concerning the form? I do not mean another kind of coding through signalling codes – road signs or pictograms but a kind of formally legible composition of elements of the form that would facilitate orientation.

Some important areas are listed below: (i) Ordering the elements of the form by the orientation of balance requirements basically means eliminating the excess of signalling elements and mass communication elements. In some zones of the city there are regulations in force (an example is Polish legal formula of Culture Park); (ii) Rearranging the image of the city as viewed from the main access and transit roads (where signalling systems cannot be questioned). This system of roads forms the basic division of the city area into vast urban superblocks. The edges of these superblocks adjacent to the roads are filled in various ways but it is those urban superblocks and the sites from which new panoramic views or vistas can open that determine the orientating quality of communication sequences. It amounts to the requirement of legibility of particular city districts and regions; (iii) The concept of *the city of small towns* which has been popular for many years makes sense when primary residential environment is taken into consideration. Identification with the site on the basis of the space of the flat, house, neighbourhood or elementary educational or shopping facilities (local shop) is insufficient. A possibly complete hierarchy of connections with other districts (more distant neighbourhood, other functions) and the centre is necessary. The relationship between the centre and the outskirts is an important reference point; (iv) It is worth recalling the mechanisms defined by K. Lynch and referring to: (a) building the image of the city (developed along familiar lines of movement, construction of an enclosing outline, by a basic

²⁵³ In philosophical terms it is worth noting the contradiction inherent in our western civilization: individualism which is at its roots leads to the destabilizing of man's identity as a person and negating its individualization.

repeating pattern, as a set of familiar regions or developed from a familiar kernel²⁵⁴) as well as (b) related to stages of awareness, how parts are arranged in a structure (unrelated elements, flexible relations of parts to one element, flexible structure, related elements, rigid structure and multiplied connections²⁵⁵); (v) A particular role in the creation of the image of the city is played by powerful forms. Jacek Gyurkovich w (Gyurkovich, 1999) writes that a powerful form : „... focuses the observer's whole attention distracting it from other elements which participate in the creation of spaces and reducing their role to that of a background”²⁵⁶. The most important feature of the powerful form, beside attracting attention, is its emotional effect through distinctness (shaping, inner organization, scale).

The author treats the powerful form as an extension of J. Żórawski's concept of the strong form. In brief, J. Żórawski's theory²⁵⁷ is concerned with the perception and construction of the architectural form and is based on Gestalt psychology. Żórawski distinguishes two categories of form in relation to its environment: a strong form (when it dominates the surroundings) or a weak form (when it does not assume a dominant role). In terms of internal relations, he speaks of coherent forms (whose composition is fixed and unalterable) and free forms (where the relationship between the elements can change with no consequences for the whole) The concept of the powerful form is an extension of the strong form concept to include urban relations.

I imagine the *Map of Orientation in the space of a city* to be an individual document for each city that would oblige the city authorities to include its guidelines in the urban planning system and which would also form the basis for creating the image, or images of the city for the purpose of the Internet or advertising since orientation key points can differ in relation to a place or person. The top-down formula should be supplemented and enriched with local initiatives to create images of local communities. The map together with its documentation could be thought as an element of the *Open Book of Urban Form of The City*.

In the case of Krakow it would be advisable to include the *Map of Orientation in the space of the city of Krakow* in the *Study of the Conditions and Directions of the Spatial Management of Krakow* and to maintain its character of a dynamic monitoring-based document.

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²⁵⁴ (Lynch, 1966) pp. 86, 87

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Urban form and social output

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Abstract. *Assuming that the ultimate purpose of the city is to provide support to human interaction and that opportunities to social interaction are unevenly distributed across the urban fabric, this paper reports some attempts to describe such a distribution, as well as to infer the role of urban form in it. In order to do that, it is proposed, firstly, a method to describe urban form from its smallest components up to the different urban fabric patches, to the entire spatial system, and second, a model to represent social interaction as a process associated to the urban morphology. Both the spatial description and the analytical model are discussed through the examination of some results, obtained through simulation.*

Key Words: urban morphology, spatial analysis, urban performance indicators

Introduction

Cities are places for social interaction (Batty, 2012, Bettencourt 2013, Jacobs, 1969). Social interaction occurs across cities in many different ways; it can vary according to group size, purpose, intensity, frequency, group composition and so on. It also can take place in different locations and settings, from the privacy of residential rooms to many collective gathering buildings to the open public space. All of them, regardless scale, type, location, etc., contribute to the social output of a city. In this sense, social output encompasses the so-called productive activities, as expected, as well as many others that invest in family, friendship, love, culture and civilization. All of them flourish in the city, some in concentrated ways, others scattered around, some daily, some occasionally, and depend upon the city to carry on.

The most recent attempt to capture such a process in a unified urban model and to describe it quantitatively has been by Bettencourt (2013); his model builds upon the notion that each individual has an actual interaction area, defined by the average distance he or she can cover in a day. The more mobile an individual is, the larger is its interaction, and consequently its social output. But area is not the only variable for interaction definition, as the presence of other people is essential, so Bettencourt considers an average density across the entire urban area, so that eventual more disperse areas will be compensated by others more dense. Mobility is, of course, defined by urban infrastructure, which puts urban actual form as crucial to social interaction and output.

Urban form is uneven and hierarchical, it is also occupied by so many different activities which contribute to its unevenness and hierarchy, some of those activities add to the basic urban form differentiation, some others can create their own differentiation. Moreover, mobility can vary widely within the urban fabric, all those evidences suggest that, despite the average described by Bettencourt's model being accurate, not only relevant differences in social interaction can be found, but also urban spaces can perform better or worse, according to their morphologic characteristics. The possibility of achieving a more morphologic based representation of social interaction distribution suggests that not only our understanding of the phenomenon would improve but our ability to act upon key components of city spatial structure, aiming at performance improvement, could be better.

Theory, model definition

Assuming that the urban fabric is an aggregate of many components, it is relevant to identify what they are, and how they are put together, from smallest urban bits. Figure 1 represents that, suggesting that the urban atom would have two types of matter particles – built forms BF and open public space PS, directly connected (A column in the figure), as well as other non-matter particles, called interaction-machines IP (B column). These are force-carrier particles of various kinds, associated to BFs, all sorts of institutions (families, shops, service providers, industries, ...), promoting specific interactions; associated to public spaces, other group of more ill-defined institutions, promoting less controlled interactions (C column).

In C, the figure suggests different types of social interactions, such as SI1, which could be strictly residential, SI3 & SI4 as two different types housed in a same built form, and SI2 as a more complex social interaction process involving the same people of SI1, 3 and 4, as well as other operators passing through the open public spaces. In this sense, the urban atom would entertain a same group of people (residents and eventual service users) in different types of social interactions, some more defined and controlled, indoors, and some less defined and controlled, outdoors. It becomes clear that some social interactions have trivial descriptions (residential, both isolated and grouped in condominiums), some are a matter of more careful consideration, as they do not have a previously known population (shops, offices, schools, hospitals), while public space is a mixture of local and passing by population.

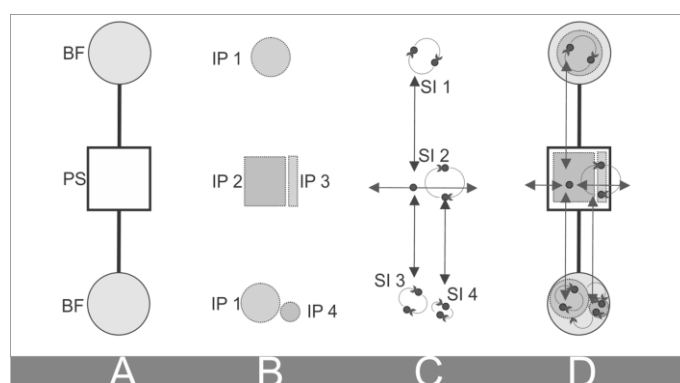


Figure 1. An illustration of a urban atom: A: matter-particles built forms BF and open public space PS; B: interaction machines IP of different types, each one corresponding to an social institution; C: social interaction associated to each matter-particle (red cycle arrows) and accumulation in the public space (blue arrows).

Urban molecules of different sizes and shapes are easily derived from the atom, such as suggested in figure 2A. In the example, other particles are included, as open collective (although not public) spaces, such as front gardens, halls and other built spaces available to more than one interaction promoter IP. Molecules are, of course, joint together, forming the actual fabric, as in 2B, and the whole city.

Now, considering that every instance of spatial configuration is likely to house some kind of social interaction, the next step is to provide formal description to them. Social interaction is, of course, a function of the number of individuals present at a certain place, interaction with each other. The least a social interaction requires is two people, whereas social interaction could involve pairs, as well as any other amount of individuals. The larger the group, the higher the social interaction, in geometrical progression. Here social interaction will be taken by its root variable, population size P , relativized by a parameter K , which measures the specific social interaction's relevance (intensity, frequency, proportion to the whole social output). Social interaction is not cost-free, however, as individuals usually

travel, sometimes striving to get to distant places, to put themselves in the right place at the right time.

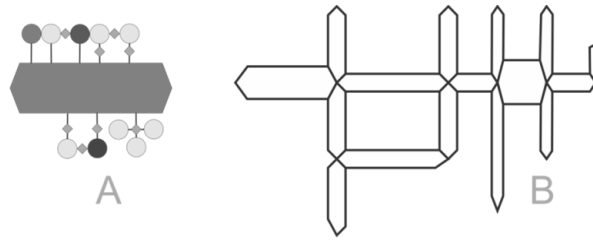


Figure 2. Aggregates of urban atoms; in A a urban ‘molecule’ made out of built forms BF (○○○○), collective open spaces (◇) and public open space (diamond); in B a second order aggregation of many interconnected molecules.

$$SI = f(P, K, (-C)) \quad (1)$$

Starting from the smallest particle of the urban atom, the residential BF’s social interaction population is the respective family, its relevance is probably high and the cost is nil, as the individuals involved in the actual social interaction are already there. In the equation 2, the expression $(P^I * C^i)$ implies that cost is per capita, meaning that in order to have interaction, C^i should be <1 . For residential BFs, C^i is zero. It is noteworthy that the opposite situation, in which cost is maximized, interaction could be null, or even negative. In this sense, interaction costs can prevent interaction, creating a sort of interaction passive. The possible values of K will be addressed later on.

$$SI(BF_{res}^i) = [P^I - (P^I * C^i)] * K^{resBF} \quad (2)$$

While residential BF’s social interaction is trivial, non-residential ones are more complex, due to the fact that their actual population is not declared, as in residences, but made out of individuals that travel from many other places, in order to interact at the given BF. One possible way to proceed with its calculation is to consider all interaction promoters, that is, service providers of one type competing for all potential consumers; in this situation, every individual qualified as potential consumer is likely to choose the place of interaction based on least distance, submitted to size and complexity of the offered interaction places. For every service type, the whole pool of potential consumers will be split up among all places of provision of that service, in different proportions, according to spatial distribution of population and size/complexity of places of provision. A measure of that configuration, called Convergence, is in Krafta (1996), and for the purpose of this work, could be taken as a measure of attractiveness of every non-residential BF, helping to define each BF potential population.

Despite being attracted to a specific IP, individual will necessarily be located at different distances from it, meaning that each individual will bear a cost to travel from home to the considered IP; such a cost can be appropriated through a travel time, taken as the sum of each shortest path’s spaces’ time, measured by the quickest mean of transport, at worst traffic situation. Normalized, so that the shortest travel time being zero (the case of an individual living in the same space as the IP) and the longest being one (the most faraway place of living) each individual’s actual travel time can be taken as its probability to carry out the travel&interaction; the chance of the individual living in the same space as the IP being one hundred per cent, whereas the most distant place being zero. In this sense, for each pair of spaces in which A is where the non-residential BF is located and B is where the residence of a potential consumer is located, the equation 2 applies, provided that population in B is resized by the convergence value of A, and the cost is the sum of travel times of all spaces

linking A to B through the shortest path. The overall social interaction in the considered non-residential BF will be the sum of all pairs A-n provided by the system. K is very high.

$$SI(BF_{IPn}^i) = \sum_i^j [(P^j * Conv_i) - (P^j * Conv_i * C^{ij})] * K^{IPn} \quad (3)$$

$$C^{ij} = \sum_j^p t^{jp} \quad (4)$$

In the equation 3, $Conv^{IPn}$ (convergence) varies between 0-1, the same occurring to C^i , so that the BF population will always be a part of total potential consumers of IPn , and the total cost will be at most equal to total population. It is notable that total population of all IPs is necessarily bigger than the total population of the city, as most individuals will be potential consumers of more than one service, so that the whole numbers need a further normalization based on the actual city population.

Collective spaces are usually placed in between BFs, the private realm, and the open public space. Social interaction in there is performed by the same people living or using the BFs attached to the referred CS. Reaching the CS from each BF involves a cost which is not measured only by the corresponding (usually very small) elapsed travel time, but also the overcoming of an institutional barrier, a locked door of sorts. K is low.

$$SI(CS_{IPn}^i) = \sum_i^j [P^j - (P^j * C^{ij})] * K^{IPn} \quad (5)$$

Open public spaces PS's social interaction has two basic components: locally it works just like a collective space, in which the population is the sum of all residents and other people attracted to it by the interaction machines. Added to it there is the moving population, that is, people passing through. Strong references on co-presence, that is, the relationship between local people and individuals traveling across city spaces are in Hillier and Hanson (1984). Estimation of flows, based on morphology is in Krafta (1994), a measure of centrality adapted from Freeman's betweenness centrality.

To each person present at a public space corresponds a travel cost. Residents will have to cross one or two institutional borders, service users are already there, their travel cost already accounted for. Following the method previously adopted, it can be assumed that travel cost will range between 0 and 1, meaning that people moving from the most faraway place in the system will have cost 1, which in practice make its interaction null. Social interaction in public spaces is, therefore, represented by the following equation 6.

$$SI(PS^i) = \in \left[[P(BF_{res}^i) - C_{res}] + [P(BF_{IPn}^i) - C_{IPn}] + [P(flow) - C_{flow}] \right] * K^{PS} \quad (6)$$

Territorial domain

The method explained above suggests that travel time, or cost, is always maxim at the most faraway location, which is obvious, and equals 1, meaning that the whole system's population is likely to be included in the global interaction process, in the sense that even the most remote residential location will have a travel cost < 1 and therefore an interaction value >1. More realistic and interesting is to consider that this condition does not always hold, and thresholds should be considered, such as Marchetti's (1994) invariant – half an hour, or the observed city's average travel time. With thresholds on, every BF holding a non-residential Interaction promoter IP will have a territorial domain, constituted by all reachable spaces

around it within the time limit. In this case, the normalized travel time value 1 won't be at the system's border, but on the threshold, and all spaces outside the territorial domain will be excluded from the considered BF interaction. This could be considered an interaction deficit, to be compared to the actual social interaction, resulting in an indicator of performance M^* .

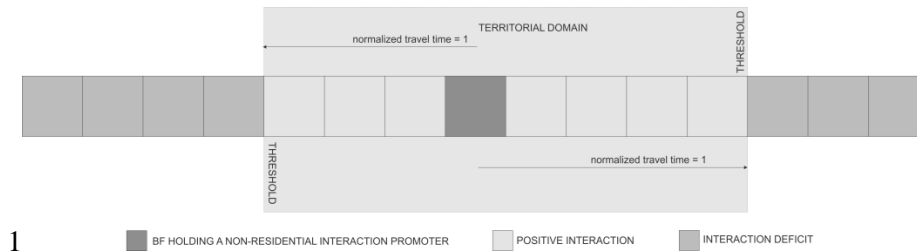


Figure. 3. The notion of territorial domain in a one-dimensional city, defining the part of the system holding actual interaction in a particular space, as well as the part of the system excluded from it, therefore bearing a interaction deficit. The difference between positive interaction (yellow zone) and interaction potential unfulfilled (pink zone) is an indicator of performance M^* .

Establishing a threshold is not trivial, as both travel mode and urban form are involved. In general terms, urban form can be described through length, capacity and traffic density. The latter can easily be estimated by one of many accessibility measures available, working as a proxy for inverse speed and parking opportunity. However, such a description suits only one transportation mode, the private car, or public, surface, transport systems that use ordinary roads. For pedestrian travel mode, capacity is not relevant and speed is more uniform. Multi-modal travels are even more complex.

Two territorial domains seem to be relevant: the first related to purpose travels ending at the space being considered, and travels using that space as a link to elsewhere. For the latter, only pedestrian travel will count, as people passing through in cars or buses won't interact; for the former, all means should be considered. Territorial domain for pedestrians can be established once a distance/time limit is defined, using a simple accessibility algorithm. TD for people traveling to the considered space has two options: point-to-point car travel, and pedestrian-public transport-pedestrian one, provided that public transport runs on segregated lanes and are, therefore, free from the ordinary traffic congestion. In these cases, it will be necessary to proceed with time calculation, from length, capacity and traffic density, then to apply an algorithm which builds up a spanning tree from the space in question up to the threshold limit, calculating for every space visited, a population/cost factor.

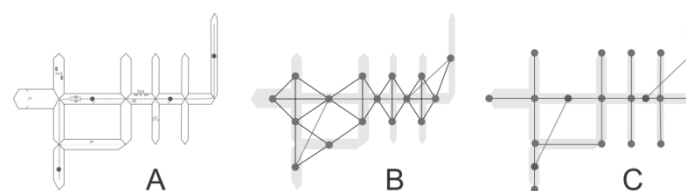


Figure. 4. Spatial system (A) and graph representation of alternative space unit description: (B) space is described as street segments, in (C) corners and street ends.

Space description is relevant here, figure 4 shows an idealized spatial system (A) and two graph-representations, taking different space descriptions; the graph (B) considers space units as street segments, whereas (C) takes space units as corners and street ends. It is easy to realize that B representation is more intuitive and probably handier for population and activity appropriation; on the other hand, C is better for distance/time description. Figure 4

shows also a possible public transport route (red dots and lines), running on segregated lane, so that its speed is different from the ordinary traffic.

Up to this point, it has been described all interaction that a space unit can generate by itself, both from its own population and from the visitors it can attract. However, nearby space units, particularly those bearing commercial activities, are known to benefit from that propinquity, case in which people visiting one is encouraged to visit, and therefore, interact in the others as well. To this extent, space units can work together, as a macro molecule (MM). Territorial domain is clearly of pedestrians, spatially defined by adjacency and increasing cost varying with distance. Equation 7 captures this interaction

$$SI(MM_{IPn}^i) = \in [P(PS_{IPn}^j) - C_{ij}] + * K^{IPn} \quad (7)$$

Finally, the K parameter should be addressed; it has been valued as ‘high’, ‘low’, ‘very low’, etc., suggesting that each type of interaction adds differently to the overall social output of a city and therefore K can be estimated. Indeed, it is easily seen that some interactions involve large number of people, compared to others that take just a couple of it or little more, some are very frequent, compared to others that occurs rarely, some are very well programmed and controlled, compared to others that are next to random. All of them are socially required and productive, each one in its own way, probably even those which look destructive. One possible way forward is to consider the relative density of social interaction over the population involved. On the one hand there is the residential instance, in which few people develop and maintain constant interaction of each family member with every other; on the other hand there is the public space, where a large population develop a few, eventual interaction. In the former, it takes few people to get high level of interaction, in the latter it takes large population to get low lever of interaction.

Experimentation

In order to provide some evidences on the effectiveness of the proposed models, some controlled experiments were carried out. The city has been reduced to a one-dimensional string of sequentially connected cells, in which one half side is removed, as showed in figure 5. In this way, the cell on the far right is the centre. This simplified city is supposed to grow, from its most initial 2-cell embryo, up to 21 cells; in all its stages, the cells are filled with an Alonso style (1964) activity and population distribution, although at some point a secondary service centre is introduced, as explained later on. Total population in each stage is always 3X the number of residential cells.

Considering that built form constitution inside each cell is not specified (assumed as a single built form), residential interaction computation is trivial – equals the population of each cell, the same occurring with collective space’s interaction (non-existent), and public space (again, interaction there equals the residence’s one). A little more interesting is to observe how interaction in the centre occurs. Having no residential population of its own, the red cell attracts service users from all existing residential cells, who have to travel along the string. The simplified city implies that all cells are alike, meaning that infrastructure (roads) is equal; in this way, it is expected that traffic fluidity is maxim at the border and minimal at the centre (more congested). Traffic differential conditions at each cell have been taken as the inverse of accessibility, that is, at the centre, where accessibility is higher, traffic conditions is worse and vice versa. Length is equal for every cells, what makes the inverse of accessibility the only variable defining the travel cost from each residential cell to the CBD; this value has been initially normalized from zero (at the centre) up to one (at the border), meaning that all population is within the centre’s range, although the cost of each one’s actual interaction varies with distance. The computation of each residential cell’s contribution to population at the centre is then made as a probability of each resident to take the trip; the

ones living at the cell next to the centre is near 100%, the ones living at the most faraway is near 0%.

Table 1 shows some results from a full 21 cell system, considered in three different ways: *a*) having a evenly distributed population (3 residents in each cell) and no traffic fluidity influence (only plain distance), *b*) population distributed according to Alonso's general curve and no traffic fluidity influence, and *c*) same as *b*, with traffic effect taken into account. Situation *b* produces the highest interaction output, whereas situation *c* the lowest. This is quite interesting, for it, first, do suggest why Alonso's monocentric, non-linear population distribution's city is so right, as it seems to be the most efficient interaction generating spatial configuration. It also suggests that it only works when the undermining effects of congestion is minimized, otherwise it loses its density advantages. Table 1 also suggests that interaction taking place at the centre involves only a portion of the total population, varying from 45 to 75%. This however does not mean that 25 to 55% of it is excluded from it, but that not everybody will be interacting at a given time, although everyone will interact at some time.

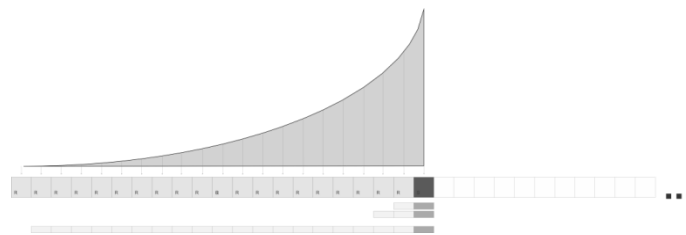


Figure. 5. A One-dimensional half city made out of a string of 21 sequentially connected cells. It is supposed to grow from a 2-cells embryo up to 21 cells. Population distribution is as Alonso's general city form curve. Jobs and services are at the centre.

Table 1. Results for a 21 cell system, considered in three different situations: A) having a evenly distributed population and not suffering the effect of traffic congestion, B) having a non-linear distribution of population and not affected by traffic congestion, and C) same as *b*, with traffic effects.

	A	B	C
Total population	60	60	60
Total interaction	28,5	45	27
% pop/interact	47,5	75	45

As a second step, the one-dimensional city has been examined while it grows from the 2-cell seed. It has been done through the evolution of the M^* interaction performance indicator. M^* is defined as the difference between actual produced interaction at a nominated space and the interaction deficit at the same place. Interaction deficit is understood as the unperformed interaction. In this sequence of experiments, a threshold point has been adopted. Threshold point defines the territorial domain for the considered centre, it is assumed that, either for preference or travel restrictions, interaction will only be possible for people located within the territorial domain, leaving anybody outside it excluded from it. Inverse accessibility, as well as travel times are calculated so that cost at the threshold will be 1, resulting in a 0% interaction probability for those located just out of it. In the case of this experiment, threshold point was arbitrarily established, although in more realistic situations, it would replicate average travel times effectively experienced in a particular city, or the invariant travel time suggested by Marchetti.

Figure 6 displays evolution of actual interaction (blue), interaction deficit (green) and M^* (red) at the centre of a system growing from a 2-cell seed (position 2 in the X axe) up to 7 cells, considering Alonso population distribution, homogeneous infrastructure, and traffic effects represented by the inverse of accessibility. It is seen that M^* grows with actual

interaction growth from the beginning, but soon enough it falls down, crossing the X very quickly. This performance is directly related to provision of mobility infrastructure, in the sense that considering it evenly distributed, the system would have less than required road capacity in the central cells (and certainly more than required at the border). The green zone in the graph represents the interval in which CBD's interaction output is positive, red zone is where interaction deficit exceeds the actual one.

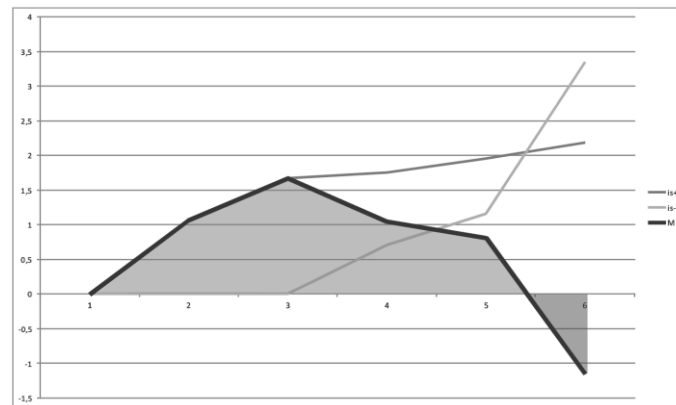


Figure 6. Performance indicators for the central space of a system growing from a 2-cell seed. M red curve suggests that social interaction at the centre is crucially dependent upon mobility infrastructure, as congestion effect at the most central cells cause the M indicator to fall sharply, becoming negative.

Figure 7 displays the evolution of the same system, in which a secondary service provision location is considered at the precise cell that causes the M indicator to become negative. The introduction of a new service location introduces a competition between the two centres for potential users, which is estimated by the measure of convergence. In this particular case, convergence of the principal service centre, which had been 1, falls to 0.76 (implying that the new one starts off with 0.24 convergence). It is seen that the introduction of this new service location not only stops the M fall, but makes it to perform positively again, near the level previously experienced (but still a bit lower). The graph captures this time the effect of spatial configuration on the social interaction, as M performance varies with changes in service locations and consequently with relative distances and mobility infrastructure provision.

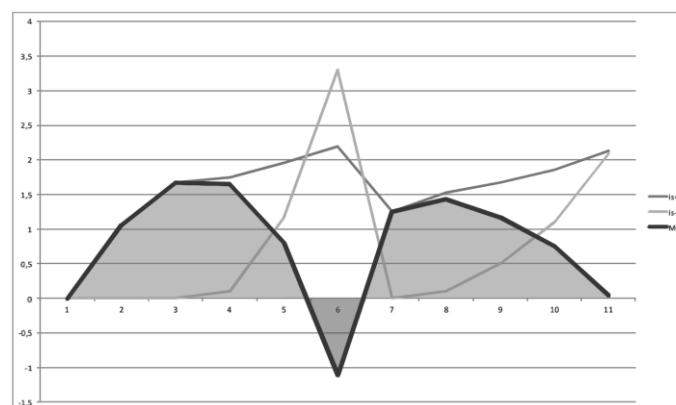


Figure 7. Performance indicators for the central space of a system growing from a 2-cell seed, with two service centres. M red curve suggests that social interaction at the centre is fairly dependent upon spatial configuration, as accretion of a new service location makes it return to positive performance.

A third experiment with the same system has been carried out, this time simulating the effect of a transport system. To do this, in the last (eleventh one) step of simulation, it was assumed that, from the border, every other cell of the string were interconnected without the traffic effect (so those direct connections would be either underground or exclusive bus lanes). The display of indicators performances are in the figure 8. It is clearly noticeable the sharp upward tendency introduced in the M evolution by this, confirming the strict dependence of social interaction on mobility services. It is, then, expected that the introduction of transport in earlier stages of the system's growth would significantly change both the road infrastructure and spatial configuration's dependence of M , probably retarding and smoothing its decay.

Finally, figure 9 displays, on the left side, M for all system's cells, and on the right the overall M performance. On the left, red and purple thick lines catch the two service centres, whereas the others are residential. On the right side, blue line describes the overall system's M performance without transport, and the red one, a bit displaced, shows how the transport would make things change. The first graph displays two different types of social interaction, the economically productive ones, in spaces where interaction is more intense, and the family-related ones, in residential spaces. Other types have been omitted, in spite of being real and operational. The right-side graph, summing up all the system's social interaction, combines different kinds of interaction and, in this way, should take measures to weight adequately each one. This issue has not been approached here, so that the graph is just a demonstration, focused more on the comparison of performances with and without taking transport into consideration.

The simulation described above does not include interaction in the streets, in order to do that another set of calculations would be required, according the proposed model. Nevertheless, in this simple spatial configuration, it is quite predictable (increasing quantity of people in the streets from the border to the centre) and it would not change the tendencies previously described. Further levels of spatial aggregation are also left untouched; if unfolded, cell aggregation could reveal instances of social interaction potentially able to change the M overall profile, but still reinforcing the role of central spaces

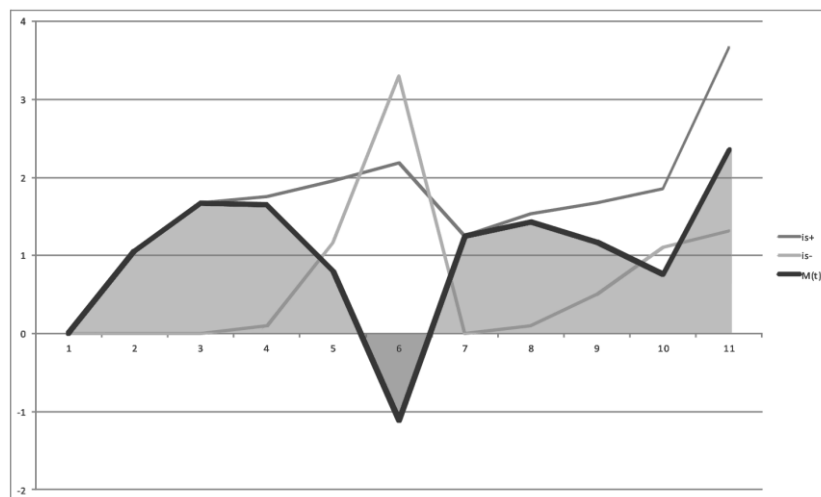


Figure 8. Performance indicators for the central space of a system growing from a 2-cell seed, with two service centres and the introduction of a transport system in the last step of the simulation. M red curve suggests that social interaction at the centre is deeply dependent upon transportation, as accretion of a traffic-free transport line makes it shoot upwards.

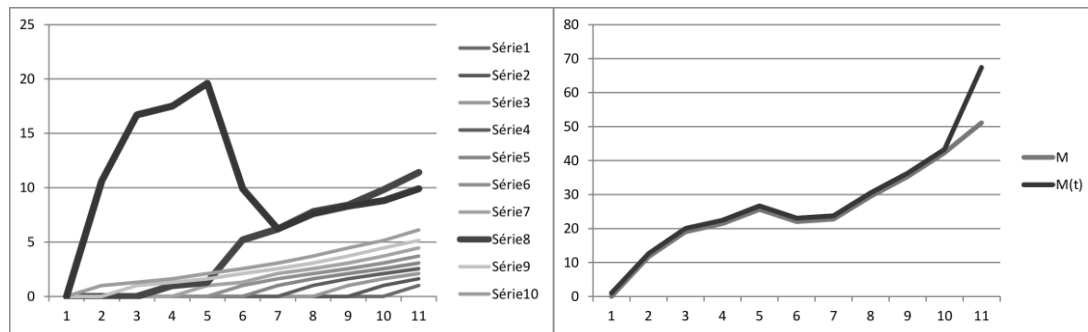


Figure. 9. Left, M curves for all cells of the system, along evolution from 2 to 21 cells; right, M overall performance with and without transport provision.

Discussion

There are two aspects of urban dynamics addressed in this work, the intertwining relationship among spatial configuration, mobility infrastructure and transportation, and the performance of spaces and parts of the city in the social interaction promotion. The model, as well as the few experiments reported in this paper, has suggested a meaningful relationship among those elements of the city, being *urban form at the very heart of it*. Indeed, both spatial configuration and mobility infrastructure are the urban form's actual middle name, they are intrinsic to urban form; even transport systems are themselves conditioned by urban form. The reported simulation has taken urban form at its very basics, although it has allowed the necessary transparency, and so, allowed for a more controlled experimentation. It has provided early evidence on the pros and cons of the monocentric city and accumulated density, but most important, it has revealed an intricate interplay of scales within the urban system. From the most private bit of built form to the entire urban system, the city offers a variety of opportunities for social interaction, where the same individuals do perform different kinds of social interactions, within different groups. In this way, the model could have been revealing a sort of scaling functionality in the urban form, not only in its day-to-day operation but also in its long term fine tuning involving changes in location, linkage, and space provision.

The M indicator deserves a few words too; taking a relationship between effective social interaction and not fulfilled one, it could be indicating a sustainability dimension, in the sense that spaces displaying bad M scores would not be coping with its most fundamental purpose. More revealing, however, seems to be the global M, taken from the entire system, which more properly indicates the city's fulfilment of its fundamental endeavour. Nevertheless, the ability to determine each space's particular performance could be precious for planning and design purposes.

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Mapping and typo-morphological inferences in low-lying coastal Tianjin

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Abstract. Nowadays, a large number of Chinese towns and villages are undergoing an unprecedented transformation. The redevelopment normally favours a one-off urban design method and replaces the traditional fabrics with identical new faces. Although typo-morphological analysis is widely used to inform the characteristics of urban structures, not many studies focus on the role of environmental elements in pattern formation and infer the underlying forces of the structuring in coastal low-lying areas. In this paper, we first mapped 27 coastal villages and towns in Tianjin and extracted some key elements such as street networks, homesteads and three-section courtyard houses. We inferred the driving forces for the origins, expansions and transformations by using the historical and current satellite imagery along with water-related toponyms. We then classified the built environment of the villages into a three dimensional, typo-morphological matrix, and used 'complexity' to categorise the compositions formed by the elements across the three classes. Our approach, which is certainly not tied to the studies of villages, is obviously applicable to any other informal settlements in urban areas. Except for some impossible compositions in the matrix, the rest would offer a template for urban design and new forms generation.

Key Words: typo-morphology, mapping, toponymy, complexity, coastal lowland

Introduction

Although typo-morphological analysis is widely used to inform the characteristics of urban structures, not many studies focus on the role of environmental elements in low-lying coastal areas. Renowned for being lowland as the Netherlands is, the hydrological foundation for urbanism has not been rediscovered until recently (Hooimeijer et al., 2005; Hooimeijer and Geldof, 2007; Hooimeijer, 2011) and moreover, few studies have applied typo-morphology. Hooimeijer et al. commenced to investigate the transformation of Dutch cities with water and water infrastructures a decade ago, where the taxonomy of water towns has been established. Based on the water features and hydraulic infrastructures where a town is adjacent to, located in or situated on, the Dutch water towns are categorised into coastal towns, dune towns, sand ridge towns, river towns, dyke towns, dam towns, etc. According to the topography in which a town is located, more categories include polder towns, peat polder towns, geest towns, mound towns, brucht towns, etc. Hooimeijer summarized the structure characteristics or interrelations of the water, road networks and buildings for most water town types. The classification provides valuable insights for profiling the relationship between water features and urban forms. Nonetheless, citing an instance for each class is limited to performing typo-morphological analysis at the plot scale.

The use of typo-morphology has a long tradition in analysis of urban transformation. A few restrictions limit its application to the non-urban areas: firstly, the analysis is laborious and relatively subjective; secondly, the method is strongly context-dependent and hardly applicable to the homogenous fabrics of new developments or data sparse areas (e.g. informal developments); thirdly, the classic analysis focuses more on the built-form than environmental attributes. Apart from some continued applications to the analysis and evaluation of urban environments (Osmond, 2010; Wang, et al, 2013), there is an increasing interest in applying typo-morphology to urban design and planning (Gil, et al., 2012). Marshall and Gong (2009) developed a concept framework for the specification of a pattern

typology that could be used for either understanding an existing pattern or specifying a future one. A more fashionable method is to use pattern recognition and data mining to support information exploration, analysis and clustering. The basic idea of this method is to decompose the objects into geometric entities or morphological constitutions, which can then be defined by a set of measurable attributes. These geometries generate combinations, i.e. morphotypes, and produce accumulated attributes when combined, which can be classified into homogeneous groups by appropriate algorithms. Computer has advantages in dealing with laborious work to develop a consistent classification, distinguishing typological regularities and further, may create new geometric features to facilitate future design works (Serra, et al., 2012; Gil, et al., 2012; Chaszar, et al., 2013). In this paper, we will study the relationship between the hydro-driven forces and built-forms in the peri-urban and rural areas in Tianjin by using maps, remote sensing images, and water-related toponyms. Characterized by the one-storey, three-section courtyard houses built on homesteads, settlements in the non-urban areas are organised by the ad hoc 'self-regulations'. Homesteads behave as the Conzenian plots (Conzen, 1960) and act as an 'engine' of the urban structuring. Therefore, we will adopt Conzenian approach to define the corresponding complexes of plan elements.

Toponymic typologies of low-lying settlements

Ancient toponyms can contribute to studies on the origin and evolution of settlements, and water-related toponyms can help reveal settlement relationships to water during early phases of occupation. If the name of a settlement contains a water-related character, this settlement likely originated along or close to a water body. Nearly all of the major water-related characters can be identified in the names of over 5,000 currently used administrative division names in Tianjin. Such characters include "sea (hai, 海)" and "ocean (yang, 洋)", which represent water bodies that cover broad surfaces; "river (jiang, 江; he, 河)", "canal (qu, 渠)", "ditch (gou, 沟)" and "flow (liu, 流)", which represent linear water bodies; and "lake (hu, 湖; po, 泊)", "pond (tang, 塘)", "shallow lake (dian, 淀)" and "pool (ze, 泽; chi, 池)", which represent planar water-bodies. In addition to these easily recognisable water-related characters, geographical names in Tianjin also describe river terrain and topographies, providing geographic information on the origins of settlements in connection to water bodies. Many of these names do not possess water-related characters or may have unique meanings that differ from conventional understandings. According to studies by Zhou (2012) and Tan (2005), a geographical name containing a "circle (quan, 圈)" denotes an area that was once positioned along a meander bend, and a geographical name containing a "mouth or head (kou, 口; zui, 嘴; or tou, 头)" denotes an area that may have been located along a confluence or on the intersection of waterways. Certain geographical names may even provide information on the topographical characteristics of a settlement. For example, "heap (tuo, 坨)", "platform (tai, 台)" and "Gu (gu, 沽)" translate to "mound", "high ground" and "central highland in water", respectively. Village names containing the characters for "dyke (di, 堤)", "dam (ba, 坝)", etc. likely denote a settlement was built along a dyke or on a dam that would protect against flooding. Geographical names containing the characters for "islet (ting, 汀)", "beach (tan, 滩)" and "mattress (fa, 垡)" indicate areas located on flat, waterfront terrain, although there are slight differences between these terms. "Islet (ting, 汀)" refers to a small flat waterfront area, "beach (tan, 滩)" refers to a large depositional area that becomes exposed during the dry season, and "mattress (fa, 垡)" refers to land that is reclaimed by an army after the sedimentation of an older river. Geographical names containing the characters for "pit (wo, 窝)" and "depression (wa, 洼)" may refer to the villages that were once located in low-lying swampland. Water-related geographical names can thus provide additional information when topographic data are limited.

The identification of spatial features

We selected the sub-basin of Hai River as the study area. It locates in a coastal alluvial plain, surrounded by the Yongding New River, Waihuan River, Ziya River, Duliu River Diversion and the Bohai Sea (Figure 1a). It is characterised by dense water systems with interlaced rivers, the functions of which include flood discharge, transportation, drainage, sewerage and water supply for agricultural production.

Methods of visual comparison and element mapping using both historical and recent satellite images were applied to explore the influence of environments on village siting and expansion. Based on the principle of well-preserved village form, which refers to villages that do not combine with other villages and that retain the traditional courtyard living structure, 25 villages and two towns were selected as the objects of the study (Figure 1b). These objects cover the Xiqing, Jinnan and Binhai New Regions, which are located in the southern section of the study area and are especially concentrated in the southwest area of central Tianjin. According to the toponyms, nearly half of these villages may have a close relationship with water. For example, the character "tai, 台" in Xueweilai (薛卫台) Village and Chentaizi (陈台子) Village, the character "gu, 沽" in Gegu (葛沽) Town and Xinigu (西泥沽) Village and the character "tuo, 坨" in Xilantuo (西兰坨) Village all refer to waterfront highlands; the character "kou, 口" in Nanlibakou (南里八口) Village refers to an intersection of waterways; the character "wo, 窝" in Zhangjiawo (张家窝) Town refers to a depression; and the character "shuigao, 水高" in Shuigaozhuang (水高庄) Village directly refers a high water level. The majority of the other villages were named using a "surname + Zhuang" structure. The main sources of data used include a digital 1:10000 line topographic map, Google Earth satellite images (hereafter referred to as GE images) and historical satellite images collected through the U.S. CORONA program (hereafter referred to as CORONA images). The digital line topographic map was prepared in 2002. The GE images were captured from 2000 to 2014. Because many villages in the study area were demolished over the past five years and the quality of the 2004 GE images is relatively high, 2004 GE images serve as the primary source of element extraction. The CORONA images primarily cover the left oblique section of the study area and provide relative high quality data for 1967 and 1970. Although they show the approximate boundaries of built areas and farmland textures, it was in some cases difficult to distinguish linear water bodies from roads and ponds from fields/grass/wasteland.

Mapping of the first decade of 21 century village morphology was conducted for all of the research objects. Using water bodies and farmland as the geographical environmental factors and streets and homesteads as the interactive artificial construction factors, elements related to village morphology, including natural and artificial water bodies, street networks and homesteads, were extracted. Most natural water bodies (rivers, streams, depressions, ponds, etc.) were extracted from the 1:10000 line topographic map, which was compared to the GE images. When necessary, minor manual adjustments to the comparative results were carried out. The extraction process for the street network was more complex than that of the water bodies, and we extracted streets of three levels, including crossing roads, main streets and lanes. It is inappropriate to classify street networks solely according to absolute road width. Thus, using the GE images as the control, the streets were classified according to their functions and relative widths in addition to other characteristics. A crossing road generally refers a road that crosses the core area of a village and that connects to other regions; the main street is a street that encloses a block following a homogeneous pattern; and a lane is a path that connects individual homesteads. Lanes that have developed spontaneously tend to have a width of only two to three meters and are thus not easily recognisable through the GE images. However, after removing all homesteads from a block, the remaining space is primarily composed of paths to homesteads. These particular street networks were thus not directly extracted in this study. Homestead borders and internal courtyards were extracted

through visual judgments of the GE images as well as through hand-drawing with judgment bases comprising traditional local residential courtyard formats, shading from the boundary walls, the ages of adjacent buildings and so on. Meanwhile, public buildings in the village were extracted.



Figure 1. Location maps: a) Hai river sub-basin in which the villages and towns are located; b) Locations of 25 villages and two towns.

Limited by the photographic range, the CORONA images cover only fourteen out of the 27 research objects. They were used to infer the siting causes and expansion driving forces of village primarily through visual comparisons with GE images.

Inferring the location and structural evolution

We used Corona satellite imagery to infer the siting history of the villages. According to the type of the water body to which a village is adjacent, we divided the villages into five main categories. The first category is composed of villages that are located adjacent to a major water course. Dangcheng Village (当城村) and Shuigaozhuang Village (水高庄村) are located outside the right bank of the Ziya River; Xiniantuo Village (西碾坨嘴村) is located across the Nanyun River and was constructed along the sinuous embankment. Rivers close to Dangcheng Village and Xiniantuo Village follow a north-south orientation, and both of the villages exhibit comb-like structures, with the comb teeth perpendicular to the river. Rivers adjacent to Shuigaozhuang Village follow a southwest-northeast orientation, and this village has a comb-like structure lying perpendicular to the river that follows the northern section of the river for approximately 80 meters. A large tract of land southward was positioned at a 60° angle to the river, with buildings distributed in the south-easterly direction.

The second category includes villages that are located at the junction of a tributary and a larger water course. Beiyang Village (北洋村) is located approximately 1,000 meters from

the point where Weijin River flows into Hai River. Xiniigu Village (西泥沽村) is located along the eastern side of the old channel of the Hai River, which is located 500 meters south of the junction of the old Hai River and the current Hai River. The western boundary of the village is positioned approximately 100 meters away from the old Hai River.

The third category accounts for villages that are located at the intersection of several small waterways. As it was not easy to identify small streams and roads from the CORONA images, we primarily made judgements based on the identification of sinuous morphologies. We therefore speculate that the Nanlibakou Village was once located in a floodplain at the intersection of multiple streams.

The fourth category encompasses villages that are located close to a constructed waterway. The constructed waterway identification from the CORONA images requires considerations of river names (Irrigation River, Diversion River, Drainage channel, etc.), shapes (straight) and related historical information. It is evident that few of the villages studied are located close to a constructed waterway, and the dominant orientation of the villages is north-south with no perpendicular or parallel relationship to constructed waterways.

The fifth category includes villages located close to a pond. It was observed that most villages that are not adjacent to a natural river are positioned next to a pond, and some villages are positioned close to multiple ponds, such as Xiaobianzhuang Village (小卞庄村), Gaojia Village (高家村), Xiaodianzi Village (小甸子村), Shizhuangzi Village (石庄子村), Yuejiakai Village (岳家开村) and Zhoulizhuang Village (周李庄村). For example, the area of Wangzhuangzi Village (王庄子村) is divided into two sections positioned at a distance of approximately 150 meters apart, and each section is located adjacent to a pond. These ponds are typically fairly large, covering up to several thousand square meters. Certain ponds exhibit irregular morphologies, while others show regular morphologies with border ridges.

Due to the relationships of village forms to water bodies in 1967 and 1970, the coastal area in Tianjin is a low-lying area, and the selection of locations for settlement was affected by comprehensive considerations of many factors, including water usage, flood avoidance and proximity to water. Proximity to an open water body represents the most important driving force. As long as flooding can be avoided, people prefer to live as close to water body as possible. Accordingly, the villages were located along river embankments. In cases where a river was not especially wide, villages tended to develop along both sides of the river. When a nearby river was not readily accessible, villages primarily developed around ponds. Topography is also an essential factor for siting a settlement. Several villages are located on large tracts of farmland far from water and roads, and some settlements separated into two parts over the course of development. We speculate that the relatively high terrain on which these villages were established may have been selected to avoid flooding. Settlement location selection was not affected by constructed waterways because they were just excavated in recent decades. Moreover, the names of Chentaizi Village, Shuigaozhuang Village, Xinigu Village and Nanlibakou Village reflect consistencies between village names and their geographical features. While the character "pit (wo, 窝)" in Zhangjiawo Town (张家窝镇) implies "low-lying", this could not be verified due to missing elevation data in the existing maps (Figure 2).

Following 30 years of development, the settlement area of Dangcheng Village and Shuigaozhuang Village along the Ziya River not only expanded to the entire area surrounding the river but also spread across the road (the original outer boundary) toward outside embankment. Beiyang Village and Xiniantuozui Village, which originally crossed a river, became completely fused. Ponds that were originally located along the edges of the settlements were later located within villages, and some ponds were even located at the centres of villages. Except for the pond adjacent to Xiniantuozui Village, which decreased slightly in area, the area of the other ponds did not change significantly, and the pond boundaries were smoothed. Large ponds were typically found along the edges of expanded villages. In fact, the southern boundary of Shizhuangzi Village (石庄子村) fully invaded adjacent ponds, resulting in an interwoven pattern of built area and water body. If constraints

had not limited the pattern of develop, the village would have expanded in a fan shape facing south. A village would expand southeast if a crossing traffic lies to the east of the village. Likewise, it would expand southwest if a crossing traffic lies to the west of it. Only when space for expansion southward is limited will the village grow northward. During the development stage of a village, the orientation of the homestead will be adjusted according to the farmland orientation. Fine, cultivated traces of farmland ("canvas grid") limited the growth of the street network and homestead. The old farm road became the basis of the street network. The developed village boundaries are largely composed of peripheral roads, drainage ditches and farm ridges that create neat borders. When the area of a farmland block was small with changes in texture orientation, the local border of the village was neat while the overall outline developed into a complex polygonal shape (Beiyang Village).

In summary, we conclude that the environmental factors that drive a village to expand include closeness to water, storm drainage, crossing road and living habits. The initial requirements of water access and flood avoidance at the time of village siting gradually lessened with the influence of recently available household tap water and with the construction of Duliu River Diversion. We inferred that the preservation of ponds addressed drainage needs, and more importantly, lacking of soil.

We then compared the 27 village street network structures obtained through mapping (Figure 3). Of these 27 villages, 26 possess a grid street network structure that is longer along the north-south orientation and shorter along the east-west orientation. Road networks close to a river typically exhibited an orientation perpendicular to the river as well as another orientation parallel to the river, thereby causing deformation based on the river curve. Along the peripheries of large ponds, road networks form loop or alternative routes and may be directly interrupted by the presence of a small pond. Other village road networks adapt to farmland textures based on ridge orientations. Although most of the street networks originate from a regular grid, the internal texture is no longer a grid structure if seen from a scale no larger than a block. We therefore further investigate the characteristics of village textures at a plot scale.

Classifying the interactively computational settlements

Using Conzenian approach, the planes of the villages and towns contain three distinct complexes of plan elements: streets/street-blocks, plots (homesteads) and their aggregation in street-blocks, and buildings within those homesteads. Texture characteristics are difficult to describe. From the perspective of physics, Salingaros drew from theories of computational complexity and classified urban substantial morphologies into four categories: interactive computation, non-interactive computation, random and non-computational. Among these classifications, non-interactive computation is primarily conducted through a planning approach that employs strong compositions, and the random category refers to the so called parametric design in recent years. These two categories are not common in villages. The texture of the villages in this study includes two extreme cases of interactive computation and non-computational forms, and the former is dominant. However, the degrees of "interaction" were different for the two extreme forms.

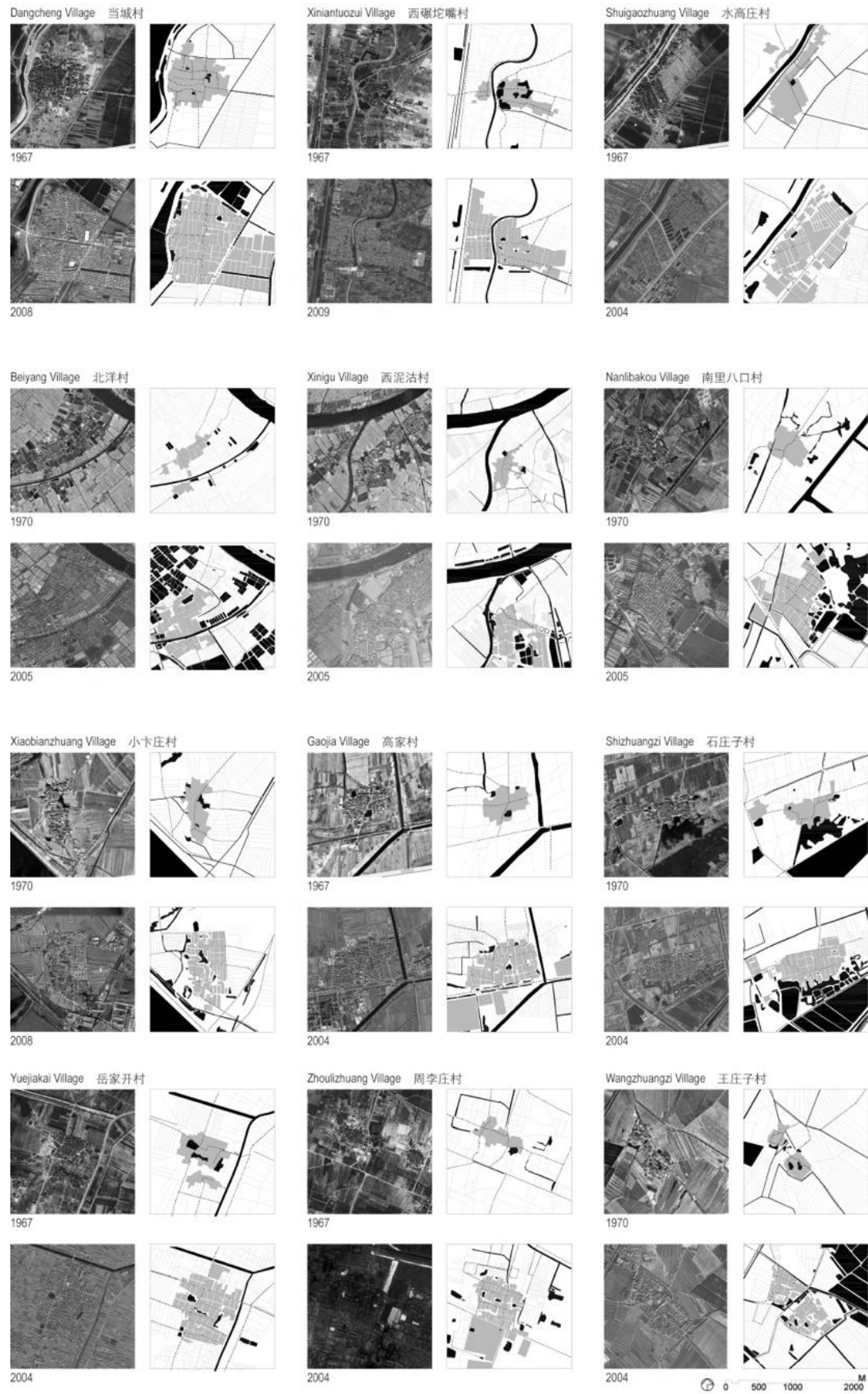


Figure 2. Comparisons between the historical and recent forms of villages.

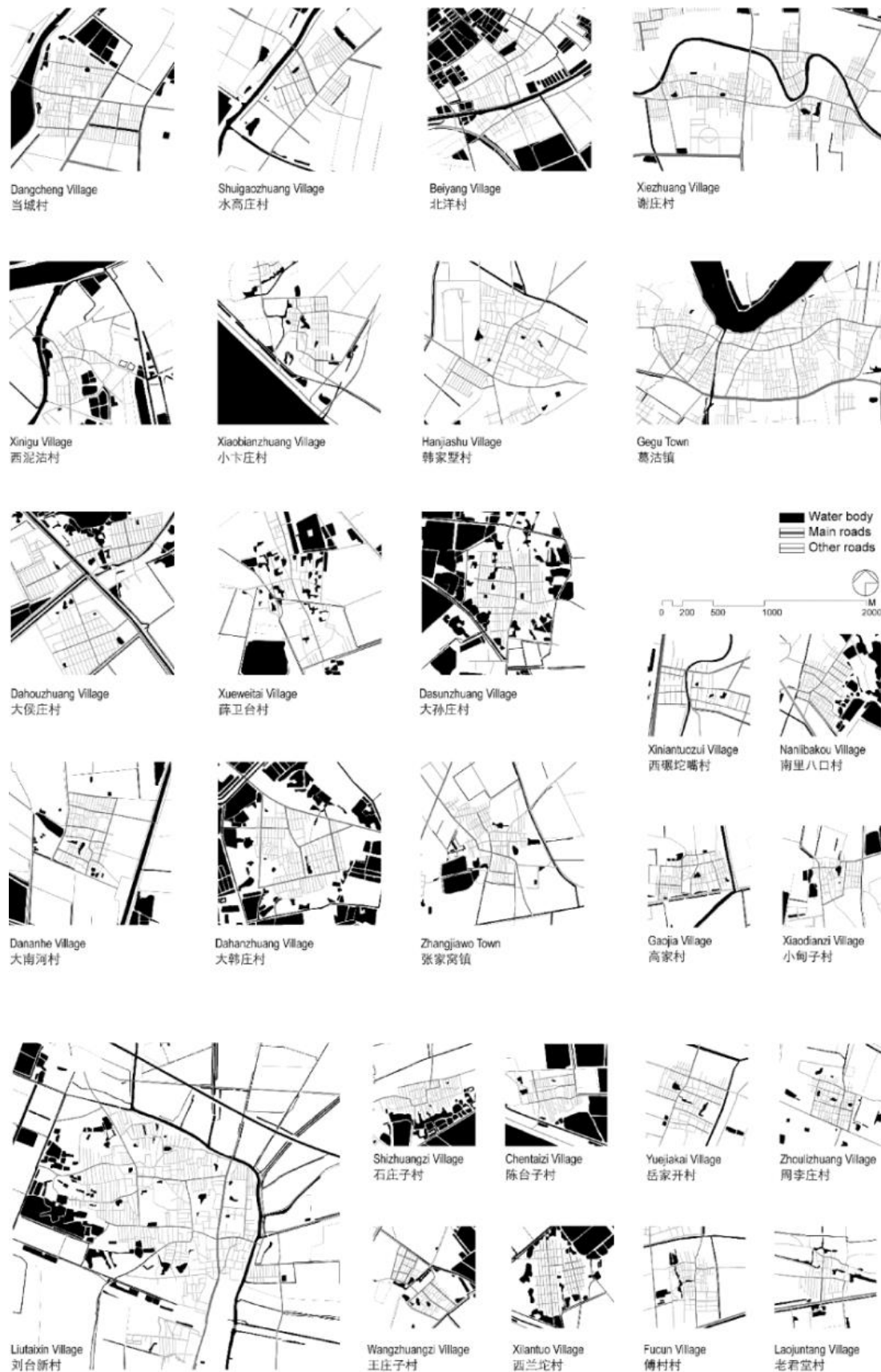


Figure 3. The relationship between the street networks and water systems.

Since Salingaros did not subdivide the class of "interactive computational" form, we devised a method that facilitates the sub-classification and cross combinations of the three plan elements. The elements of each level were expressed as a polygon or combination of polygons of different forms, and the orientation and length variations (abbreviated *Ov* and *Lv*, respectively) of the polygon edges were used together to evaluate the richness of information for this element. A value of *Ov1Lv1* indicates that changes in orientation and length are small; *Ov2Lv2* indicates that changes in orientation and length are large; and *Ov1Lv2* and *Ov2Lv1* indicate that changes in orientation and length are small in one instance and large in the other. Because local resident house orientation requirements are relatively homogeneous (south-facing), the *Ov1Lv2* category represents more self-selection. *Ov1Lv1*, *Ov2Lv1*, *Ov1Lv2* and *Ov2Lv2* show the information richness in the order of simplest to most complex. For the sake of simplicity, these are expressed with the values 1, 2, 3 and 4, respectively. For example, *S1* may represent an orthogonal street system that is nearly equal in width and interval. Next, an inter-level crossing was executed for each element.

The method involves first defining combinations of streets and homesteads in various classifications (Figure 4a) and then cross-combining these combinations with each category after the screening of results (Figure 4b). Three major screening criteria were applied: 1) the information richness for high-level elements should be lower than that of low-level elements (e.g., the information richness of streets should be lower than that of homesteads so that the *S2H1*, *S3H1*, *S3H2*, *S4H1*, *S4H2* and *S4H3* combinations may be excluded); 2) the information richness of orientations should be consistent with each other when plan elements at different levels are cross combined. Hence, the compositions formed by elements from the odd-number classes with elements from even-number classes, or vice versa, e.g. *S1H2*, *S3H4*, *S1H1B2*, *S4H4B4*, etc., were deleted; 3) since buildings in villages are all self-built, the combinations involving *B1* and *B2* were also excluded. After verifying the above principles through real village comparisons, we obtained the 'six basic compositions' in the order of simplest to most complex: *S1H1B3*, *S2H2B4*, *S1H3B3*, *S2H4B4*, *S3H3B3* and *S4H4B4* (Figure 6). For simplicity, we used *I*, *II*...*VI*, to denote the above six basic compositions. The six settlements of Dangcheng Village, Shuigaozhuang Village, Xinigu Village, Xiaobianzhuang Village, Xiaodianzi Village, and Yuejiakai Village were selected for a case study to further investigate internal temporal and spatial morphology changes in villages at the scale of the plot.

Following the above complexity classification model, the villages were classified into varying levels of complexity for the preparation of a grey tone map. Town and village construction boundaries over the two different periods were then superimposed onto the grey tone map. We also calculated the weighted complexity of the two periods (Figure 6). We found that all six villages showed a trend of a gradual decrease in morphological complexity from the village centre to the perimeter, or from one side to another. The morphological complexity level showed a specific correlation with the phase of the village construction. The settlement area morphological complexity levels were dominated by V and VI before 1970 and by I and II at the first decade of 21 century. Thus, rather than overall reconstruction, the growth of these six villages was primarily driven by external expansion. Borders of high complexity in the village centre experience more disruption than the less complex outer boundaries of the lower peripheral region. Public constructions are primarily located in the boundary areas between two levels of complexity, indicating that public buildings were constructed during periods of village expansion.

a . Combinations of streets and homesteads

b . Combinations of streets, homesteads and buildings

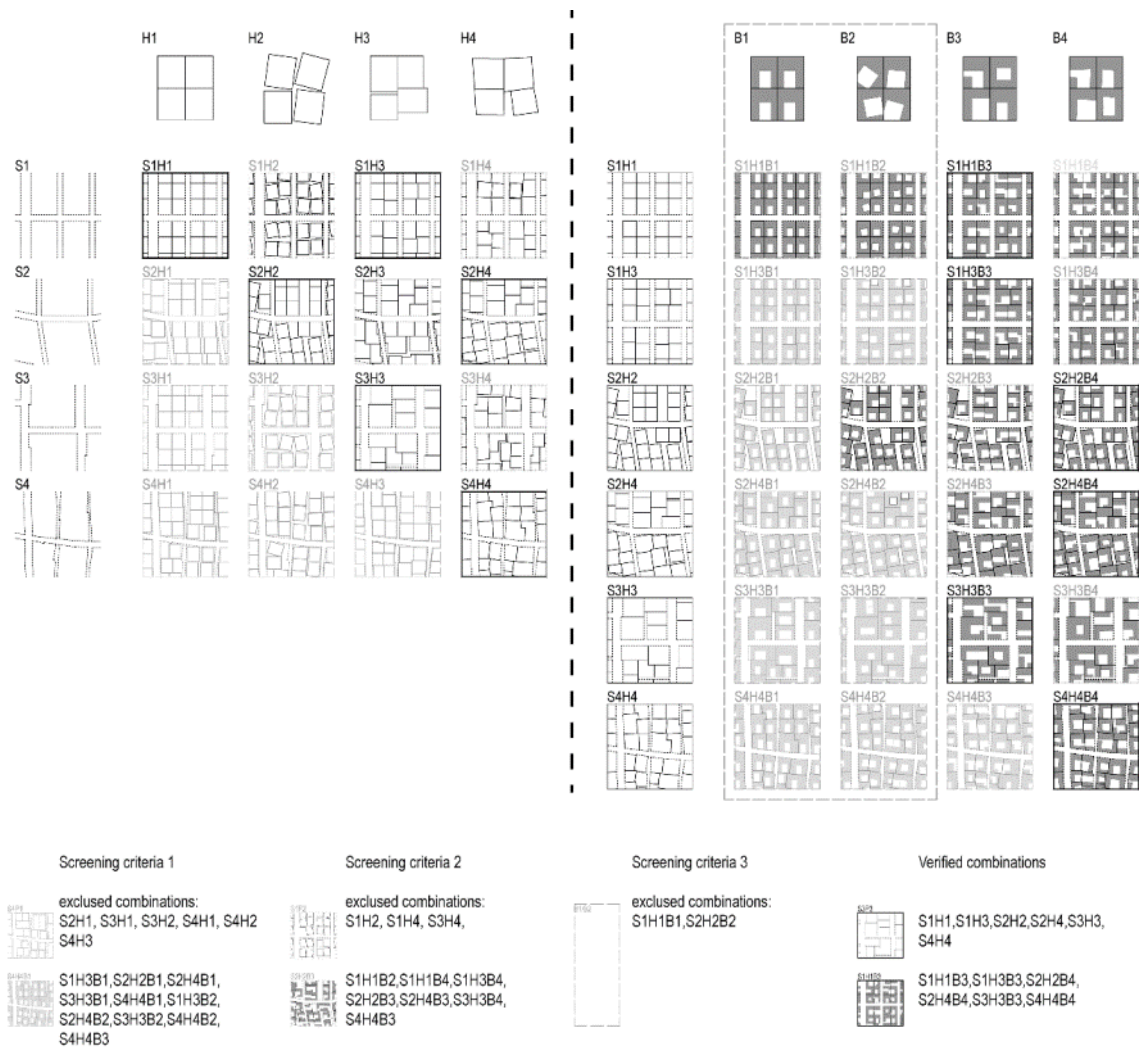


Figure 4. Selected typo-morphological matrix showing the inter-level combinations of the three elements: streets, homesteads and buildings.

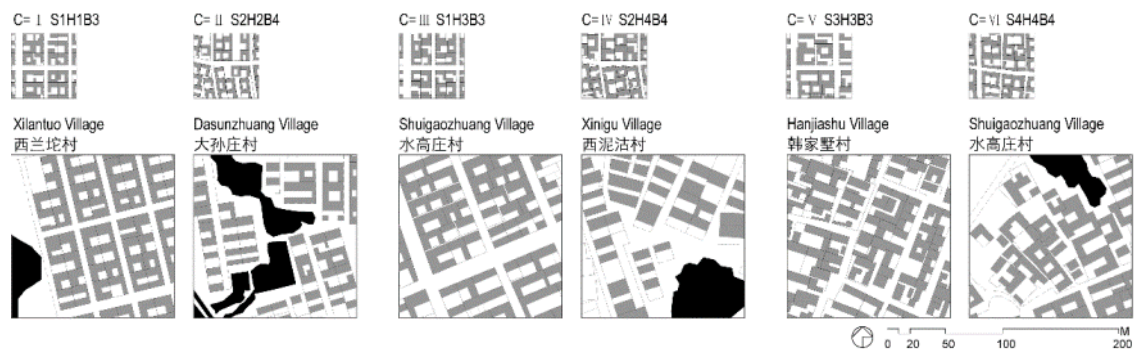


Figure 5. Selected six combinations shown in the village segments.

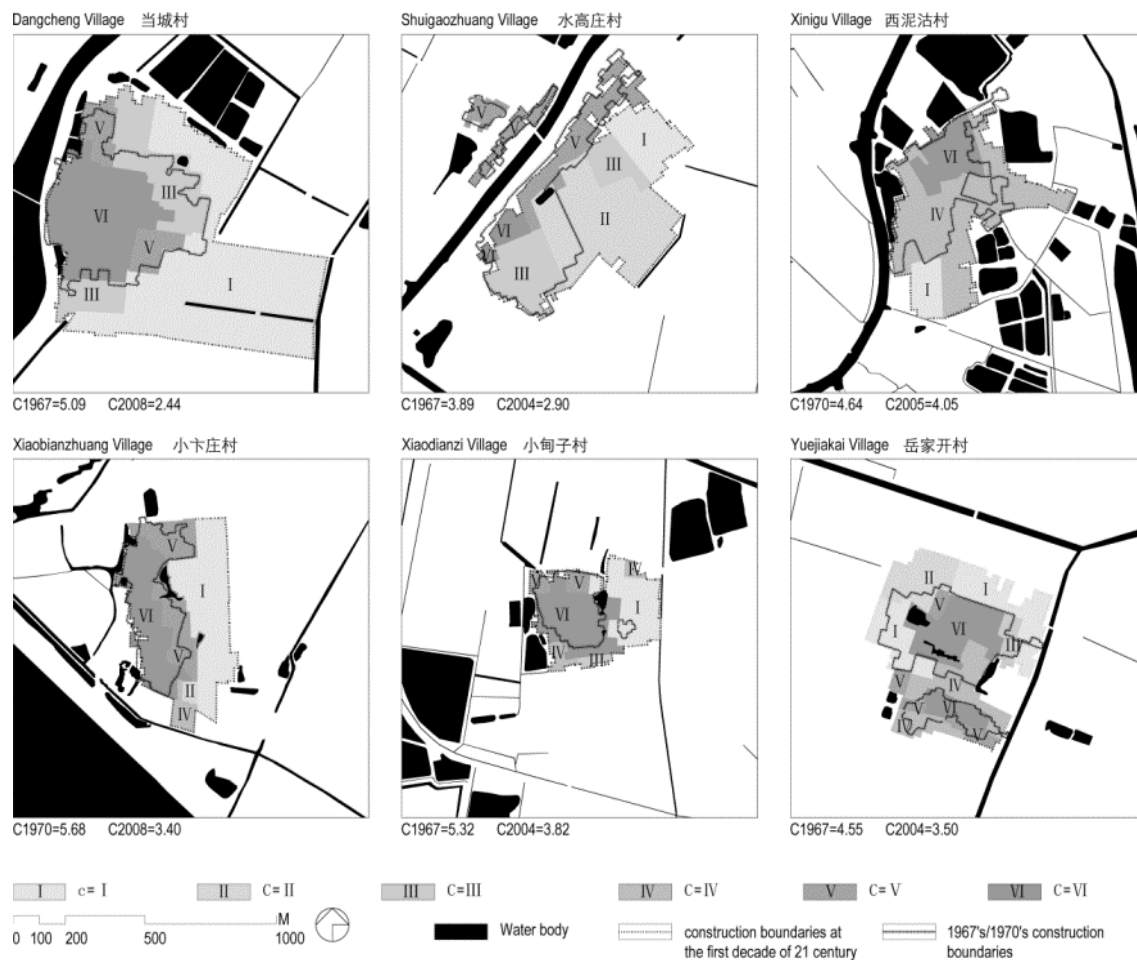


Figure 6. Degree of complexity of the tempo-spatial morphology of six villages.

Inference of homestead-scale interplays

We also examined interactive patterns between homesteads, streets and water bodies. The homestead is the smallest unit of the village environment. Deformations of the road network will thus be affected by homestead aggregation. From 1967 to 2004, homesteads located along village boundaries gradually compacted from loose formations, and the homesteads that were built later on have not always been located adjacent to existing homesteads. With the splitting of households and the arrival of migrant populations, open spaces within villages were gradually occupied. New homesteads were constructed based on existing homesteads and roads, and road borders were gradually defined by homesteads positioned along both road sides.

Homesteads exert the greatest impact on road network morphologies with respect to entrances and angular distributions. The courtyard style house possesses only three entrances along the east, south and west walls. An east-west lane can thus provide the entrance to the north side of a homestead, while a north-south lane road can provide east and west entrances to a homestead. The road network structure of the villages thus follows a grid morphology with lanes of a north-south orientation and with main streets following an east-west orientation. In a strict regular grid, the space between two lanes comprises the width of two homesteads. Homesteads are thus not only affected by the overall pattern of the road network

but are also affected by street linearity. The shape of a single homestead forms a roughly regular rectangle with at least one side of the building lying perpendicular to a water body or road. In spontaneous morphologies, when the border of a water body in a village is irregular, the orientation of the homesteads adjacent to this water body is adjusted accordingly, forming a grid with deformations that are approximately parallel or perpendicular to the water body. We observed a combination of homestead areas following differing orientations, suggesting that these homestead had been planned as integrated zones.

In addition to being affected through a bottom-up process by homesteads, the intercepted texture findings of this study show that road networks may also be destroyed through top-down processes of macro-control. The satellite image of Hanjiashu Village (韩家墅村) shows an oblique crossing road lined with buildings along both sides, with homesteads along the road boundary that do not respond to the road orientation, denoting the occurrence of splicing (Figure 7). This road was thus developed after the village texture had already been established.



Figure 7. An oblique street running through the Hanjiashu.

Conclusions and discussions

Inspired by Conzenian approach to interpreting urban forms with three classes of elements and Salingaros' thoughts on the urban forms as computational complexity, we classified and mapped the built environment of the low-lying villages into a three dimensional, typomorphological matrix. Here, the hierarchical method of traditional typology is challenged by the seemingly homogenous villages where elements at different classes are frequently twisted. We used 'complexity' to categorise the compositions formed by the elements across the three classes, and 'information richness' to classify the properties of elements within the same class. When completely listed, we would gain 64 compositions and form a total set of the degrees of 'complexity'. For the sake of simplicity, we picked out six possibilities out of the 64 compositions and assured that no compositions from our villages fell out of the scope. Our approach, which is certainly not tied to the studies of villages, is obviously applicable to any other informal settlements in urban areas. Except for some impossible compositions in the matrix, the rest could offer a template for urban design and urban form generation. Our method, however, stays in qualitative analysis, which indeed relies on an analyser's intuitiveness.

Although not widely verified, our method lends help to understand the formation of low-lying settlements in coastal Tianjin. The small sample analysis suggested that the older the part of a village was the higher degree of the complexity it exhibited. The only exception, Xinigu Village, which demonstrates an equally high complexity throughout the history, is because the village has been surrounded with abundant water features. The high complexity arises when frequent interactions between the plots and water features occur. Similar to the research into the history of Dutch water cities, many low-lying settlements originate from mounds, opt to live with waters, and develop with water infrastructures (Hooimeijer *et al.*, 2005; Hooimeijer and Geldof, 2007; Hooimeijer, 2011). Accessibility to water supply and avoidance of flood hazards would be the primary factors for siting a village, as evidenced by the toponyms in Tianjin. Villages that abut river levees would remain somewhat orthogonal to the river reaches when expanding, and the expansion of others would normally depend on living conditions, construction cost and industrial development, whereas the need of water is substantially decreased. We therefore concluded that before the systematic water management significantly loosened the tie between the urban form and surrounding water bodies, the water-related settlements in Tianjin were logically shaped by, and thrived with water systems. Insofar as structural measures for the systematic flood control has established and consolidated in the Hai river sub-basin, the development of villages located in the sub-basin barely illustrates the responsiveness to water features.

Acknowledgements

This work was supported in part by National Natural Science Foundation of China under the grant number of 51178295. The authors would like to thank Xuzhou Zhang and Chi Zhang for their assistance with the mapping work.

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Industrial-housing ensembles at Lisbon: morphology and spacialization

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Abstract. *This study aims to analyze the housing solutions implemented during the 19th century in Lisbon, focusing in particular on pátios and vilas operárias. Main objectives: i) classify, analyze and describe the urban morphology of pátios and vilas operárias; ii) understand the relationship between urban morphology and toponymy. Clarify the terms "pátio", "vila", "rua", "travessa" and "beco"; iii) analyze which steps have to be taken in order to conserve and adapt this complex heritage; iv) analyze the spatial distribution and points density of pátios and vilas operárias by using the potentialities of Geographic Information Systems, as well as analyze and describe its spatial matrix;*

Key Words: *Vilas operárias, pátios, Lisboa, industrial-housing ensembles, industrialization.*

Introduction

The population lodging is recognized as one of the major urban issues of the last two centuries. Recently the urban population equaled the rural population.

The urban demographic explosion was experienced in several large cities. In Portugal, the population explosion in large cities occurred after 1850 and also during this period started its first industrial developments.

In Lisbon, in the second half of the 19th century took place the first great population impulse, with the arrival of rural population (Brito, 1976). The city newcomers passed serious difficulties to get decent homes. The poor population lived commonly in housing ensembles analyzed in this work: *pátios* and *vilas operárias*.

Methodology

We proceeded to the information collection and georeferencing. In this sense, were collected and georeferenced 562 *pátios* and 364 *vilas operárias* (total: 926 elements), using the following methodology:

- i) information collection: books, articles, annuals, geographic information and fieldwork;
- ii) georeferencing and data processing: list of *pátios* and *vilas operárias* (name, localization, date, parish);
- iii) data validation with historical cartography, particularly: Filipe Folque 1856/57; Silva Pinto 1911; Lisbon Municipality 1950;
- iv) map creation: spatial distribution; mean center; standard distance; directional distance, and; spatial density (Kernel density estimation).

The spatial analysis makes use of the following measurement forms: mean center, standard distance, ellipse distance.

The density maps are exploratory analysis that aims to estimate the intensity of phenomenon occurrence. Thus, it was possible to generate a grid whose values reflected the

intensity of the phenomenon per unit area. This made possible to calculate the value of *pátios* and *vilas operárias* per km².

To the density maps was used the Kernel density estimation method. For the density maps production was used: *grid* (using *Kernel density*); cell dimension: 10 meters; search radius: 1 000 meters.

Results

19th century housing crisis

In Lisbon, during the 19th century the precariousness housing scenario had the condescension of the central and local government. Public authorities considered themselves unable to respond to such challenge. During this period it was believed that the housing market would eventually meet the housing needs of the population (Batista, 1999).

In Lisbon, the first answer to demographic explosion was based in buildings over-occupancy. The city newcomers were forced to live in poor conditions, settling in substandard dwellings, unoccupied houses, ruined palaces, convents, small rooms and basements (Pereira, 1994; Teixeira, 1992; Almeida, 1993).

Thus, the initial response to population growth was the occupation of derelict buildings. In result, the population density increased within the historical perimeter of the city.

Lisbon grew "inwards": pátios

After the buildings over-occupancy, real estate entrepreneurs realized that they could use the backyard to increase profits. Accordingly, *pátios* emerged as a natural conjectural evolution.

Thus, entrepreneurs with limited economic capacities began to build *pátios*. The *pátios* construction meant a small, profitable and secure investment. (Teixeira, 1992).

Ethnographer José Leite de Vasconcelos (1959) defined *pátios* as courtyards with single-family homes around. In the center *pátios* has a space open to the sky, surrounded by small precarious homes. *Pátios* can be thought as semi-spontaneous forms of accommodation that occupy the consolidated urban space. Without planning and as a fallback solution, these habitation ensembles seek to maximize land use (Salgueiro, 1992).

Pátios were small and informal unhealthy houses ensembles, where welfare was not a concern. Stands out the poor habitation conditions, where prevailed construction problems that did not guaranteed minimum living conditions. Bad sanitary conditions potentiate pathogenic problems, increasing hazards to the whole city.

Pátios: spatial analysis

We proceeded to collection and georeferencing of *vilas operárias* built in Lisbon. We identified 562 elements. From the information contained in Figure 1, 2 and 3 we highlight the following results:

- i) in the northwest boundary of Lisbon exists an important concentration of *pátios* (over than 45 per km²). This important concentration extends to downtown direction. In second half of the 19th century this area was in a process of urban expansion;
- ii) Cerca Fernandina endogenous area: dozens of *pátios* in the historic neighborhoods of Alfama, Mouraria and Socorro. This area was consolidated in the 19th century and *pátios* emerged as urban surplus;
- iii) Eastern Axis: there is a significant concentration of *pátios* (35 to 44 per km²) associated with the East Lisbon industries;
- iv) Western Axis: on the slopes of Alcântara valley and in the parish of Prazeres. This axis prolonged to more remote areas, such as Santo Amaro and Ajuda.

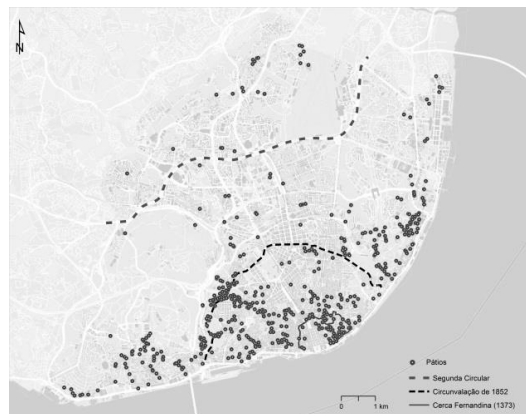


Figure 1. *Pátios*: elements distribution.

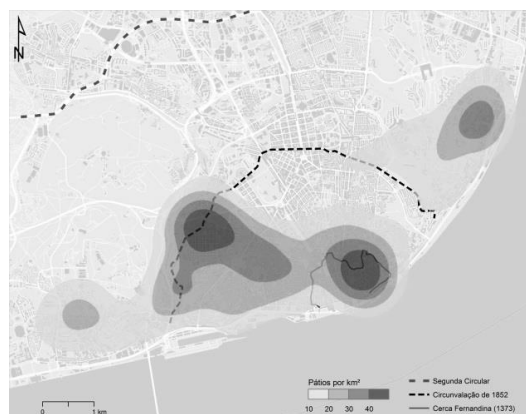


Figure 2. *Pátios*: spatial density (km²).

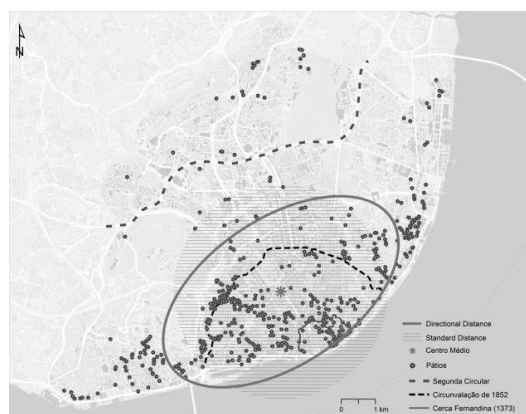


Figure 3. *Pátios*, spatial analyze: mean center, distance standard and directional distance.

End of industrial-housing evolution: vilas operárias

In 1881 was realized an Industrial Inquiry that made critics to industrial housing in Lisbon, specially to the *pátios*. After that, *pátios* lost relevance and were replaced for a new kind of habitation ensembles: *vilas operárias* (cf. Leite *et al.*, 1991).

Vilas operárias were built in devalued land by using cheap material. So, *vilas operárias* were built mainly outside the city in the area of urban sprawl. This period was tender about constructions standards and surveillance. This situation potentiated the economic construction of buildings with one or two floors, repetitive and monotonous.

In this sense, *vilas operárias* were intended to lease low cost for families with low incomes. The *vilas operárias* construction were economic, simple, used inexpensive materials and based on a modular structure, allowing higher densities of occupation and easy expansion.

Thus, the demand to maximum utilization of area to get great profits remained in *vilas operárias* period. However, it should be noted that *vilas operárias* had better living conditions than *pátios* (Pereira, 1994; Leite *et al.*, 1991).

Vilas operárias: morphology

To Nuno Teotónio Pereira the morphological classification should favor the characteristics associated with size and relationship with the public space. In this way, Pereira (1994) classifies *vilas operárias* as:²⁵⁸

- i) Corridor Vilas: exist all over the city, developing directly on the public street.
- ii) Vila generating pátio: houses grouped around a common and discovered place.
- iii) Vila built behind buildings: demarcating the social status of residents. In the building that faced to the public street resided the bourgeoisie, the backyard was left to families with low incomes. This type of vila operária divided the space with a strong social dichotomy. The architectural quality and living conditions were better in the main building, as opposed to the backyard.
- iv) Vila generating street: were often associated with industrial production and near of factories. Some industrial entrepreneurs took the initiative to built vilas operárias, ensuring proximity houses to their workers.
- v) Vila with urban scale: superior area comparing to the previous classifications. This concept of vilas operárias definitely departed from pátios style, although it has not lost the segregated nature (Pereira, 1994).

Vilas operárias: ban, preservation

In the early of 20th century emerged two regulations that defined the construction conditions, namely Regulamento Geral de Saúde (1901) and Regulamento de Salubridade das Edificações Urbanas (1903)²⁵⁹.

These regulations made the buildings construction more demanding, but *vilas operárias* developments were not stopped. This only occurred in the 30's, when the Lisbon Municipality forbade *vilas operárias* construction.

In the 90's Lisbon Municipality created *Gabinete dos Pátios e Vilas* (Bureau of *Pátios* and *Vilas operárias*), which aimed to survey the real number of *vilas operárias* in Lisbon. Accordingly, it identified about 100 *vilas operárias* as *historical and heritage interest to preserve*.

Vilas operárias: spatial analysis

We proceeded to collection and georeferencing of *vilas operárias* built in Lisbon. We identified 364 elements. From the information contained in Figure 4, 5 and 6 we highlight the following results:

²⁵⁸ Authors such as Salgueiro (1981) and Rodrigues (1978) also classified *vilas operárias*.

²⁵⁹ General Health Regulations (1901), and Urban Hygiene and Construction Regulation.

- i) the largest concentration is located in the old western boundary.
- ii) we can identify in Lisbon historic center an axis on the north of S. Jorge Castle. Some historic neighborhoods, like Graça, Mouraria e Alfama have several vilas operárias.
- iii) less relevant: 1) in the East there was a significant concentration of vilas operárias; 2) In the west of the city we can identify a set of vilas operárias extending to the waterfront.

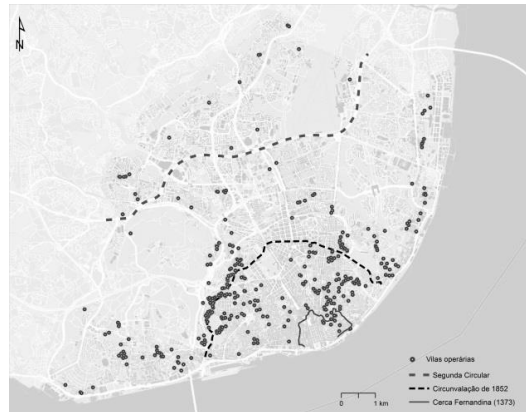


Figura 4. Vilas operárias: elements distribution.

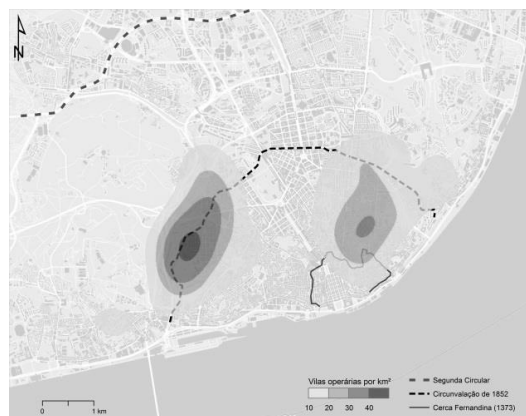


Figure 5. Vilas operárias: spatial density.

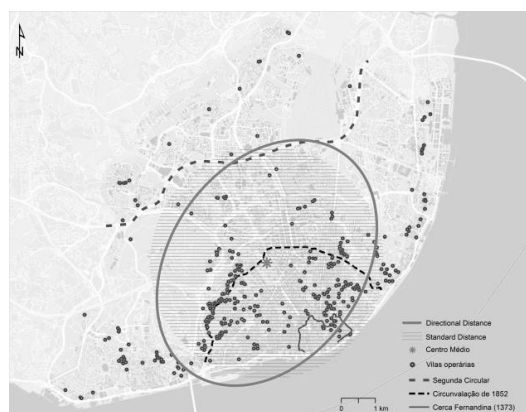


Figure 6. Vilas operárias, spatial analyze: mean center, distance standard and directional distance.

Discussion

In the second half of the 19th century the industrial growth caused high levels of urban growth in Lisbon. In this way, Lisbon faced many problems common to other major European cities (*i.e.* population and urban growth; population density increase; urbanization rate increase; urban space and buildings over-occupation; urban expansion to rural areas; real estate speculation; local administration lethargy; precarious housing construction; neighborhoods without sanitary conditions; urban poverty; mendacity; epidemics, etc.).

Regarding to the housing ensembles analyzed in this work is clear that we are in the presence of different generations: 1) buildings over-occupation; 2) *pátios* dissemination (*i.e.* backyards colonization); 3) *vilas operárias* dissemination (*i.e.* housing ensembles with urban scale).

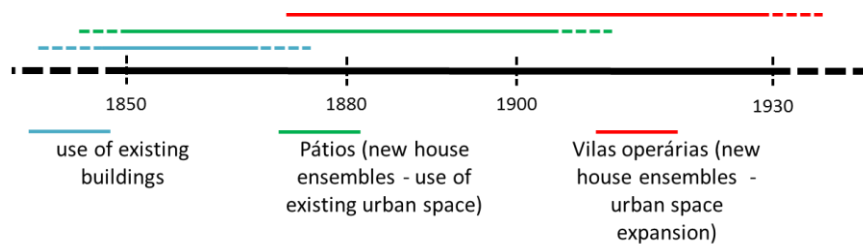


Figure 7. Temporal evolution.

In parallel, and as the results obtained by georeferencing and mapping of almost 1000 elements, are evident for the following results:

- i) *Pátios* had a higher quantitative and spatial spread than *vilas operárias*. Nevertheless, although *pátios* are more in number, *vilas operárias* generally have higher dimension;
- ii) *Pátios* had higher concentration values in the historic center of Lisbon. On other hand, *vilas operárias* show a spread marked by urban expansion areas (between the nineteenth century and 20th century). In this way, the location of the *pátios* and *vilas operárias* is not fully converged. This is confirmed by mean center analysis, where can be seen *pátios* mean center is located most southern than the *vilas operárias* mean center.

It can be stated that in the transition between the 19th century to the 20th century, private developers have resolved the first major housing crisis in Lisbon. Only in the early 20th century some voices began calling for public policies to promote social housing.

Currently, *pátios* and *vilas operárias* conceal in the urban landscape, in the *non-visible space* of city. With its hidden passages and entrances, these housing ensembles are often imperceptible from the public street, mingling with the other city elements.

Finally, currently *pátios* and *vilas operárias* were presented strongly uncharacterized. The mischaracterization is characterized by the increase of area, allowing dwellings to meet the current demands.

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An urban taboo

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Abstract. *The historiography of the twentieth century has always looked to the architectural production of the last century with different critics, while maintaining uniquely, as an unavoidable prerequisite for modernity, the constant reference to the Modern Movement, considered the only parameter and yardstick for any 'value judgment'. As a consequence of this vision, an important part of the projects related to the 'Reconstruction' has long been marginalized from the debate around the contemporary architecture, superficially labeled as the product of an ideological authoritarianism or the aftermath of a broader 'nineteenth-century thought'. Monumental projects like Don Bosco district look significant today, especially if related to the historical period they belong, the Fifties, when most of the interventions on the urban fabric were morphologically punctual and autonomous, probably even more meaningful if we consider that monumentality, that characterizes those projects is a feature obtained through the use of architectural typologies usually unrelated with the idea of monumentalism, and thus they shaped a new idea of city different from both the past and coeval experiences.*

Key Words: monumental districts, countertrend methodology, Don Bosco, urban-integrity.

Monumental district countertrend Rome interruption

Defined through monumental perspectives, dimensionally related to the historical Roman avenues, and philologically connected to the Mausoleum of Alexander Severus, the Don Bosco district in Rome has both the characters of a lithic wing and the obsessive seriality of its housing blocks.

It was mostly planned by Architect Gaetano Rapisardi in the first half of the Fifties, by resuming and developing the "Plan of Rome" made in 1931, and it represents the only discontinuity in the Italian panorama of low-cost housing districts, more related to foreign contexts like France than its Italian coeval experiences, that assume new districts as conflictual realities with the historical urban fabric.

While almost completely ignored by the Italian architectural debate, the Don Bosco district denotes a refined spatial stronghold, thanks to: the monumental dimension of the courtyards and the scenic continuity of Viale Don Bosco (one of the largest axis in Italy); all those elements define an highly discernible morphological area, enclosed by two poles: the Mausoleum and Cinecittà.

The Don Bosco is set on a monumental urban axis, Viale San Giovanni Bosco, that has a length of about 1 kilometre and a half, and which connects the Mausoleum of Alexander Severus to the Basilica of San Giovanni Bosco. This pair of poles identifies what is, in substance, a triumphal street, if we consider the presence of the two thematic depths that open and close Viale San Giovanni Bosco.

The whole axial system, interrupted only by Piazza dei Consoli (which distributes an array of smaller lots), is in fact concluded by Piazza San Giovanni Bosco, where Viale San Giovanni Bosco and Viale Marco Fulvio Nobiliore are tied through the monumental buildings designed by Gaetano Rapisardi, which also bound a space that has no precedent among the public housing estates in Italy, having only few similar cases in Europe, mainly in the countries of the former socialist block.

Viale San Giovanni Bosco's unusual width of fifty meters, in consideration of which would seem more correct to call it 'promenade' (which by definition is opened and

concluded by theme or by a singular architectural episode) is indicative of a strong aesthetic projectual will, which produces, in contrast to the Italian prevailing urban thought, a city-district, both linked to the notions of urban morphology and the Piacentinian idea for the suburb as the sum of large urban systems functionally and formally autonomous but related to the historical urban fabric.

The Plan of Rome made in 1931 originally envisaged the structure of Tuscolano (as it was called the macro area that actually includes the Don Bosco) around a central trident, patterned after a colonnaded square and circumscribed by housing blocks.

The central trident had been planned having as main axis Via Tuscolana, with a branch ending in a widening in the proximity of the rail, and another in a new square. By the latter, in turn, a further, less accentuated trident would have to rise, characterized through a central axis, and interrupted by a large square with government buildings.

The Tuscolano was thought, in this sense, as a homogeneous urban episode, according to the model of the town as a sum of different districts; and thus the Don Bosco was somehow thought to be the typological reference for the southern suburbs, populated by the working class.

Subsequently, for a term of the administration, the uniform project of 1931 was split into two smaller plans, planned at a distance of 7 years, hinged on via Tuscolana. Due to this change Via Tuscolana became a separator element, and also mutated its function from "urban axis" to freeway.

One of the two plans (the one that originated the Don Bosco), was organized around a new axis, parallel to via Tuscolana, and delimited by two thematic polar squares, plus another one in the middle, Piazza dei Consoli, necessary considered the size of the central axis, but also signal of a smaller system of perpendicular streets. However, it remained partially incomplete.

Only one of the two smaller plans was built, creating the district Don Bosco, that reproduces, in a smaller scale, all the features included in the original project for the Tuscolano: in this way focus and theme of the square became the Basilica of San Giovanni Bosco, built between 1952 and 1964 as a result of a competition organized by the Pontifical Commission on May 15th, 1951, on a plot of 17000 square meters donated by the real estate company Tirrena to the order of Salesiani.

The competition was won by Gaetano Rapisardi, who had already worked with Piacentini for the Città Universitaria in Rome (he designed the faculties of Humanities, Law and Political Science) who proposed a building that had both the character of the central plan (expressed by a dome resting on the huge drum) with a basilical type characterized by the great transept.

During the subsequent phases of the project, the nature and the size of the dome were defined, in fact it was lowered and put directly on the drum; then on the main facade three large portals framed by pilasters were opened, a treatment that was later extended to the other elevations with the opening of further portals. On the morning of May 2, 1959, after seven years of work, during an international conference of more than four thousand Salesian Cooperators, present all the superiors of the order, the Cardinal Protector Benedetto Aloisi Masella, consecrated solemnly the Basilica and ten bishops consecrated at the same time the ten altars.

In its final version, the building looks like a rectangle of 45 x 78 meters. The height is 73 meters, including the crypt that is 6 meters below the ground level. The building can be read as two parts, which summarize the basilical type of church and the one with the central plan: the first part stands as a pedestal and measures approximately 20 meters, the latter acts as the crowning, 46 meters and includes the main drum, with a double row of circular pillars, and the smaller drum, the domes, the metal plated terminals and the two bell towers. The facade is divided into seven bays by pilasters (not featured in the first project made by Rapisardi).

The monumental Piazza San Giovanni Bosco (m125 x 185) that opens and concludes the namesake avenue, features the same theme of the colonnaded square included in the Piano

Particolareggiato made in 1942, and enforces the perspectival outcomes through the relational character that binds the church and the square.

The jury of the competition for the Church of San Giovanni Bosco wanted that the winning architect supervised the design of the opposite overlooking buildings opposite in order to achieve a unified image, which is what happened in 1955, when the town gave Gaetano Rapisardi the provision of urban square.

The project made by Rapisardi, aimed to emphasize the homogeneity of the project by using a unified design of the facades of residential blocks, and furthermore by using a sophisticated play of perspectives, such as the narrowing of via Marco Fulvio Nobiliore, which was supposed to put in contact the church to the square, but that was not realized.

The square, Piazza San Giovanni Bosco, is characterized by the constant presence of a massive portico, 8.50 m high, with a distance between the spans of 5.20 m and with the pillars having a section of approximately 1 x 1.20 m. Above the portico there are six floors with a height of 3, 50 meters, are divided into three zones by a continuous band of bulwarks. Each one of these three areas of the elevation is unified vertically through a sequence of small pillars, three times the number of the portico below. The south-west side feature a tower that connects two different lateral buildings and works as a backdrop for Via Calpurnio Pisone.

Originally a large circular fountain was planned to be placed in the center of the square, but only the shape of the base was realized (a circle with a diameter of 40 meters that has the same dimension of the section of Viale San Giovanni Bosco), which originated its current appearance.

A perceived figurative relation with the fascist model of urban planning is one of the reasons for which this district has mostly been considered as a taboo in the Italian architectural debate avoiding to solve, in a rational way, the urban problematics posed by a, highly populated peripheral area.

In the same years were realized three projects of public housing close to the Don Bosco, linked to the idea of the city closer to the dictates of the Modern Movement. The proximity of such interventions, made by INA Casa (the authority for the public housing), emphasizes the diversity of two ways of approaching the plan, one based on large urban signs independent from the urban fabric and influenced by the idea of the functional city, the other on strongly hierarchical parts, which although preserving its autonomy create a "different" kind of city, in which the dialogue with the existing city, while preserving its recognition, is not in terms of conflict.

The Tuscolano I was carried out between 1950 and 1951, and is a collage of different buildings designed by different architects within the same plan (Piano Regolatore Generale), but it does not show an overall urban design. Its boundaries are Via Tuscolana, Via del Quadraro, Via Giulio Agricola and the Park of the Aqueducts. It features intensive buildings and villas.

The Tuscolano II was built between 1950 and 1952 with a strong formalistic will in urban design. The project is by Mario de Renzi, Saverio Muratori and Lucio Cambellotti with Francesco Fariello, Adalberto Libera, Giuseppe Perugini, Giulio Roiseco, Dante Tassotti and Luigi Vagnetti as collaborators.

The Tuscolano III or Horizontal Residential Unit is located in Via Selinunte 49 and was designed by Adalberto Libera and built between 1950 and 1954. The district is enclosed by a wall, the entry is placed in line with Via Sagunto, and underlined by a low arch

The complex consists of 200 apartments (about 1,000 people) on the ground floor, each one with a patio. These accommodations are preceded by a central garden planted with pine trees that contrast with the green of the tiny patios.

Unlike the other sectors of the Tuscolano area, realized by INA Casa, all of which well documented, there is lack of documentation on the district of Don Bosco, both in general terms (general plan, intervention programs, etc) that in specific terms (on individual buildings, but also on the work of Gaetano Rapisardi that is nowadays the best known

architect among those who worked on the Don Bosco Quadraro, mainly known for having designed part of the Città Universitaria in Rome).

Numerous are the causes but mostly related to the ostracism coming from the coeval cultural and political prevailing ideology, hostile towards an idea of the city considered, unfairly, traditionalist and reactionary.

Despite the size of the project, dimensionally larger than any New Town made in the fascist era, there is no trace of the project on the coeval architectural magazines. On the other hand the Don Bosco district has been widely documented by the neorealist cinema, a fact that gives the idea of the project's impact on the collective imagination. The opening scenes of *La Dolce Vita*, fictionally set in the EUR district were shoot in the Don Bosco.

The Don Bosco is in fact very close to Cinecittà, to the Istituto Luce (institute of cinematography) and to the Experimental Centre of Cinematography, and the district has been featured in a countless number of movies since its creation. In fact is depicted in movies like *La Dolce Vita*, *Mamma Roma* and *Fantasma in Roma*, from time to time scenically representative of different parts of the city, all included within the district.

A second reason why the intervention has not been adequately investigated is the incompleteness of the original plan, due to, a number of lacking lots were later completed in a regime of speculative real estate investing. However a huge part of the Italian historiography has proven to be more prone to justify the great failures of urban modernist thought, guilty of making anonymous suburbs, detached from the cities in which the idealistic logic of the great signs has not provided a logical urban thought. As a proof of the persistence of this attitude, also recently published books report the Don Bosco case only as an example of speculative overbuilding: “(..) to better understand both the ethical and urban vision presiding over the system of Viale Etiopia, just a quick comparison with the simultaneous realization (we are in the mid-fifties) in the district of don bosco in the tuscolano neighbourhood. In the building blocks, the different morphological-type models (the urban block in the front courtyard, the tower houses, the tall houses in line arranged in parallel, diamond or herringbone) are used to construct an urban fabric that has a paroxysmal character because the built volumes are designed and matched with each other only to respond to the principle of maximum utilization of the lot”.²⁶⁰

Yet just a quick comparison with the urban projects made under the Fascism is needed to underline that the origin of Don Bosco district is actually linked to a different architectural thinking, related to the notions of fabric and shaped by a concept of monumentality not associated to ideology. Just think of the plan made by Auguste Perret for the reconstruction of Le Havre or the project for the MDM Marszalkowska Housing District in Warsaw in which, both the specialized tissue and monumentality are defined, as in the Don Bosco, through basic buildings, a thought more ancient than the Modern Movement and that is starting to be seen as a solution to the problems of the contemporary city.

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European spatial paradigms towards urban infrastructural morphologies

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Abstract. *Because of their impact on urban fabric and economy, infrastructural changes, are key components of complex urban transformations. Large scale interventions, shaping major European cities, are mostly related to the Trans-European Network (TEN-T) policy. The nature of this development results in the increasing evolution of urban hybrids and multi dimensional morphologies within the territories infrastructures cross. They are characterized by aggregations, juxtaposition and super positions of different modality of transport, defining new typologies embedded within the urban scenario and, at the same time, linked to a larger urban frame. This contribution aims to explore how within the new policy EU territorial changes can be supported by research and methods of analyzing urban form and its structural elements. In that sense an integrated design approach to mobility will be presented from the dialogue between theoretical reflection and design practice of infra-urban reconfiguration processes, in order to increase the awareness of the unique challenges of infrastructure and the role of architectural design. From the research analysis of coding Urban Morphological Types (A) to the investigation of Intermodal Knots (B), driven by public-private interests along the high speed line, the paper attempts to enlighten the meaning of new European spatial paradigms.*

Key Words: infrastructure, intermodality, urban morpho-type

Coding urban morphologies

Transitions. From Modernism to EU visions

“Almost all the streets should be straightened and enlarged. They should be extended as much as possible to eliminate too frequent windings. New streets should be driven through all blocks that are longer than 600 feet. At all intersections of streets the corners should be rounded; at all crossroads there should be squares” (Laugier, 1765)

At the turn of the nineteenth century, the unity of the urban tissue, based on the built intertwining of masses and voids, is definitely substituted by the presence of a new figure, the infrastructure, assuming the asset role for the incoming vision of Modern City. As prologues of this condition were standing the XIXth century disembowels operated in European cities’ large interventions on urban body, as the Haussmann boulevards, writing new urban codes based on the rational geometry of accessibility. Inheriting Italian Renaissance axioms, the urban body at the end of the XIXth century was the representative scene of institutional power and at the same time the perfect embodiment of idealistic urban concepts emerging (Vidler, 2011). In few decades the institutional power was substituted by the Industrial Revolution values, however maintaining the same key components to build its own image. In that sense the ideal of urban construction evolved towards a new metropolitan configuration in which the infrastructure acquired a status of autonomous formal entity. The spatial urban perspective defined by urban curtains is overpassed by an horizontal and infinite metropolitan extension, in which nature and artifice became interrelated parts of the whole. The spatial development linked to Industrialization and the process of formal autonomy of infrastructure together reorganized the urban scene in a a system of objects floating in a dialogue through distance. It defines an exploded space (Choay F., 2000 ed.it.), a city carefully dismantled into its components and lying in the openness, where each part becomes singular entity of

dialectic with a totalizing landscape. These characters of the Modern City - the dismantling of urban scene's unity, the giantism, spatial isotropy - generate what Sitte defined as the disease of modern isolation (Sitte C., 1889). "Urbanism will abandon the current street-corridor, and through the path of new developments will create, on a much larger scale, the architectural symphony that need to be conducted. The street-corridor with two sidewalks, suffocated by high houses, must disappear. Cities have the right to be something else that many buildings with corridors". (Le Corbusier, 1924)

Infrastructure becomes, within the formulation of Modern and post modern urban visions, a constant reference, even more a true alter ego to the city itself, duplicating and overcoming it. In this direction proceeds the research of Alison and Peter Smithson that, mostly on infrastructure and its role in contemporary urban development, tried to found a specific design iconography as, for example, in the project for Golden Lane Housing of 1952 or the project for Hauptstadt Berlin of some years later. In Smithson's experimental project the settlement design literally duplicates the infrastructural one. The city raises to a formal simulation of circulation flows, becoming a sort of iconic network mold. The semantic autonomy gained by infrastructure within the construction of urban scene rages, along the last century and up to the contemporary, its own morphology based on elemental figures -as viaducts, flyovers, superficial and underground conducts- strongly conflicting with urban form.

But at the turn of the new millennium we are observing a deep transformation of the figural relationship between infrastructure and urban body. The key factor of this transformation is related to infrastructural proliferation, namely to the exponential growth of networks and transport modes. Major European cities host at least two airports, large harbor areas, several subway lines, traditional rail lines implemented by those of high freight capacity and high-speed. Compared with the amount of infrastructure is also profoundly changed its quality aspect. If in Modernism, in fact, infrastructure constituted an extensive grid of territorial accessibility, today it is increasing in terms of greater intermodal concentration. These two factors, proliferation and higher density, are deeply influencing the change of infrastructural characters, that could be defined as new hybrid morphologies.

Interferences. Infra-urban morpho-types

"Rather the new forms and those inherited from history seem to be able to live within new frameworks of meaning that hide, under the blanket of an apparent familiarity of the daily scene settlement, the multiple and disjoint memberships to the space of flows and the new scales of interdependence with territories at a distance. Thus new settlement morphologies accompany the profound changes that have affected the places of living, producing, consuming and their specific relationships" (Clementi, 2010).

Contemporary infrastructural intersections are mostly envisioning a new European metropolitan scale through the interventions of redevelopment, conversion and expansion of infrastructural lines and areas within urban conditions. Because of the emerging panorama of intermodal transport and the need of physical density, infrastructure cannot be read through individual and autonomous figures as it was in Modernism. Arises, in fact, the problem of new settlement morphologies' materialization, linked to the flow dynamics, which frequently overlap themselves on the stratified territorial frames, generating ambiguous complicities if not outright conflicts.

The proliferation as well as the increasing spatial complexity that these intermodal density bring into the urban scene, make impossible a clear and defined figurative reading. They are merged within the city, mostly relocated in its underground and are more and more presenting the ability to duplicate city itself. For these reasons today we can talk about not single infrastructures, not individual figures, but about new infrastructural grounds articulating urban body and its limits. In that sense we talk about intersections that create new morphologies, in balance between infrastructural and urban spheres. The emerging intersection morphologies have to do with a larger and more complex issue within the

disciplinary debate. It is possible to affirm that intersections represent a key word in the disciplinary framework, that are more and more present within different fields and seen as interactive, hybrid spheres of cultural domain. A semantic intersection we talk is related to infrastructure, urban form and architecture. The semantic hybridizations evolve towards new forms and design configurations in which infrastructure is continuously compared, showing deeply modified in its disciplinary statute. Looking at the main infrastructural and urban transformations happening in EU cities, is possible to enlighten and describe which morphological changes have been defining for the forthcoming years. These interventions are mostly related to redevelopment projects where the infrastructure, exponentially loaded over time, has become a factor of social exclusion, of physics break and, for this reason, of conflict within the social scene. Nowadays these huge transformations are a primary mean of financial attractiveness as privileged sites for new flows demographic and labor, are real engines of economic development and socio-cultural development.

A first case of morphological interference concerns the relation between infrastructure and the recovering and re-appropriation of nature within urban and territorial contexts. The place of the conflict - the ground divided between infrastructure and urban body - is now conquered by an artificial ecology (Allen, 2003), which redraws the cities' ground and internalizes infrastructural figurativeness. In general terms, this trend allows to trace an emerging twenty-first century iconography that appeals to a new arcadia for future scenarios, solving in disappearance, the conflict between infrastructure and urban form. Some examples of this phenomenon could be addressed to the ongoing projects of Avenue 2 for the city of Maastricht or Parque Central in Valencia. Both of them work on the covering of infrastructural lines within urban context, reallocating over them new leisure and green areas. The second case of morphological interference is similar to the previous one and refers to infrastructural interventions in urban conditions. The fundamental choice, in fact, is to reallocate infrastructure in underground spaces (Purini, 2005), creating a sort of infrastructural artificial basements within the cities. Near to the urban subway that builds under the city plan, a physical substrate of mobility interactions. A third form of the intersection between urban body and infrastructure is represented by the concept of threshold, where the infrastructural density appears at the city limits. Indeed these interventions occur in a greater need of surface able to host a dense field of lines, traces, viaducts, building voted to mobility. Patterns that take up more and more impressive bands of liminal territory to the city, becoming no more doors as stations were for the modern city, but real infrastructural thresholds, whereas the increasing extensions fall within a more complex imagery. They constitute, as in the cases of Zuidas in Amsterdam or Euralille, new typological hybridizations between infrastructure, architecture and public space.

In all these morphologies of intersections, that can show a general framework for several ongoing projects in Europe, the role of infrastructural typology emerges with new meanings. Through a process of interdisciplinary synthesis, it appears more complex in configuring new typologies that could be defined as urban morpho types. These present themselves as result of an hybridization process, overlapping for instance three different disciplines such as environment, urban and infrastructural studies, merging together and finding spaces for design interactions. The different disciplines, within the interaction with each other, are weakened. As semantic and figural weakening, which appear similar to state transitions, these new morphotypes are able to weave new scenarios and new compositive configurations in architectural and urban design. The interferences, between infrastructure environment and urban form, are bearers of innovation, for remodeling reading instruments and design methods.

Negotiating urban form

Intermodal Knots. Hybrid Spaces

“Infrastructures allow detailed design of typical elements or repetitive structures, facilitating an architectural approach to urbanism. Instead of moving always down in scale from the general to the specific, infrastructural design begins with the precise delineation of specific architectural elements within specific limits. Unlike other models (planning codes or typological norms for example) that tend to schematize and regulate architectural form and work by prohibition, the limits to architectural design in infrastructural complexes are technical and instrumental. In infrastructural urbanism, form matters, but more for what it can do than for what it looks like”. (Allen, 1999)

The investigation on infrastructural matters becomes a common interests among researchers over the last decades, especially on the topic of High-Speed Railway (HSR), part of the trans-European transport network (TEN-T) policy, and the (re) developments of the hubs along the line. At the city-level, HSR stations emerge as Intermodal Knots that connect different spaces linked to the various parts of the urban surroundings, emphasizing infrastructures’ design potentials and limits (Bertolini, 1996, 2012). The (re) development projects of these hubs raise new urban questions of emerging morphologies – where architecture and infrastructural urbanism are blend together in hybrid configurations across multiple scales.

Furthermore train station area (re) development projects in Europe are assuming new definitions of Typology, as result of the interface between networks and design potentialities for architectural and urban interventions around the node (Peters and Novy, 2012). The notion of Hybrid Typology blends together the issues of flexibility, multi functionality and interconnection between mobility functions and related urban activities. Recent research studies attempt to classify architectural and urban Hybrid Typologies, both in Europe and Asia context, as follow: the hyperpole, the urban connector and the extended hub (Tiry, 2008). These mega-urban structures, as a three dimensional infrastructure, become the interpretation of contemporary spatial experimentation on multi-use buildings that enrich the city’s fabric, based on principle of interconnection between different networks and their capacity to take shape from the intersection between architecture and mobility (Ziedler, 1985; Banham, 1976). Upon taking a closer look at the researches on HSR infrastructural urbanism associated with architectural development in-around intermodal hubs, there is still a line of investigation to be defined in the architectural knowledge: the unfinished and long term (re) configuration processes as current critical issue for the design of HSR station areas across multiple scales.

A large number of strategic National projects, dealing with contextual conditions, such as political and economic constraints (as for example the case of Stuttgart 21 rail station mega-project), are forms part of wider planning initiatives at different policy level and aim at triggering multi-dimensional changes: the (re) development of the station facilities, the interfaces between the infrastructural node and its impact on the urban surroundings and the public-sector strategic interventions and private-sector driven and commercially oriented real estate projects with a longer term purpose in mind. The interaction with local stakeholders deeply influences the configuration of these stations from functioning as truly intermodal nodes to potential interfaces between pre-existing conditions and future urban scenario development (Tesoriere, 2013).

Addressing specific attention to the design process of the HSR stations Torino Porta Susa (Italy), Rotterdam Centraal (Netherlands) and Lille Europe (France), this paper aims to illustrate the typo-morphological design aspects through which infrastructure manages to transform itself from urban dis-connector, that is was in the last century, into connector of hybrid forms. Especially if we consider the overlapping systems of transportation, it is possible to reconstruct a new configuration, both in scale and distribution for each project. The HSR becomes instead the ‘urban connector’ between diverse realities, often addressing to infrastructural nodes an active role of integer of urban and architectural space, in a dynamic layering of multiple scales, in the urban core or at the edge of the City. Torino Porta Susa, Rotterdam Centraal and Lille Europe are representing projects of hinge between living places at different scales, in which the mobility of people, goods and information plays a

central role²⁶¹. The combination of functional and the programmatic flexibility of HSR stations and its environs are often identified through an organization of functional plans or layers of a dynamic system that does not correspond to the different urban shapes in place but to the spatial connections able to generate hybrid conditions. In both vertical and horizontal planes, infrastructure (re) connects interrupted spaces of urban life. Therefore these projects closely link architecture and urban reconfiguration to a markedly political character, which requires the coordination of a variety of planning documents and programs, and also the involvement a great number of actors, by means of negotiation and cooperation between a variety of policy makers and investors. (Terrin, 2011)

Given the variety of scale, economic interests and interaction with the stakeholders (on local, national and international level) that have been targeted, the architectural programs on these projects focus on typological settlement within ambitious master plan, providing a single-building solution, where all activities will be concentrated, for the HSR station in Rotterdam, a multiplicity of buildings in Turin Porta Susa, variably integrated in the urban fabric, and a site with different multi layered urban fragments in Lille.

The station becomes a covered part of the City in Torino Porta Susa, where the linear and horizontal continuum of the structure is a reminiscence of the traditional gallery in the history of the City. (Figure 1) The tracks have been sitting where the boulevard crosses, cutting the city in two parts but at the same time linking both sides through public pedestrian passages. The station is a longitudinal roof that links all the networks and the train disappears from the urban scene below the future Central Spine (D'Ascia, 2010).

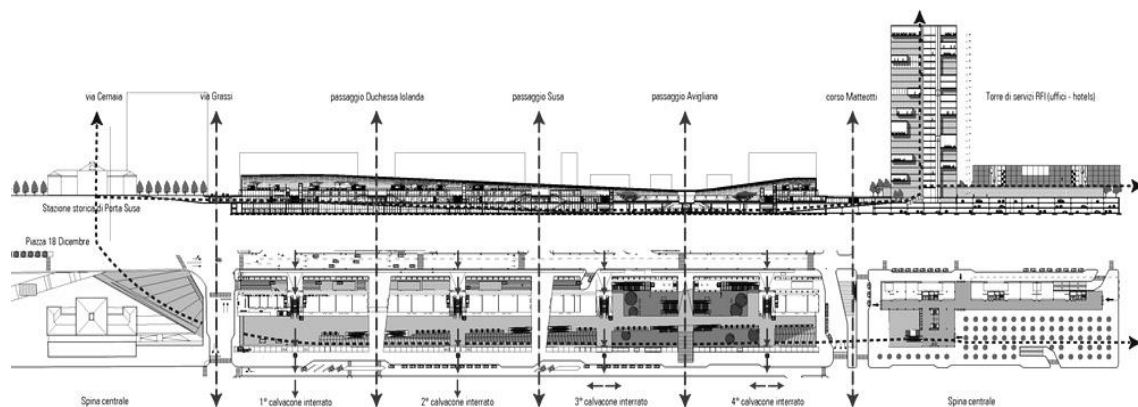


Figure 1. Torino Porta Susa (Silvio d'Ascia Architecture).

The station is a node of urban centrality in Rotterdam Centraal. (Figure 2) In the city of the permanent change, since the post-war reconstruction plans, the master plan for the Central Station quartier (Rotterdam Central District) contributes to the definition of the new skyline for the City. It perfectly fits within the Dutch tradition of integrating land use planning and urban development with transportation planning.

The station belongs to the site in Euralille master plan, the Quantum Leap by Koolhaas. At the beginning of the 90s' Lille was triggered by transportation and urban development around the node Lille Europe. The different networks influenced the position and the function of the station and its relation to the urban environment. As piece of the infrastructure, the station is sitting under high-rise buildings in the middle of the park, where the roof becomes the symbol of the multimodal hub and the envelop of the modern station. (Figure 3) The (re) development of multifunctional area between the two stations, Lille Flandre and Lille

²⁶¹ Torino Porta Susa and Lille Europe have been presented as 'covered part' of the City and as a 'site' by Andrea Heym, Director of International Development AREP, during his lecture The Station is not a Building (23 May 2014, TU Delft).

Europe, is underway after almost twenty years, taking then a central position in the EU urban panomara.

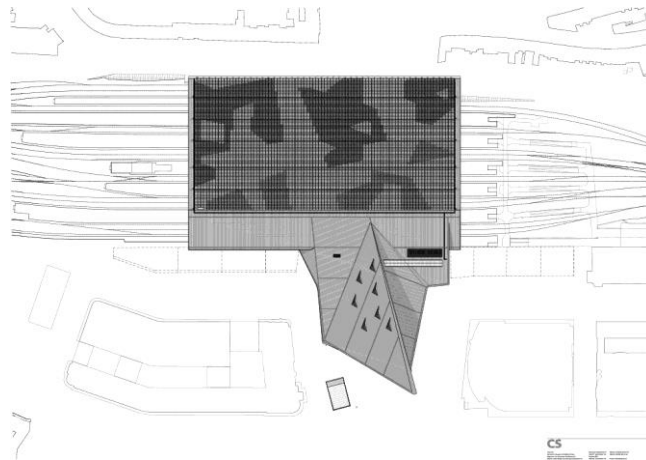


Figure 2. Rotterdam Centraal (Team CS).



Figure 3. Lille Europe (Manuela Triggianese).

Master Planning. Hybrid Process

«It has been recognized for many years now, even by the most rigid planners, than a ‘master plan’, like Utopia, an ideal completed form, can no longer serve the purposes of design in which change and growth may be the essential determinants of order. Forms in their great diversity must become apparent and significant; no single ‘master form’ can do this. Urban design cannot be form alone. Purposeful social commitment must precede all action in the design process without concern for the techniques or shapes through which the commitment may finally be translated into physical reality. (Chermayeff and Tzonis, 1971)

During the last decade the increasingly combination of public policy with private initiatives helps to change the territory of EU cities to promote and position as strategic sites leftover spaces and neighborhoods around the intermodal hubs, located in or out-side the heart of the City. The desire to reconfigure the station and its intermodal character and a number of large real estate projects supported by the Railway Company and private stakeholders contribute to initiate urban interventions for the area. In this context, the City wishes to encourage a renewed ambition by performing larger urban projects around the hub

to implement a coordinated public intention and supervise the work of private actors. Long term ambitions of the urban project – in the ideal form of the Master Plan - pursue the following fundamental objectives: strengthening the status and image of international gateway area, employment hub around the station as part of an overall urban strategy, combining social and functional diversity; take advantage of the excellent accessibility of the public transport to target urban development model based on regional perspectives for the area.

Therefore the complexity, as result of long term purposes for the development of an infrastructural area, lays in the following tasks: the design of an urban project (programming, densities and urban forms, templates, landscape, urban and architectural requirements, requirements for the design of public spaces including lighting design and signage, etc.); the study of multimodal mobility (including the definition of scenarios and traffic plans change and networks modeling the impacts of different scenarios of urban planning and mobility); economic feasibility studies and financial; the possible implementation of the Master Plan (where the architect becomes the coordinator of the process) monitoring the projects (architecture, public spaces, mobility) and its adaptations. In the negotiation of these hybrid urban configurations can be confirmed the Deleuzian assumption « Creation's all about mediators. Without them nothing happens ». (Deleuze, 1990)

These complex issues raise major questions in terms of density and morphology, especially at the district level of HSR stations (Bajard, 2007). Research on high speed railway and the mega projects along the network increasingly proliferate, in relation to the evolution of urban dynamics and different national context. (Bruinsma et al., 2008, Peters et al., 2012) Furthermore contemporary utopian models (master plan) as urban renewal by means of large-scale interventions around nodes, require a particular investigation on decision-making processes and the role of the architectural design within its complexity, especially for the design (re) development of infrastructural areas.

Conclusions

Throughout the different morphologies of intersections, presented as a framework for several ongoing projects in Europe (Berlingieri and Triggianese, 2013), the role of infrastructural matters emerges with new meanings. The issues of interdisciplinary (environment, infra-urban and design process studies) keep configuring more complex typologies that could be defined as new Urban Morpho-Types. They present themselves as result of hybridization, both in spaces and in process, overlapping for instance three different disciplines, linked together in new composite configurations in architectural and urban design interactions.

“Infrastructural work recognizes the collective nature of the city and allows for the participation of multiple authors. Infrastructures give direction of future work in the city not by the establishment of rules or codes (top-down), but by fixing points of service, access, and structure (bottom-up). Infrastructure creates a directed field where different architects and designers can contribute, but it sets technical and instrumental limits to their work. Infrastructure itself works strategically, but it encourages tactical improvisation. Infrastructural work moves away from self-referential and individual expression toward collective enunciation”. (Allen, 1999)

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Teaching urban form

Considering how aspects of urban form are taught is of increasing importance as the subject becomes more international and more interdisciplinary. Further, some key figures in the field are retiring, and a new generation of researchers and practitioners needs to be recruited and educated. Finally, the challenges posed by technological advances in data collection and analysis need to be explored. This is a big agenda, and this session can only make a start. We have sought contributions from academic and professional courses, and from different national contexts. We have deliberately sought comparisons, with local innovations being set in wider contexts. But this session does not provide a 'how to' manual for teaching urban form: it questions approaches and demonstrates good practices. Many issues will remain unexplored; but the profile of teaching urban form will be raised for future conferences.

Peter J. Larkham

Teaching and Seminar of Urban Morphology in Peking University, China

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Abstract. *There are three teaching and seminar activities on Urban Morphology in Peking University, whose academic background is urban geography and urban planning, under the charge of Prof. Feng Song, from UMRG.CN. The first one is the undergraduate course, Introduction of Urban Morphology. The second is the graduate course, Senior Lectures of Urban Form and Culture. The third is the seminar about theory and practice of Urban Morphology in the research group for graduate students. Through the design of curriculum, the research group focuses on important issues, like multidisciplinary background of urban morphology; disciplinary history of Conzenian School, Italian School and Chinese School; method and tips of field work survey; integrated research with practice and multi-cultural comparison and international communication. On the other hand, there are also some difficulties during the urban morphology teaching, like language, field work survey, multi-cultural comparison etc. The paper also gives the future plan of urban morphology teaching in Peking University.*

Key Words: Urban Morphology; Teaching and Seminar; Peking University

Academic Background of Urban Studies and Planning in Peking University

Peking University was founded in 1898, considered as the earliest modern university and the supreme comprehensive university in China. Different from the origin of architecture in technology universities, Urban Studies and Urban Planning in comprehensive university usually derived from geography, focusing on multi-scale urban problems and strategies handling with them.

The academic background of urban studies and planning in Peking University could be retrospect to the Department of Geology and Geography, which integrated Geography, Geology and History from other universities before 1949. In the early time, site selection of industry was the most important research and practice of the department. Through 50 years, the department has developed to three colleges with various subjects (see Fig.1). At present, Urban Studies and Planning in Peking University has the fundamentals of multidisciplinary academic background with the core of urban geography.

Teaching and Seminar of Urban Morphology in Peking University

Similar as the worldwide development of Urban Morphology, despite of its long history in China since 1930s, the academic interest in the study urban form arouse after 1990s considering its influence on urban planning and design.

However, in comparison with the situation in China, the teaching and research of Urban Morphology has played an important role since 1950s in Peking University because of its tradition of historic geography research. Prof. Hou Renzhi, whose supervisor was Sir Henry Clifford Darby, has focused on the historical process of Beijing after finishing his study in Liverpool University. Although the research of Prof. Hou did not use the terminology of Urban Morphology, his concentration had reached some important issues like geographical difference

of urban landscape. Thanks to the corporation with archeological department and opportunity to make early urban planning in China in 1980s, the teaching and research of urban form in Peking University had long-time accumulation especially in these historical cities, which provided profound academic tradition and atmosphere.

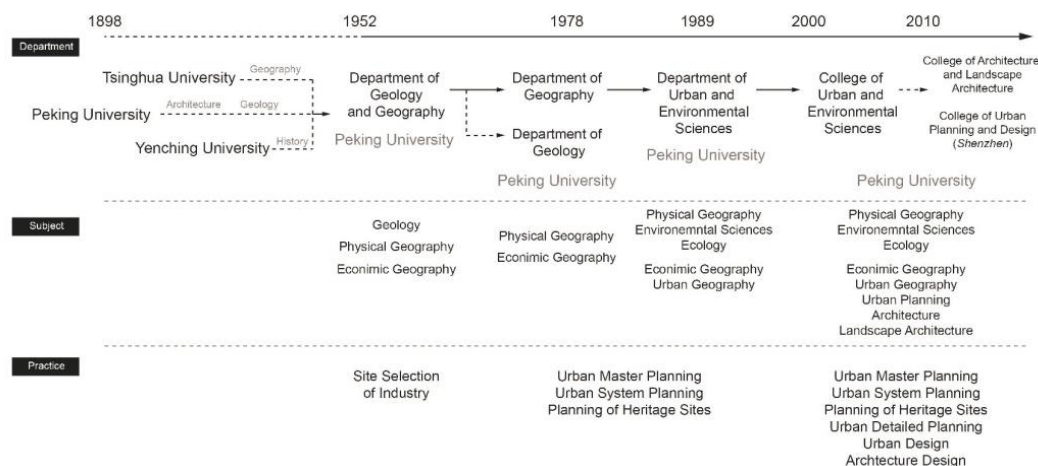


Figure 1. Change of Department, Subject and Practice of Urban Studies and Planning in Peking University.

After his retirement, the rise of urban system and urban structure research to some extent affected the study of urban form in Peking University. These researches focused on the other aspect of urban geography using massive cross-sectional data integrated with the approach of geometrics and GIS. Up to now, these researches have still held the dominant position in urban geography, while the tradition of historic geography has gradually been overlooked because of its “incomplete” academic paradigm.

After 2000, the “culture turn” of Chinese urban geography and more and more highlighted city problems led the rethinking of the urban form study especially influenced by the idea of American urban planning, such as Kevin Lynch. At the same time, Prof. Song Feng got to know the Conzenian academic tradition of Urban Morphology and ISUF. After his academic visit to UMRG cooperating with Prof. J.W.R.Whitehand, he started to found the research group of urban form in China and reestablish the teaching system of Urban Morphology in Peking University.

In the teaching system of Urban Morphology in Peking University, integration of Chinese and European academic tradition seems to be the most significant issues as well as the application of Urban Morphology in the teaching of urban planning. Because of its multi-disciplinary knowledge preparations and its influence on planning practice, the introduction course has been arranged in the 6th Semester of undergraduate students since 2011, given its mid position of the teaching plan (see Fig.2). In addition, the UMRG.CN seminar has been prepared for the graduate students who have deep interest in this field, including: perusal of important academic literature, monographic independent research and academic lecture. In 2013, another graduate course named as Senior Lectures of Urban Form and City Culture was established for the students major in architecture and urban design focus on the application of Urban Morphology (see Tab.1).

The details of these teaching and seminar activities will be illustrated in the following parts.

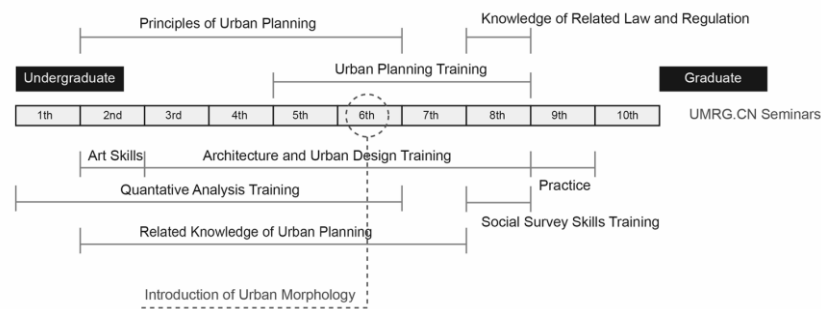


Figure 2. Position of Urban Morphology in the Teaching Plan of Urban Planning.

Table 1. Brief Information of Teaching and Seminar of Urban Morphology

Course and Seminar	Starting Time	Credit	Type	Participant
Introduction of Urban Morphology	2011	2	Optional	Undergraduate Students, (Urban Planning, Urban Geography) <i>College of Urban and Environmental Sciences, Peking University</i>
Senior Lectures of Urban Form and City Culture	2013	1	Optional	Graduate Students (Architecture, Urban Design) <i>College of Urban Planning and Design, Shenzhen Graduate School of Peking University</i>
UMRG.CN Seminar	2011	Professors and Graduate Students whose concentrations are Urban Morphology in China		

Undergraduate Course: Introduction of Urban Morphology

Target of the Course

The target of the course is to help undergraduates learn the system of Urban Morphology, including: understanding the key concept of Urban Morphology, comprehending the disciplinary history of different school and applying the terminology and theory in urban form study. Because of the academic background of UMRG.CN, the course focuses more on the concept and theory of Conzenian School.

However, since the course assessment is the independent research of Urban Morphology, ‘Introduction of Urban Morphology’ gradually becomes one of the most important guides for the potential students whose concentration is Urban Morphology and help them build their own academic habits and interests.

Significant Issues of Curriculum Design

The curriculum design mostly follows these principles:

Firstly, the curriculum is divided into 5 parts referring different topics, including: disciplinary history, concept and theory of Conzenian Urban Morphology, basic introduction of building typology and cross-culture research. In these 5 parts, Conzenian Urban Morphology is the most important one, which leads the mainstream of the introduction course. In the curriculum design, Chinese local urban morphology study is also included to compare with the classical ones.

Secondly, the arrangement of the course follows the logic to present the academic context of urban morphology. The origin and development of urban morphology is designed to present first, dating back to the late 19th Century Germany geography. Then, the case study of Alnwick is designed to present after the disciplinary in order to use a classical case study to illustrate the terminology system of Conzenian Urban Morphology and help students understand what the

town-plan analysis is and how to make it. After the case study, concept of urban landscape, building typology and cross-culture research are designed to present more recent research results of the concept, theory and case study in the field of urban morphology(see Tab.2).

Thirdly, the course includes lecture section and discussion section. There are totally 12 lectures and 4 discussions in one semester. The lecture section is mostly prepared by Prof. Song Feng, but the building typology course is designed as the joint teaching with Southeast University. Prof. Deng Hao has been invited to present lectures of his research. The discussion section requires the student to read the classical paper in such topic and presents their idea based on these literatures. The topics of discussion include disciplinary history of urban morphology, Alnwick study, Conzenian and Italian school urban form study, approach and significance of cross-cultural research. All students are required to make 4 paper reviews in each discussion course and at least make 1 presentation for their idea.

Finally, the course assessment needs the students to take the independent research and make the field research work(see Fig.3). This assessment could help student take some practice in the field work and make some brief urban morphology study integrated with just learned theory and concept independently. The assessment also could lead them to understand the urban landscape around them which will help them in their future work of urban studies and planning.

Success and Experience

This course is one of the few urban morphology courses for undergraduate students in China. Although the course just went through a few years, there also exists some success and experience which could be shared all around the world:

1. It is not a good idea to present the concept and theory first, because it is hard to understand for new learners. Presenting the disciplinary history and classical case study will help them where these concept and theory come from.
2. Reading classical papers plays the most important role of teaching because it could give more details of the study. However, it is also hard for students to read the paper without any guides. Some papers could be introduced in the lecture part to help students be familiar with it.
3. Field work and independent research are important for the students who are new in this field. This could help them find their own academic interest and better understand the cities at least.

Graduate Course: Senior Lectures of Urban Form and City Culture

Target of the Course

The target of the course is to help graduates who only want to grasp the basic idea of urban morphology which could help them in the field of urban design. Most students taking this course learn architecture when they are undergraduate students. This course focuses more on how to help students understand the context of city, cultivate their capacity and integrate some idea into practice.



Figure 3. Picture about the Field Wok of the Course.

Table 2. Curriculum of ‘Introduction of Urban Morphology’.

Week	Arrangement	Description
1-2	Chapter 1. Origins and Development of Urban Morphology	Basic Concept, Disciplinary History Chinese Urban Form Research
3	Discussion 1: Disciplinary History of Urban Morphology Selected Paper: [1] Moudon, A.V. (1997) ‘Urban morphology as an emerging interdisciplinary field’, <i>Urban Morphology</i> vol. 1 pp. 3-10. [2] Cataldi, G., Maffei, G.L. and Vaccaro, P. (2002) ‘Saverio Muratori and the Italian school of planning typology’, <i>Urban Morphology</i> , Vol. 6, No. 1, pp. 3-20. [3] Cataldi G. (2003) From Muratori to Caniggia: the origins and development of the Italian school, <i>Urban Morphology</i> , Vol.7 No.1, pp.19-34. [4] Whitehand, J.W.R. (1997) Why Urban Morphology_Editorial Comment, <i>Urban Morphology</i> , Vol.1, No.1, pp.1. [5] Whitehand J W R. (2001) British urban morphology: the Conzenian tradition. <i>Urban Morphology</i> , Vol.5, No.2, pp. 103-109.	
4-6	Chapter 2. Case Study of Alnwick	Case of Alnwick, Achievement and Idea of M.R.G.Conzen
7	Discussion 2: Alnwick Study Selected Paper: [1] Conzen, M.R.G. (1960) Alnwick, Northumberland: a study in town-plan analysis, Publication No. 27, Institute of British Geographers, London; reprinted with minor amendments and Glossary, 1969. [2] Conzen, M.R.G. (2004) Thinking about urban form: essays on urban morphology, edited by M.P. Conzen, Lang, Oxford.	
8-11	Chapter 3. Concept of Urban Landscape	Conzenian School of Urban Morphology Urban Landscape, Plot Cycle, Fringe Belt, Landscape Unit, Agent of Change
12	Chapter 4. Building Typology (Joint Teaching with Southeast University)	Italian School of Building Typology Concept and Theory of Building Type, Typological Process
13	Discussion 3: Conzenian and Italian School Urban Form Study Selected Paper: [1] Kropf K.S. (2001) Conceptions of change in the built environment. <i>Urban Morphology</i> , Vol.5, No.1, pp. 29-46. [3] Corsini M.G. (1997) Residential building types in Italy before 1930: the significance of local typological processes. <i>Urban morphology</i> , Vol.1, No.1, pp. 34-48. [4] Whitehand J.W.R. (1972) Building cycles and the spatial pattern of urban growth. <i>Transactions of the Institute of British Geographers</i> , pp.39-55. [5] Caniggia G, Maffei G L. (2001) Architectural composition and building typology: interpreting basic building. Alinea Editrice.	
14-15	Chapter 5. Cross-culture Research of Urban Morphology (Field Work in Beijing)	Cross-culture Comparison, Field Work, Independent Urban Morphology Research
16	Discussion 4: Approach and Significance of Cross-cultural Research Selected Paper: [1] Conzen, M.R.G. (2004) Thinking about urban form: essays on urban morphology, edited by M.P. Conzen, Lang, Oxford. [2] Whitehand J.W.R. (2009) The structure of urban landscapes: strengthening research and practice, <i>Urban Morphology</i> , Vol.13, No.1, pp.5-27.	
Course Assessment: 1) Independent Research based on Urban Morphology 2) 4 Paper Reviews and at least 1 Presentation in Discussion Course		

Significant Issues of Curriculum Design

The curriculum design mostly follows these principles:

Firstly, the curriculum is divided into 5 parts referring different topics, including: concept of urban morphology, Conzenian School Urban Morphology, Italian School Building Typology,

urban morphology and city culture: cross-cultural and morphogenetic approach and application of urban morphology in urban planning and design. Different from the undergraduate courses, application of urban morphology becomes the most important part here.

Secondly, in the arrangement of theory teaching, the lecture is designed not only to illustrate the concepts but also more on how urban morphology could help in urban studies and urban planning. For example, morphological process is related to how city culture is formed and urban landscape unit is related to the site and context as the basis of urban design.

Finally, the course assessment is an independent research or design works based on urban morphology. This requires the students integrate urban morphology with their own academic interest and design practice, which could help them better grasp the critical part of urban morphology.

Table 3. Curriculum of ‘Senior Lectures of Urban Form and City Culture’.

Week	Arrangement	Description
1	Chapter 1. Concept and Theory of Urban Morphology	Basic Concept, Disciplinary History Chinese Urban Form Research
2-4	Chapter 2. Conzenian School Urban Morphology	Case of Alnwick and Conzen’s Achievement Conzenian School of Urban Morphology
5	Chapter 3. Italian School Building Typology	Italian School of Building Typology Concept and Theory of Typological Process
6-7	Chapter 4. Urban Morphology and City Culture: Cross-cultural and Morphogenetic Approach	Urban Landscape Unit/Urban Tissue and their Relationship with City Culture Cross-cultural Comparison of Urban Form
8	Chapter 5. Application of Urban Morphology in Urban Planning and Design	Application of Urban Morphology in Heritage Conservation Planning and Urban Design
Course Assessment: Independent Research or Design Works based on Urban Morphology		

Success and Experience

This course is not designed for the graduates whose concentrations are urban morphology but the ones who need it in their design or research. This course is the new one for the graduates major in urban design but it actually receives the good effect. The success and experience of this course maybe more helpful for most colleges of urban planning and urban design:

1. It is helpful to integrate existing concept and theory with the urban planning practice, especially for the students who need urban morphology but not take the research.
2. It is important to help more graduates learn the idea of urban morphology, because the idea will be taken into planning practice which could give more opportunities for the scholars to bridge the gap of research and practice in the future.

UMRG.CN Seminar: Theory and Practice of Urban Morphology

Target of the Seminar

The target of the Seminar is to help graduates who are interested in urban morphology and want to take deeper research. Most students in the seminar have taken the course “Introduction of Urban Morphology” when they are undergraduates, so they have a clear view of what is urban morphology.

The seminar is not only for the graduates but also for the researchers from all over the world who are interested in urban morphology. The role of the seminar is to provide the opportunity of academic communication for both researchers and students.

Arrangement and Topics of the Seminar

The seminar is divided into three parts: classical literature review, lecture and thematic study (see Tab.4).

The target of Classical Literature Review is to read the paper by former famous scholars more carefully in order to find important ideas and details critical to present research. In this seminar, 3 books are selected for reading: M.R.G.Conzen's 'Alnwick, Northumberland: a study in town-plan analysis' and 'Thinking about urban form: essays on urban morphology' and Caniggia's 'Architectural Composition and Building Typology: Interpreting Basic Building'. The work of Alnwick is the most important literature for the new comer. A lot of detailed review has been done to help learn Alnwick's academic point(see Fig.4).

Despite the literature review, lectures are also important in the seminar. M.P.Conzen and J.W.R.Whitehand have been invited to give the lectures in 2011 and 2013. In the seminar, the lecture becomes not only the way to present the knowledge of Urban Morphology, but also the important opportunity for scholars across the world to communicate with each other.

Thematic study is the most important topic in the seminar. Until now, 4 theme researches have been done: Urban Landscape Analysis of China after 1949, Urban Morphology and City Problems, Urban Morphology and Heritage Conservation, Chinese Urban Morphology Research. The cities of case study are across the whole country, e.g. Beijing, Shanghai, Jiujiang, Macao and etc. Thematic study is important for learning Urban Morphology, because it helps graduates cultivate the research skills and review the concept and theory of this field.

Table 4. Arrangement of UMRG.CN Seminar.

NO.	Arrangement	Description
Classical Literature Review		
1	Conzen, M.R.G. (1960) Alnwick, Northumberland: a study in town-plan analysis, Publication No. 27, Institute of British Geographers, London; reprinted with minor amendments and Glossary, 1969.	Detailed review of Conzen's approaches, terms and research details in the study of Alnwick.
2	Conzen, M.R.G. (2004) Thinking about urban form: essays on urban morphology, edited by M.P. Conzen, Lang, Oxford.	Detailed review of Conzen's original idea of Urban Morphology and other case studies.
3	Caniggia G, Maffei G L. (2001) Architectural composition and building typology: interpreting basic building[M]. Alinea Editrice.	Detailed review of Canaggian original idea of Building Typology.
Lectures		
1	M.P.Conzen in 2011	Cross-cultural Comparison of Fringe Belts
2	J.W.R.Whitehand in 2011, 2013	Conenian approach of Urban Morphology Research in China(Beijing, Pingyao, Guangzhou)
Thematic Study		
1	Urban Landscape Analysis of China after 1949	Case Study: Shenyang(<i>Wu Menghe</i>), Yuxi(<i>Dai Ying</i>), Shenzhen(<i>Xiong Xinkai</i> , <i>Shi Chunhui</i>), Beijing (<i>Shi Chunhui</i> , <i>Dai Ying</i>), Shanghai(<i>Xiong Xinkai</i>), Chengdu(<i>Ma Yandi</i>)
2	Urban Morphology and City Problems	Physical Environment Study (<i>Liang Yuecong</i>)
3	Urban Morphology and Heritage Conservation	Case Study: Kuling Town(UMRG.CN,J.W.R. Whitehand and S.M. Whitehand), Macao(<i>Liang Yuecong</i> , <i>Xiong Xiao</i>), Beijing(<i>Xiong Xinkai</i>), Kaiping(<i>Liu Hao</i> , <i>Xiong Xinkai</i>)
4	Chinese Urban Morphology Research	Zhao Zhengzhi's research work(<i>Song Feng</i> , <i>Dai Ying</i> , <i>Shi Yanhui</i>)

Success and Experience

This seminar is designed for the Urban Morphology research student and scholars. It is the most common way of communication for the researchers concentrating in Urban Morphology all over the world. The success and experience of this seminar maybe helpful for the foundation of similar type of Urban Morphology Seminar:

1. It is helpful to review the classical literature again and again, because the most excellent case study has not been transcended. Therefore you can get a lot of information from the old paper about the idea, viewpoint, academic history and skills in the field of Urban Morphology. On the other hand, the more you know about the classical literature, the more you understand the future research.

2. It is important to get group research, because the students can share more information through the same topic and find newer information about it.

3. No matter how large the cultural difference is, cross-cultural communication of the viewpoint shows its significance for future research.

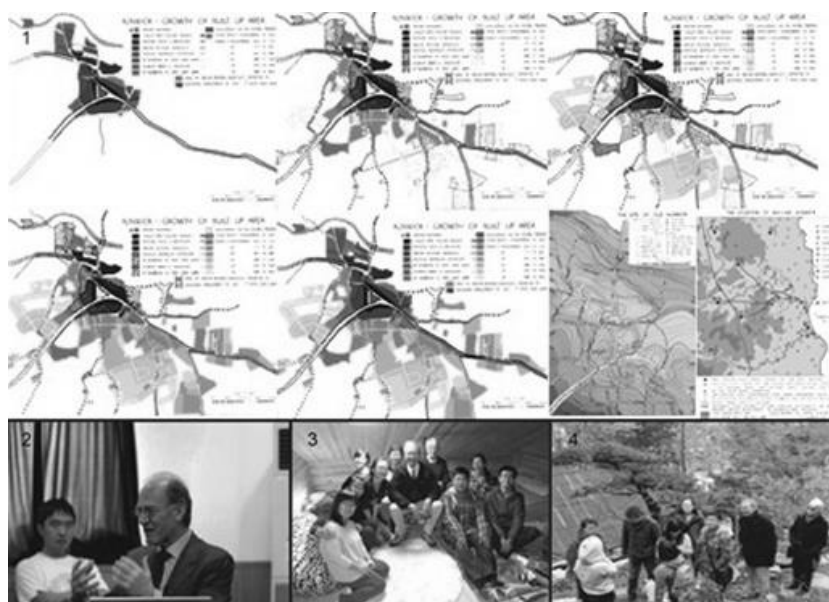


Figure 4. Picture of the Seminar (1: Research Result in the Seminar; 2: Seminar Lecture by M.P.Conzen; 3,4: Field Work with J.W.R.Whitehand and S.M.Whitehand).

Conclusion and Discussion

Difficulty faced in the Teaching and Seminar

Although the teaching and seminar of urban morphology in Peking University has received satisfactory results, a list of difficulty also appears in these years.

The first difficulty is the language in translation of glossary and urban history. In the introduction of Alnwick study, the students appeared very confused to some glossary which is easier to understand in different cultural background, such as burgage, town-plan etc. However, the glossary and some terms related to urban history and institution could not be easily changed into another one because of the loss of cultural information. For example, the concept of “plot” could not just transplanted into Chinese term “dikuai”(地块) without any notes, because the “plot” especially “burgage” contains more important information of morphological period.

The second difficulty is the multidisciplinary teaching, mostly the gap between geography and architecture. Conzenian School and Italian School have different academic background with different academic habit and knowledge. However, in actual urban morphology study, it is more important for researchers to get a comprehensive and multidisciplinary view. This requirement is quite difficult for students if they want to get more achievement.

The third difficulty is the field work survey. Actually, the field work requires the most experience in the whole process of research. However, for the young people who are new to this field, the details in the landscape are hard to find and understand. The teacher also does not have enough vitality to guide each student carefully. Thus, it is necessary for the experienced scholars to prepare a Guide Book of Investigation which could help new students get some useful skills in field work.

The fourth difficulty is multi-cultural comparison. It is not only the problem for the students but also for all scholars. To cultivate more future scholars in urban morphology, international communications are critical especially for young students, including: visiting research, global cooperative study etc.

Further Discussion

Urban Morphology is a “new” research field with more than 100-year academic history. However, the teaching of urban morphology is even “newer” because of its unsystematic state. There even not exists a whole textbook referred to urban morphology. Thus the share of teaching experience is more important for our common future of urban morphology giving the fact of raising number of ISUF members and papers.

The teaching and seminar of Peking University only have a short history. Our research group is also new to this field. Therefore it is significant to build more close and global relationship of each university offering courses of Urban Morphology considering the cross-cultural nature of this research field.

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The relations between research and practice

In January 2013 Michael Conzen, then president of ISUF, launched a task force to strengthen the relation between urban morphological research and planning practice. Subsequent responses to accounts of progress of the work, published on the ISUF website and in *Urban Morphology*, including an exceptional number of Viewpoints, confirmed that there was a latent body of opinion and experience which seemed to be waiting for a vehicle for its diffusion. The papers in these parallel sessions confirm the extent to which urban morphology has been applied in practice in wide variety of countries and through a diversity of practice instruments which range far beyond those few western countries which have hitherto dominated the field. This broadening of the context also responds to a major intention of the embryonic Porto Charter and it is hoped that it is a start to a new and fruitful chapter in ISUF's endeavours.

Ivor Samuels

Making a case for the broadening of the urban morphologist's battlefield - the impediments for small-scale development in Miami-Dade County

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Abstract. *Following Moudon's work on the history and philosophy of the ISUF (International Seminar on Urban Form) movement, urban morphology can be described as the study of the physical form of cities and the process of city-making. Particular emphasis is given to the notion of time and the importance of the single lot as the fundamental unit of evolutive analysis. As a professional and foremost academic set of methods, urban morphology functions empirically and descriptively, even though the complexity of city-making, its multi-disciplinary character and behaviorist interdependencies do not facilitate the scientific proof of causalities. This paper further explores the discipline's normative challenges, particularly on the base of the above-mentioned positivist limitations, but also on the background of implementation issues for the present. To what extent, and for whom, can or should common goals be defined? Which ones are crucial for the creation or retention of an urban environment that does not mock the fundamentals of what we call "urban grain"? How can we have an impact on city- and policy-making without losing the freedom of a neutral academic discipline? As a very tangible example of one of the discipline's allegedly most important issues, the one of scale, the paper discusses legal obstacles to small-scale development in Miami-Dade County. Informed by Moudon's definition of the city as "the accumulation and integration of many individual and small group actions" (Moudon, 1997, p. 3), the authors address the current virtual impossibility of implementing this definition due to systemic impediments to small development.*

Key Words: normative challenges, small-scale development, Miami-Dade County, policy implications, implementation issues

Introduction

Initially, this call for papers was perceived as a simple opportunity to study and raise awareness of a very specific development issue: legal obstacles to small residential development in Miami. On second thought, the authors questioned the obviousness of this endeavor, sensing that such a non-historic analysis of the development processes falls outside of the canon of academia.

To test this intuition and make it part of the paper, we explored all the abstracts from the past eight years of "Urban Morphology", a leading publication in its field and the one closely associated to this conference. How many of the 64 contributions dealt with a similar topic?

Only a few articles -- such as "The morphological dimension of municipal plans" (Volume 10.2, p.101-113) and "The persistence of suburban centres in Greater London" (Volume 14.2, p.85-99) -- genuinely extended their analysis of historic urban development processes into the present. Several other articles mentioned the issue, but did so abstractly, without analysis of specific contemporary forces on development, as if these forces -- including economic constraints and legal requirements -- were no longer relevant to city-making.

A similar exercise for the journal "Urban Design International" revealed a higher percentage of papers that examine current conditions. This suggests the discipline of urban morphology (at least for the active contributors of the eponymous journal) is still perceived as a specialization in a historic understanding of urban development, rather than in urban development as such -- past, present, and future.

This is not surprising given Moudon's characterization of the movement as originally confined to geographers, but it underscores her concerns regarding the discipline's further evolution and impact. Jeremy Whitehand, editor of "Urban Morphology", has repeatedly published similar reflections, such as "Making connections" (Volume 16.1, Editorial Comment) and "Towards a more integrated approach" (Volume 10.2, Editorial Comment).

We would like to suggest possible reasons for this tendency of urban morphology to focus on historic development patterns and the important role played by laws and procedures, but not extrapolate such importance to present and future development. Keep in mind that the below possible reasons reflect the personal opinions of an urban designer and a developer, and furthermore are likely not reflective of geographers, planners, or architectural historians.

(i) As mentioned by Moudon, urban morphology as a discipline can be understood as a critique of and reaction to Modernism, and specifically Modernism's ambivalent relationship with history. Studying the past is hence not only a crucial methodological component, but also a professional and even political statement.

(ii) Historic research and contemporary research differ in methods, skills, and sources, and they attract different kinds of scholars. Contemporary research particularly lacks previously-published work, and its primary sources -- communications with developers and designers -- can be full of colorful and evocative "marketing language" that obscures relevant details like legal obstacles.

(iii) The most recent generations of city-makers -- developers, planners, designers, engineers, lawyers, etc. -- are most familiar with large-scale interventions. From the famous city-extending projects of the second half of the 19th century (Barcelona's Eixample, Vienna's Ringstrasse, Castro's Plan for Madrid, etc.) to Germany's Siedlungen of the 1920s to post-war public housing projects, urban planning academia has been preoccupied with "big power" and its implementation, preferably of visionary character.

However, the plain fact that a large-scale plan was implemented (often because the relevant government was persuaded to change laws) does not prove that the content of the starting vision was the only or even most important determinant for its final outcome. It may be that the large-scale state of mind obscures and underestimates some of the aspects of development that were actually operative. Regarding developments (especially vernacular ones) in the more distant past, physical, economic, and legal "details" are -- in contrast -- considered of crucial importance, details such as building materials (e.g. wood beam strength in row houses), material prestige thinking (e.g. Shanghai Shikumen), property tax calculation (e.g. the width of houses in Amsterdam or Charleston), or laws regarding inheritance (e.g. Tokyo mini-houses). Yet for contemporary projects only the conscious design intent seems to be relevant.

This point leads to two contradictory conclusions: on the one hand, the machinery of large-scale development has prevented the emergence of new types of vernacular architecture, or such types have emerged but a large-scale state of mind has clouded our ability to detect and analyze them.

(iv) Architects often view their work primarily as externalizations of their vision, regrettably constrained by parameters. An architect is given certain parameters by the client or building codes or engineering calculations, and after a brief analysis, the architect creates a form and space that accomplishes the parameters and expresses creativity. It is not central to his work to examine the source of the parameters, or to question them. Unlike an economist or a planner, the architect is not interested to know how economic and legal forces influence behavior and outcomes. This is also true for urban designers. For good or for bad reasons many designers try to force his or her will as a product on the environment, rather than to see design as a process of internalizing exterior forces.

To summarize and tie back to the main thrust of this paper, we have tried in this section to understand possible reasons that urban morphology has not paid special attention to the contemporary development process, including obstacles economic, legal, and otherwise. The next section will scrutinize exactly such obstacles and how they shape development using the

case study of a single product in a single US local government: new small residential construction in the City of Miami.

Legal obstacles to small residential development in Miami

New small residential construction faces many obstacles, some inherent in its small size (i.e. lack of economies of scale), but many others artificially imposed by law. Legal obstacles come in three flavors: 1) make small buildings physically impossible, or 2) increase cost or 3) decrease revenue. Often one obstacle will both increase cost and decrease revenue, for example required parking drives up a small building's construction cost and reduces its net square feet (or, because required parking is usually prescribed on a per-unit basis, it steers a small developer to subdivide the building into fewer, larger units).

Obstacles result from laws at every level of US government: federal, state, and local laws, regulations, unwritten policies and interpretations. Because the legal obstacles occur at varying levels of government that do not coordinate, the obstacles are difficult to catalog and their effects difficult to isolate.

We provide this case study of Dade County, to show a few of the many obstacles faced by small developers, explore their effects, and ask the reader to imagine these problems multiplied across all the cities in the US, all its counties and states, and countless federal laws.

Federal Regulations Regarding Permanent Debt

Obstacle: An example of a legal obstacle at the federal level are regulations regarding how the government buys permanent debt (long term, not construction debt) for small residential buildings with up to four units. The federal program is very useful if you want to build a building with up to four units, but penalizing for five or more.

Law: The program is intended to promote home ownership, and the US federal government buys notes through its subsidiaries Fannie Mae and Freddy Mac to give an additional incentive to private banks to make loans for owner-occupied buildings: a guaranteed "secondary market". Because the federal government's desire to promote home ownership is so great, the program is "over-inclusive" (to an extent) so as not to exclude houses that happen to have a "granny flat" or other accessory unit. Fannie Mae and Freddy Mac will buy a note for buildings with up to four units.

Effect: How does the secondary market for permanent debt affect new construction of small rental buildings? Banks are more likely to make a construction loan if they know that, at the end of construction, there is more likely to be a buyer (or refinance) to pay off the construction loan with permanent debt. So there is more construction debt for buildings up to four units, but less for buildings with five units or more.

It is a legitimate concern that this program creates "moral hazard" for one- to four-family home ownership. However, even if the US government is in the business of creating moral hazard, it should be acknowledged that the four-unit "bright line" regulation has a secondary but significant negative effect on small but more dense development.

State Fire & Building Code

Obstacle: At the state level, a key legal obstacle is the state building code requirements for the number of exits that a building must have. A tower with a large floor plate can absorb two stairs, but a small building ends up mostly stairs.

The number of exits – and thus separate stairs and corridors leading to exits – is another example (like required parking discussed below) of a "two-point swing" in the wrong direction for small developers: stairs increase construction cost and reduce each floor's net square feet.

More specifically, for a small building, the jump from a single exit to two stairs, corridors, and exits can be catastrophic. Assume a stair occupies about 200 square feet per floor. In the

City of Miami, a residential tower in the most dense and intense zoning area (T6-80) can have a floor plate up to 18,000 square feet (Article 5, page 41). One stair occupies 1% and two stairs occupy 2%, a difference of only 1%.

However, most of the city is platted into lots of 50 feet wide. Assuming a building with zero side setbacks (permitted in T4, 5, and 6) and 60 feet deep (a typical apartment unit is 30 feet deep), its floor plate is 3,000 square feet. One stair occupies 7% and two stairs occupy 13%, a difference of 6%. So state egress rules have a potentially 600% greater impact on the assumed small typology than on the large tower.

In Florida, laws regarding the number of exits come from both the state's adopted Fire Prevention Code and its Building Code. The requirements differ in each code, so must be read carefully to find the small area where they overlap. If a building design meets the requirements of one code but not the other, it must have two stairs (or more).

Law: Florida Fire Prevention Code Section 30.2.4 states that for new apartment buildings "a single exit shall be permitted in buildings where the total number of stories does not exceed four" subject to a maximum of four dwelling units per floor and a maximum travel distance of 35 feet. The building must have 0.5-hour fire rating between units both horizontally and vertically, and must have an automatic sprinkler system. Corridors and exit stairway must have 1-hour fire rating with self-closing doors. The stair may not serve more than one-half [sic] story below the level of exit.

Florida Building Code Section 1021.2 states that "only one exit shall be required" for Group R-3 occupancy buildings (one or two units) and certain other occupancies. An occupancy is a space with a specific use within a larger building. Such occupancies are subject to a maximum number of occupants (or dwelling units) per floor and a maximum travel distance to the exit, reproduced below.

Table 1. Story, occupancy, maximum occupants

Story	Occupancy	Maximum Occupants (Or Dwelling Units) Per Floor And Travel Distance
First Story Or Basement	H-4, H-5, I, R	10 Occupants And 75 Feet Travel Distance
Second Story	R-2	4 Dwelling Units And 50 Feet Travel Distance
Third Story	R-2	4 Dwelling Units And 50 Feet Travel Distance

Footnotes state that "basements with a single exit shall not be located more than one story below grade plane", and third story R-2 occupancy may have a travel distance of 100 feet if equipped with an automatic sprinkler system and provided with emergency escape and rescue openings.

Effect: While the Fire Prevention Code suggests that a building may have up to four floors with a single stair, the Building Code limits it to three stories. (Both require that the building be equipped with an automatic sprinkler system, in itself a large cost.) Thus for a small building with five or more units per floor, or more than three floors, it must double the number of stairs, corridors, and egresses.

County Water & Sewer Regulations

Obstacle: At the county level, the small developer faces formidable obstacles in the regulations promulgated by its Water & Sewer Department ("WASD"). According to John Hall, a civil engineer in Dade County for decades and a leader in its development industry, "WASD regulations are our community's biggest obstacle to economic development" (2014).

More specifically, WASD regulations treat large urban towers, large suburban subdivisions, and small urban buildings the same when it comes to forcing developers to upgrade off-site water and sewer mains. Large developments can absorb such exactions, which can easily run into the hundreds of thousands of dollars, but small developments cannot.

Law: WASD rules state that for any new construction, addition, or even change of use, all surrounding water and sewer infrastructure must be upgraded to meet current standards. WASD regulations Section 2.04(2), paragraph (e) states that, when property is “redeveloped, its use changed or otherwise improved”, any water facilities serving the property must be improved “so as to comply with prevailing Department standards, pursuant to paragraph (d)” and subject certain exceptions “in the flow charts of Exhibit A.”

This requirement to upgrade is triggered whenever the water main serving the project does not meet current standards. Per Exhibit A, Chart F-2, for low- and medium-density residential (defined as townhouses or apartments or condos), the current standard is set at 8 inches, and anything smaller must be replaced. Per Exhibit A, Chart F-3, for high-density residential the standard is set at 12 inches. In both cases “an offsite extension may also be required”.

This requirement to upgrade applies not only to immediately abutting mains, but also off-site mains and even secondary services to other properties. Paragraph (d) states that a developer must install a water main that meets current standards “along one entire boundary line of said property [that] abuts a public road” as well as “any required off-site mains” and secondary services to “abutting properties”. The Department “may also require said Developer to install additional water mains as the Department may deem necessary to promote the public interest” in accordance with Exhibit A.

There is an exception in paragraph (e) that states “the Department may, at its sole discretion, perform additional infrastructure analyses consisting of field investigation of flow and pressure provided by existing mains for a period of no less than seven (7) days to determine if capacity is available”. The Department may determine that capacity is available and no water facility improvement is required if there is an existing building with a change of use but no increase of total building square feet and either 1) an increase of “daily rated gallonage” of less than 50%, or 2) the change of use will not cause “a reduction below 750 GPM at 20 PSI residential pressure in the level of domestic and fire flow service”.

The Department may still determine that no water facility improvement is required, but only if additional criteria are met, listed in paragraph (e) and Exhibit A. However, such criteria are only for re-occupancy of bays in retail centers and industrial parks, and new construction of single-family, duplex, and commercial and industrial buildings of up to 5,000 square feet. The criteria do not include apartment development of any kind.

Effect: These water and sewer regulations are unreasonable in many ways, but for our purposes they are a clear obstacle to small development. The regulations give WASD wide discretion regarding single-family and duplex construction – which uses water and sewer infrastructure least efficiently – but not regarding small urban buildings.

This means that, for a small urban development that happens to occur on a street with a water main smaller than eight inches, on at least “one entire boundary line” the developer must upgrade the off-site urban water and sewer network as if it were building new mains and services in a virgin green-field area on private property. The urban water and sewer network is under existing roads that must be closed, and the old pipes must be removed, neither costs that burden a suburban developer. Furthermore, the small developer must upgrade the main and services until it intersects with a main that meets current standards, which may be several blocks.

City > Density (Units Per Acre)

Obstacle: Miami zoning in certain areas permits a maximum density so low that the number of units is less than the existing building (for redevelopment) or does not correspond to the permitted maximum square feet (for new construction).

Law: Miami zoning T4 permits a maximum density of 36 units per acre (Article 5, page 17).

Effect: Miami is platted into lots that are typically 50 feet wide and 100 feet deep, and at least 1,000 acres are zoned T4. Thus on a typical lot, T4 permits four units. T4 also permits a maximum height of three floors and maximum lot coverage of 60%, and does not require a

minimum side setback, which sounds like what are known in the US as “brownstones”: small attached buildings divided into apartments.

Much of Miami’s T4 area is currently developed with one- and two-story rental apartment buildings built in the 1920s and 1930s with very poor quality and thus nearing the end of their useful lives. These areas are ready for the next increment of urban development, which would be three-story buildings.

However, most of the existing buildings have at least five units. A common building type is a one-story apartment building with five units in a row perpendicular to the sidewalk. Thus while such a property could be redeveloped into a building three times the current height, the owner would lose at least one unit.

In the less common case that a lot is vacant, the owner could build a building with a floor plate of 3000 square feet (60% lot coverage) times three floors, for a total of 9000 square feet, but could divide it into only four units. Each unit would be 2250 square feet, which is twice the average unit size in a typical rental apartment building, and not marketable or financially feasible.

City > Parking (Spaces Per Unit)

Obstacle: Miami zoning requires an amount of parking spaces per unit that do not fit on small lots.

Law: Miami zoning requires 1.5 spaces per unit (Article 4, Table 4).

Effect: Assume a small property owner has a lot that is 50 feet wide and 100 feet deep and is zoned T6-8, which permits 150 units per acre (Article 5, page 29). The owner wants to develop a small rental apartment building with eight units, which require 12 parking spaces.

Each space is approximately 10 feet wide and 20 feet deep and the driveway along the 12 spaces is 120 feet long (10 feet multiplied by 12 parking spaces) and 22 feet wide. Clearly a driveway that is 120 feet long does not fit on a lot that is 100 feet long, and 5040 square feet of parking spaces and driveway do not fit on a 5000 square feet lot.

This effect does not apply to large buildings that can fit multi-story structured parking garages. Thus the law is a disproportionate burden on small buildings. Furthermore, it is not even a problem of cost or income, the required parking for a modest apartment building physically does not fit on Miami’s typical platted lot.

Conclusion

We hope the above-listed obstacles and their effects are self-explanatory. Our motivation in discussing them in an academic paper is to insist on the relevance of external forces and processes for understanding urban change.

Though it is only one small example of this process-focused (not product-focused) approach, small residential construction in Miami makes two important points. First, this case study provides a road map for how to detect and document many systematic obstacles to a particular urban morphology.

Second, it helps bring some attention to small urban buildings, a building type overlooked in recent decades, as part of a broader effort to shift focus away from large, master-planned projects and toward smaller, interdependent interventions, an effort joined by developers like Jim Heid (2012), planners like Victor Dover (2011), architects like Brian Phillips at ISA (2013), writers like Robert Dalziel and Sheila Qureshi (2012), Howard Davis (2012), and Ed McMahon (2012), and organizations like ULI (through its small scale developer conferences), the National Trust for Historic Preservation’s Green Lab, Lean Urbanism, and the California Infill Builders Federation.

Urban morphology as a discipline is uniquely skilled to analyze small-scale development patterns -- past and future -- but the issue of scale seems not yet to have caught the attention of a significant number of its members. This is somewhat ironic because small-scale development is

one of the most characteristic features of urbanism before the mid-1900s. Historically speaking, urbanism in which most projects are large (such as the current building activity in central Miami) is rare. The historic city developed in a piecemeal manner, mainly through investment by private individuals. In most cities this is still the case, but this fact tends to be overlooked by most professional associations and academia.

What would be the benefits of a research paradigm shift to small, other than consistency with actual conditions on the ground?

The preceding section's analysis of legal obstacles to small development helps us understand why a city would fail to develop its small lots and instead develop in a mostly large-scale fashion. The reason may surprise many readers: some small lots remain vacant not because the owners speculate on a windfall offer from a large-scale developer, but simply because a small-scale project would not be feasible due to the operation of one or more legal requirements.

Uncovering these hidden obstacles is a condition for policy change and an increase of small building construction, especially in areas that are not the focus of large development companies. The latter idea is essential, in that it moves beyond urban morphology's predominantly descriptive activities and into the territory of the normative. It is of crucial importance to study the relationship between the urban development processes and the socio-economic outcomes for the occupants of the resulting city. Even though the role of academia cannot be the making of generalized value-judgments, parts of its vocation might be the preparation of informed decisions by the wider public, politicians and professionals in a specific place and situation.

In the case of small-scale development and the resulting fine-grain urban neighborhoods, literature already exists documenting its advantages. The same day this paper was due, the National Trust for Historic Preservation's Green Lab published a report finding that urban neighborhoods characterized by small lots and buildings of different ages also have more people per acre, households per acre, residential units per acre, businesses per square foot, jobs per square foot, and percent of jobs in small businesses (National Trust for Historic Preservation, 2014).

Nassim Taleb writes that, while modern urbanism is "fragile", the urbanism of Jane Jacobs (dense but fine-grain and mixed-use) is "anti-fragile" and can actually improve with stress (2014); however, he also writes that, in the event of calamity, the most robust systems are made of many small parts that each have many uses (2010). Richard Reep makes a similar point about urban development post-2008: "People are turning local needs into opportunities at a scale that is small enough that outside help is not needed" (2012).

Continuing with the theme of small scale contributing to robustness, Joe Minicozzi finds that small (three- and four-story) mixed-use buildings generate outsize property tax per acre, meaning a city need not incentivize towers to balance its budget (Sonoran Institute, 2012). Eric Klineberg, a disaster recovery expert, writes that the best disaster recovery resource is social connectivity that is characteristic of neighborhoods that are dense but fine-grain (Klineberg, 2013), not composed of the skyscrapers that Richard Florida calls "vertical suburbs" (Florida, 2012).

Charles Montgomery's book *Happy City* about the many ways that urban design can improve human lives describes a surprising number of such improvements that depend on or are intensified by a fine-grain urban context (Montgomery, 2013).

More correlations should be studied to understand if and why small-scale development leads to urban environments that tend to be the most desirable and sustainable. Such insights can then guide policy and political decisions. Such studies would be particularly helpful if they focus on recent developments and avoid the distractions of "historic patina" and "charm". What matters is not that tourists on their Paris trip prefer the Marais to La Defense, but the fact that small-scale environments anywhere might be more robust, diverse and mixed-use.

Another potential benefit of small-scale development is its ability to involve more people in city-making. Buying a condo or renting an apartment is not the same as an individual designing, building, and owning his or her small building. Natalie Weinberger writes that small-scale

development can be a path to economic justice (2010), and William Apgar makes a similar point about ownership (2004).

The value of increased participation is difficult to dismiss in societies that proclaim democracy. If our built environment is seen as a mirror of our political system, such interpretation is not negligible. However, increased participation in a process may not result in improved outcomes, just as there is no agreement that Swiss direct democracy produces a better society than a more representative form of democracy.

Such a thesis regarding participation in urban development is difficult to prove, but that does not render the inquiry irrelevant. It fits well with the current Zeitgeist of “open-source” and “crowd-source”, and the perfection of that approach in computer programming (Raymond, 2000) now being tested in real estate “crowd-funding” by Fundrise and similar companies. This trend has already manifested itself in small development, for example the early-2000s rise of co-housing development in Germany. Such novelties are just the translation of changes happening outside the real-estate sector, including trends like 3D printing, customized fashion and individualized app-programming. In the coming decades we will witness the growth and creation of ever stronger conglomerates and monopolies, but on the other hand we will - and already did - see the emergence of a counter-reaction.

Urban morphology provides all the tools to analyze the workings of these promising developments and opportunities, and can help reveal the implementation issues that they face. Most importantly, it can also help identify the most promising development patterns, an exercise that historic studies do not have to provide. We believe that this could and should be one of the goals for the future of the conferences, the journal and the discipline in general.

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Towards a flexible definition of limits in urban planning: controlling urban form under uncertainty

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Abstract. *Portuguese formal planning system was born in the thirties and has since then promoting the development of an opaque, centralized, hierarchical and ineffective planning system. In the seventies modern concepts of planning began to be applied, still limited to consolidated urban areas and surroundings. Reality was that the territory beyond those limits was growing without control, pushed by industrialization, increased mobility and people's expectations towards better conditions. When the first systematic plans that considered the municipality as a whole were born in 1982 and the shift towards a strategic planning approach gained importance in the nineties, the territory was complex and disordered. Plans and regulations created to limit and control the individual's increased capability to transform the territory became part of a reactive and prohibitive planning system instead of one based on pro-activity and responsibility: the inflexible nature of these plans led to delays in their definition and approval as a response to uncertainty. (Portas 1995). The concept of limit is structural and deeply embedded in plans and regulations, as it influences and controls urban form, which is gaining significant relevance within urban planning since the eighties (Oliveira 2006). Our goal, as part of a research focused on the flexibility of planning instruments and their efficacy on regulating contemporary urban space, is to identify how these limits have been understood in key moments of society and expressed in their plans and regulations.*

Key Words: Flexibility, limits, municipal planning, uncertainty, urban form

Introduction

Contemporary territories are changing at a fast pace. Concepts and methods to understand and regulate it are being questioned as they do not efficiently respond to these territories' needs, such as, precisely, the concept of *limit* – morphological, administrative, symbolic and disciplinary.

A flexible limit is, apparently, a paradox: by *limit* we use to think of a boundary that clearly separates one entity from another, a boundary that is stable and unchangeable, of entities that have their own autonomous logics and that don't overlap. This was clearly noticeable during the Modern Movement, when the *limit* was used as a rational tool to bring clarity and order to planning, mankind overcoming Nature throughout an unlimited rationality. Nature itself always had, however, its kinds of flexible limits.

With this article we intend to address one specific question: *How has the concept of limit been understood in key moments of the twentieth century in science, society and urban planning theory?*

With this article we intend to introduce how the concept of *limit*, applied to those topics, is changing towards openness, multidimensionality and flexibility, and why we must adopt it to be able to effectively control urban form under uncertainty and achieve better plans and regulations, providing an important theoretical framework for the broad research which is currently undergoing and that has as case study the municipality of Santo Tirso in Vale do Ave, Portugal.

The three topics that will be discussed in this article – “*Towards a limited rationality*”, “*Unlimited citizens and territories*” and “*The limit in controlling urban form*” – have their own autonomy, but they can also be read as a (simplified) macro-narrative, introducing how the shift towards a limited rationality and the increased ability for the citizens and cities to break their

own limits have brought uncertainty to the ability (and purpose) of controlling urban form in contemporary societies.

Towards a limited rationality

Contemporary urban planning is shifting from a rational-comprehensive approach towards a strategic approach. It is common to consider, on the one hand, the rational-comprehensive approach as a centralistic “top-down” approach where science and technical knowledge are used to determine the best solution for all planning issues, attending to a well defined public interest, and following a precise and linear process, while, on the other hand, strategic planning is considered a decentralized, multi-level and multi-directional approach where the discussion and the learning process between planners, policy makers and the citizens is as important as the scientific and technical knowledge, the planner assuming a mediating role between numerous public and private interests, and where the process is non-linear and subject to changes and uncertainties.

The seek for unlimited rationality in planning was evident on the “voluntaristic” and “planifying” urbanism of the sixties and seventies (Ascher 1991) but it was already present in several scientific fields and production modes which have influenced it – such as *Positivism*, *Taylorism* and *Fordism*.

The theory of *Positivism*, introduced by Comte and further refined by Durkheim in the late nineteenth century, argued that the natural science’s rationalism should also be adopted by social sciences. Reality was something that existed independently from the knowledge of those who were living it. The world should be objectively defined independently from our representation of it and social reality was conceived as divided between “normal” and “abnormal” states which needed to be “cured” (Durkheim 1982).

In the rational-comprehensive approach, the planner had indeed the role of defining urban development with maximum objectivity and independence from city life, deciding what was right and what “needed to be cured” on behalf of a well determined public interest, paying little attention to those who were living the reality (and thus were unable to see what was best for them). The design of the city was therefore scientifically based in zones, parameters, ratios and indexes (Busquets 1995).

In the beginning of the twentieth century, Taylor aimed to promote efficiency in scientific management, arguing that despite the extent of material inefficiency (such as natural resources depletion), human inefficiency was far a greater problem in need to be addressed. He then proposed *systematic management* as a rational system able to reduce every single action of the workmen to a science, replacing individual judgement with universal and systematic laws (Taylor 1919).

Traditional and empirical knowledge, passed from one generation of workers to another, was to be replaced by scientific knowledge gathered, filtered and disseminated by a new class of men – the *managers* – who should develop a science for each step of the productive process and train the workmen. This meant separating *planning* from *execution* in the belief that the subdivision of labor would increase productivity but also well-being of both workers and managers by balancing responsibilities, and that better management was the way to make workmen do their work better.

Planning ahead was a key component of Taylor’s theory and the specialty of these *managers*, who should anticipate *tasks*, means to achieve them and time to be spent, an effort to avoid the discretionary present in old management systems which allowed a great part of the learning and decisions to be led by the workmen. In the end, Taylor’s vision was of an organizational machine comprised by well defined and organized groups of individuals interacting with each other with clearly defined roles.

Taylor’s principles can be found in the rational-comprehensive approach in urban planning, namely in the planners’ position as *managers* of urbanity in the sole possession of scientific

laws, correct principles and adequate ratios and parameters. Planning believed and intended to anticipate all tasks of urban development, as if there was only one (scientifically) truth, only reachable by planners with their technical expertise, thus reducing any sort of judgement from those who executed – and lived with – the plans.

As of *Fordism*, it emerged as a paradigm for the innovations in the work processe, capital accumulation and social regulation established in the capitalist society around 1920 (Jessop 1992). Mass production of standardized goods was achieved through the division of labour in the assembly line (and in the territory), increasing their affordability and profitability by means of an economy of scale, producing standard goods for an anonymous and homogeneous public and making them available through mass retailing and desirable through mass media; accumulation was possible throughout a repeating cycle of mass production and mass consumption, driven by the continuously rising cycle of productivity, demand, profits and re-investment; but Fordism was also to be found in the social regulation present in the set of norms, institutions, networks and patterns of conduct that guided the capitalist society (Jessop 1992). Planning focused in the production of plans, rather than on the production of urbanity, through hierarchical and institutional assembly lines that produced plans for an anonymous and homogeneous society and on behalf of a centrally defined public interest.

The post-war economic boom was driven by these paradigms, which were reflected in the new practices on work management, mass production and consumerism as allowed by technological assembly lines and economies of scale (Moreira 2004). Rationality was the answer to the city problems as a whole, aiming to replace the old and degraded (or destroyed) cities by racional, homogeneous and functional new ones (Busquets 1995). The Modern Movement played an important role on bringing rationality to the planning system: the plan as a technical document designed by specialists and enforced by a strong central state (Soares 2000) finding in it the instrument of its own legitimacy (Veneza 1998). Fordist cities were created, combining modern architecture and urbanism with *neo-keynesian* urban policies (Ascher 1991).

Keynes' vision was of an economy that should incorporate the concept of uncertainty, instead of being obsessed with predicting the future – therefore distancing itself for the seek of ultimate rationality as Positivism, Taylorism and Fordism did. For Keynes, the economic theory should be a method and not a doctrine (Olivares 2009) and its models should be used as instruments of thought and not as quantitative formulas (Hodgson 2011). Keynes attacked the traditional concepts of economy who believed that unemployment was a self-regulated system, stating that it depended (as well a consumerism) on the amount of investment – which, in turn, was extremely volatile due to the uncertainties towards the future (Hodgson 2011). The way was open for centralistic and (still) powerful national states to legitimately enforce extensive public interventions on behalf of a supposedly public's interest, reflecting the rational distributive nature of the public welfare state policies that tried to balance the access to goods and services (Ascher 1991; Moreira 2004), distributing public investment to more recessed areas (Marques 1995) and leading to a decentralization of equipments and production activities in an attempt to balance urbanity.

Again, an homogeneous vision of reality was present in the minds of politics and planners and in the mainstream economy and other fields of knowledge, obsessed with rationality and with the intention to predict the future with the help of technocratic, mathematical and formalist models, stepping back from the uncertainty concept that was fundamental in Keynes theory (Hodgson 2011) and that is gaining increased relevance in contemporary society.

Contemporary thought on urban planning is distancing itself from this kind of absolute rationality towards a more limited one due to several failures in previous paradigms. Fordism has failed as a virtuous cycle of permanent growth – making companies think on switching from stocking large quantities of standardized assets towards a “just-in-time” strategy (Ascher 1991) and from producing homogeneous standardized goods to producing good with some sort of customization – and as a rational approach to urban development, which has led to mono functionality, segregation, crime and dispersion of residential zones. Collective and public transport policies are challenged by the needs of contemporary society, which demands more

flexible means of transportation, especially in dispersed territories, leading to the rise of the private transport (Soares 2005). The welfare state is facing serious problems as well as the Keynesian politics which are suffering from the vicious cycle of “stagflation”, i.e. high unemployment and inflation and low growth (Jessop 1992).

The planning efforts that tried to accommodate and control reality as a whole are now inefficient due to their normative and rigid nature when faced with new, complex and fragmentary urban forms and political, social and economic dynamics (Venezia 1998), being now understood as obstacles to decisions that must be made quickly in order to grab opportunities (Marques 1995) *just in time*. Planning needs a broader project for the city, able to articulate several scales and actors in its development.

After this “rationalizing” and “voluntarist” phase, we are facing, since the eighties, a “liberal” and “concurrential” urbanism where rational models are losing ground to incrementalist and heuristic methods on urban development (Ascher 1991). Urban planning is shifting from the rational-comprehensive approach towards strategic planning, or from an absolute towards a limited rationality. The solution for the future cities is neither in chaos, nor in global solutions, and there’s no unique key to explain all current urban forms (Borja et al 2003).

The concept of strategy is now deeply present in urbanism: the city is no longer planned as a whole, but with precise interventions which try to grab or create opportunities. Instead of rationalized “truths” about the territory and its development, the focus is now on defining long-term objectives and ideas on the city, finding the available options to make them possible and creating urban management mechanisms able to make that strategies operational (Ascher 1991). Strategy, and its integration of deliberative, responsive and shared participation mechanisms, is also found to be a way to develop urban proposals with enough legitimacy and social support (Borja et al 2003) in a time where social life is fragmented and national political power diminished, thus making it difficult to determine and give unique answers to societies’ needs.

Unlimited citizens and territories

Contemporary citizens are increasingly complex in their needs and aspirations and in the tools they have to achieve them. The association between new, faster and more reliable ways of transport and communication has increased mobility and communication possibilities and the ability for these citizens to respond to needs and aspirations that would otherwise be harder to fulfill. This has been leading to new ways of interacting with others, giving rise to more heterogeneous social groups and family models and to more numerous and diverse – though less stable – social relationships (Borja et al 2003).

Still, in an apparent paradox, these *unlimited citizens*, powered by all these means of transport and communication often isolate themselves. The increased mobility and access to information and communication technologies, although can play an important role in promoting citizenship by making easier the relations between citizens and administrations, and by connection global with local identities (Borja et al 2003), may also increase segregation for some sectors of society (Domingues, & Silva 2004) as economic capital and knowledge restricts the ability to move and connect. Gated communities, in suburban areas, linked to an “hiperspaced” mobility, show how some of these citizens do fear the “real city” (Muxí 2003). However, their spatial segregation is different from that of the Modern Movement, where rationality was involved in determining spatial distance between different social groups; in the contemporary city the space is fragmented and diverse, personal and work relationships have no fixed territory (Carreiras 2013): a gated community can coexist side by side with social housing and / or with a highway. Social cohesion and citizenship coexists with urban and social fragmentation (Borja et al 2003).

This complexity leads to the difficulty in representing the society as a whole and mediate or make compatible everyone’s interests. Political power still fails to recognize this plurality,

dedicating speeches to the *public* or the *people's* interests because they represent an ideal of *limited* society that is not accepted anymore but that is still the main target of the political power. Public interest is hard to be defined. Due to this increasing complexity, citizens in contemporary world are increasingly harder to be represented. There isn't a single territory of proximity but multiple belongings and identities, and citizenship should not be limited to the scope of an individual "state" (Borja et al 2003). Belonging is no longer funded in proximity or on densities, as transports and communication technologies made us part of numerous and diverse relationships (Choay 1999). Contemporary citizens have progressively more numerous and diverse interests and values, which translates into more complex and varied actions throughout the territory, giving way to new ways to explore and inhabit it (Domingues, & Silva 2004) and to a new kind of citizenship.

Citizenship is deeply related and embedded in the concepts of city and public space, which tend to confuse themselves and have multiple meanings (Borja et al 2003). Dispersion, fragmentation and privatization are considered to be the three key processes which are making public space disappear as a citizenship space (Borja et al 2003). In the "Third City", there is (often) a lack of an "urban landscape of citizenship" (Borja et al 2003). The Generic City produces dispersed pieces throughout the territory in a "functional urbanism" for private business among politics and architects, but it does not produce citizenship (Borja et al 2003). These unlimited citizens are making the territory harder to be limited as well.

Increased mobility has deeply changed and reduced the *limits* of the territory for those who were able to pay the price of mobility. Cities have expanded their well defined and fixed limits towards suburban growth, invading rural land. A new reality has emerged where those expanded city limits have clashed, confused and mixed themselves, ultimately making their limits disappear – such as the limits between those two main containers where we still insist on fitting all reality: urban and rural land.

Urbanity has ceased to be an exclusive feature of the city (Domingues 2013) and its limits are increasingly hard to trace if we intend to do it against a "rurality" that no longer matches its archetype and has no substantial social and cultural difference from the city (Soares 2005); the construction of urbanity has also ceased to be the exclusive competence of the public sector, weakened in its ability to intervene, to be opened to partnerships with the private sector, to the international capital and to a strategic and entrepreneurial management (Moreira 2004) considered more effective for its flexibility, adaptability to opportunities and to uncertainties, but still in need of democratic control and transparency (Borja et al 2003).

Both territory's and citizens' limits are becoming hard to define: there are multiple types of limits at a given time, overlapped and diffuse. Multiple limits coexist on our cities: traditional limits, industrial limits, relational limits, symbolic limits, all present at the same time in our imaginary. Delimiting this territory is an task requiring innovation – these *real* limits do not correspond and are questioning *administrative* and *political* ones, which do not correspond anymore to the complex dynamics of economy and society (Ferrão 2014).

This leads us to the last topic of this article: after stating that an absolute rationality is no longer an answer for the knowledge of the city, and that its knowledge is increasingly harder to gather due to the fragmentary nature of the citizens and their ways of living – how can urban form be controlled under this context of uncertainty?

The limit in controlling urban form

The changes in the strategies of urban planning and management can't be understood unless in relation with the changes in its social and economic contexts. The major transformations on the european societies of the twentieth century have generated, besides multiple distinct urban forms, different positions on how to plan and manage the territory.

Urban planning was legitimized by means of the Athens Charter, place where the CIAM Congress of 1933 was organized, as a rationalizing instrument used by a welfare state in its full

capacity, able to promote large urban operations integrating, simultaneously, “networks”, built “volumes” and “green” or “free” spaces (Portas 2005). From the post-war to the seventies, society grew in a fast pace motivated by the Fordist machine of mass production and consume, at the same time that the welfare state reinforced its rational and distributive planning actions on the territory.

This state, true to technique and to its notion of public interest, distributed public equipments and productive and industrial activities into *zones* according to technical and scientific criteria, assuming itself as the main agent of the territory’s transformation – but the Fordist model started to decay, the mass production and consumption cycle started to wear out, and this state’s capability to transform and control urban form became weak. Influenced by neo-liberal politics, it had no choice but to share its power with the private sector throughout partnerships, and to bet on more targeted interventions – losing its monopoly on controlling the territory, abandoning its role on designing urban form except for the infra-structures, unable to cope with the increased number and power of agents able to act on the territory (Portas 2005).

From the eighties, we are witnessing the globalization and internationalization of economy and the reticular recomposition of the territory. The tertiary is gaining more relevance and the rigid Fordist production models more flexibility, betting on innovation in order to adapt to the needs of a complex and differentiated society demanding, simultaneously, mass production and customization. It’s in this context that strategic planning is gaining importance, trying to make more operational the actions on the territory, seeking complementarity relations between cities and the engagement of all actors with enough power to intervene in the territory, reviewing and integrating alternatives in the planning process, and progressively paying more attention to context and contextual solutions (Domingues, & Silva 2004). Regions are inherently different in their built environment, population, lifestyles – not “blank sheets” (Ferrão 2014).

This increased localism seeks also the participation of a greater number and diversity of actors in planning (Alves 2008) and is a reflex of the globalization that reduced the power and functions of the central states, weakened their representativeness, and promoted a greater distribution of power throughout the territory and more noticeable actions from local and regional economic, social, cultural and administrative agents (Ferreira 2005). The national states are losing their power in controlling urban form towards both local or regional powers, but also to supra-national organizations such as the European Union.

This same role of events was present in Portugal, with the adoption of Duarte Pacheco’s detailed and rational urban plans in the forties, which intended to predict the city transformation in long term (Carvalho 2004) but quickly became misfit to reality; then, in the sixties, with the state seeking to involve privates in urban developments and replacing urban design by zoning and quantitative parameters.

The unpredictability of opportunities and execution capabilities, the need to opt for cooperative solutions over “rationalized” unilateral ones, and the need to more responsively involve the increasing number of agents with the power and will to transform the city would lead to the strategic model in urban planning (Carvalho 2004) and to substantial changes in understanding the city and the urbanized territory, particularly from the eighties (Domingues, & Silva 2004). This connection between planning, evaluation and reflexive management of the territory with a strong local component is essential to the uncertainties of a society where reaction is sometimes as important as planned action.

Planning and urban management must be intimately related and permanently informed by processes of self-evaluation in order to be able to change, if necessary, and to define new goals and objectives (Encarnação 2011). Only through a systematic evaluation can planning be assessed in terms of its efficacy and credibility (Oliveira 2011) and adequately respond to the specific problems of urbanity – hence the importance of the concept of reflexivity, in which every action needs a reflection for its adequate response (Ascher 2010). Planning systems must be flexible enough to adapt to these needs, both in their *formal* and *informal* instruments.

Portuguese planning system is formalized by a set of legal documents that establish power relations. These documents – plans, laws, decretes, regulations, etc. – create a network of

relationships that becomes an *apparatus* that act as a link between the state, its citizens and their multiple organizations.

The *formal apparatus* is an instrument of control of the urban form, understood not as an hostile device but as expected and legitimated by the society and democracy. However, due to the rising complexity and specialization of contemporary society, and of the entities of the state itself, these formal *apparatus* are often understood in contradictory ways, raising conflicts and deadlocks. The concept of state, as clarified by Bourdieu, is therefore fundamental to understand this logic of control: the state is a collective construct which derives from the historical accumulation of capitals of diverse nature – military, economic, cultural, symbolic – making it able to use its influence in all these fields in a way unsurpassed by any other group or social agent, having, in exclusive, the ability to create the laws and punish the offenders: the “monopoly of legitimate physical violence” (Bourdieu 2001).

The formal *apparatus* assumes itself as a particular expression of this “legitimate physical violence”, carried out by a state legitimized by its citizens, with the particular purpose of regulating the transformation of the physical and spatial environment of the city but also the social relations of the agents responsible for such transformations. Implicit here are the two dimensions of these formal *apparatus* that we consider fundamental to their understanding: the *apparatus as an object*, embodied in the writings and documents that give the its material support; and the *apparatus as a process*, reflected in the institutional relations between social agents whose power directly depends on their ability to interpret and manipulate those *apparatus*.

The complexity of these *apparatus* as objects is clear since they are many and relate to each other in complex ways. In the current framework of the Territorial Management Instruments, these *apparatus* are distributed by national, regional and municipal levels, according to a hierarchical logic; we find *apparatus* of strategic nature (such as the PNPOT, the PROTs, and the PIOTs), of regulatory nature (such as the PDMs, PUs and PPs) and of special or sectorial nature, such as the specific plans for key areas of administration – such as transports, communications or energy.

All these types of plans establish between themselves complex networks of relations that influence behaviors and processes, affecting the ways to understand the logic of planning itself. Some authors point out the difficulties in understanding the role of these plans as defined in theory and consequentially their wrong use in practice, such as using the PDMs as rigid and normative plans instead of regulation tools (Encarnação 2011) or the excessive formalization and binding nature of the PPs and its misuse (by ignorance of the role of the PUs) as a way to change plans of a higher order (Sá 2002).

We thus realize that these *apparatus* as objects are not likely to be fully understood without their use and transmission by the agents and social groups that deal with them. However, their material transmission (which is becoming increasingly facilitated with ICT) must not be confused with their real understanding and incorporation, which requires time, as Bourdieu remembers us (Bourdieu 1979). To use them without interpretation or critique is to forget the complexity and uncertainty that defines contemporary society, rendering the *apparatus* useless.

The limitations and lack of flexibility of these *formal apparatus* make for more *informal* actions to occur within urban planning processes, as a response to the inefficiency and inflexibility of the former, both as objects and as processes, although some authors accuse this inefficiency to be associated more with the latter – such as the mechanisms involved in planning revisions – than with the material content of those plans (Sá 2002). The difficulty comes from the fact that changing the formal object may also mean changing a previously established power relationship. The plan is therefore involved in a struggle between several entities that try to control it according to their skills and interests.

We may as well note that the struggles around the formal *apparatus* are not simply struggles between a state and its citizens: state and citizens are increasingly complex entities formed by agents and social groups of different natures, resistant to such broad simplification; the state multiplies itself by several entities, and the same happens with contemporary citizens, with their

multiple belongings, interests and aspirations, continuously adapting themselves to more and new challenges in the contemporary society. In the growing impossibility of predicting the future, it becomes increasingly important for formal plans to learn to act in a more strategic and less deterministic way on defining urban form. The formal plan, both as an object and as a process, must therefore seek to be the structure of human action and not the prediction of the action itself, assuming uncertainty as an integral part of human nature which gives the foundation to the “plurality of world views” (Bourdieu 1989).

It's in this context that the informal *apparatus* moves: as a flexible structure and not as a set of rigid rules. The use of these *apparatus* has become widespread due to the inability of the formal plans to solve, in due time, the problems of the territory, with the entities responsible for its control using other sorts of plans such as details, plans of city blocks, of heights and alignments, of axis, to name a few (Portas 1998). They assume themselves as plans of no legal validity, but they allow for more open negotiations with individuals, the creation of more and faster alternative scenarios with a strong visual component, therefore being more effective on reconciling the diverse interests and positions of the agents involved. Their content is not determined *a priori*, but according to a set of events and developments and according to the particular objectives of each situation. Informality is thus present both in the more diffuse power relation between those agents, and in the un(pre)defined nature of the informal *apparatus*, allowing for more flexibility and proximity during the discussions.

Conclusion and further work

This article intended to provide a theoretical framework on the concept of *limit*, discussed in the three topics that we've covered: “Towards a limited rationality”, “Unlimited citizens and territories” and “The limit in controlling urban form”.

In “Towards a limited rationality” we've focused on the limits of the rational-comprehensive approach in planning in relation to the unlimited conception of science and knowledge, expressed in several paradigm such as *Positivism*, *Taylorism*, *Fordism* and *Taylorism*. As those paradigms failed, a new way of planning has risen, adopting *uncertainty* and a *limited rationality* as a way to better address the new contemporary challenges of urbanity.

“Unlimited citizens and territories” showed us how both territory and citizens *limits* have changed, became more complex, diverse and multiple, influencing one another in the production of space and citizenship. Globalization, internationalization of economy, development of better transports and communication systems are enabling us to extend and dissolve *limits*, making them more complex.

Finally, “The limit in controlling urban form” intended to show us how these diffuse limits and their expressions in the territory are making it difficult for planning to understand and accommodate all urban forms and dynamics that they have created, forcing it to bet not on over-rationalized and homogeneous solutions – or rational intentions to balance urbanity – but on diverse, complementary and cooperative solutions to make urbanity and its unequal parts work better together, which sometimes means taking advantage of unpredicted – and unpredictable – opportunities.

Understanding the contemporary limits in controlling urban form requires, therefore, understanding the complex context of our unlimited society and territory and how they relate to a particular philosophical position concerning science and knowledge.

The concept of *limit* is also being questioned in other topics that extend or complement the topics that were brought to this article, such as the *limit* between *urban* and *rural land*, *center* and *periphery*, *public* and *private* developments, *formal* and *informal* planning, the *limits* on the representation and communication of the territory, of *Supra-National*, *National*, *Regional* and *Local* powers, the *limits* in the increasingly *multidisciplinary* knowledge on the city, etc.; all these *limits* are becoming diffuse and confused, questioning the role and efficiency of urban planning; but still we argue that understanding this new reality where pure black and white is

being replaced with multiple shades of gray is fundamental for urban planning to be more effective and able to deal with uncertainties and opportunities.

This article is part of an on-going research, and field work concerning the impact of these *limits* in the territory and in urban plans is currently under development on the municipality of Santo Tirso, in the Ave valley, Portugal.

Acknowledgements

This paper is part of the PhD research project “From informality to formal variability – planning and urban management strategies under uncertainty contexts: the municipality of Santo Tirso between the Provisional Regulations and the review of the Municipal Plan” (original title: “Da informalidade à variabilidade formal – estratégias de planeamento e gestão urbana em contextos de incerteza: o município de Santo Tirso entre as Normas Provisórias e a revisão do PDM”) which is being financially supported by FCT – Fundação para a Ciência e a Tecnologia – under the QREN-POPH program and the PhD Grant SFRH/BD/86675/2012, and developed in CEAU – Centro de Estudos de Arquitectura e Urbanismo – at the School of Architecture of Porto University.

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Interpretation of morphological data to inform design. *Bridge to Bridge: Ridge to Ridge* urban design workshop

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Abstract. *The importance of design practice informed by urban morphology has led to intensification in interest, signalled by the formation of the ISUF Research and Practice Task Force, and voiced through several recent academic publications²⁶². Cognisant of this current debate, this paper reports on a recent urban design workshop at which urban morphology was set as one of the key themes. Initially planned to be programmed as a augmented concurrent event to the 2013 20th ISUF Conference held in Brisbane, the two day Bride to Bridge: Ridge to Ridge urban design workshop nevertheless took place the following month, and involved over one hundred design professionals and academics. The workshop sought to develop several key urban design principles and recommendations addressing a major government development proposal sited in the most important heritage precinct of the city. The paper will focus specifically on one of the nine groups, in which the design proposal was purposefully guided by morphological input. The discussion will examine the design outcomes, shedding critical light on the issues that arise from such a design approach.*

Key Words: urban morphology; urban design; design workshop

Discussion

Context

This papers reports on the outcomes of a major urban design workshop held in Brisbane, Australia, that occurred over two days in August 2013. The workshop involved over one hundred participants, with representation from the design professions and academic disciplines. Of particular interest is the inclusion of urban morphology as a key theme in the agenda of the event, and the paper will assesses how the theme manifest in the design strategies of the working groups.

‘ISUF aims to bridge the divide between academic and applied. It seeks to advance research and practice’ (Whitehand, 2012).

The paper responds to the call from the ISUF Task Force on Research and Practice for examples of research-led practice (Samuels, 2013), and provides a case study in which the design leadership of one particular workshop group was jointly led by an academic (the author) and a leading urban design professional.

The Bride to Bridge: Ridge to Ridge urban design workshop (B2B UDW) was organised in reaction to the release of information concerning a proposed development which put an important heritage precinct under threat. Ever since the initial consolidation of the urban form of Brisbane in the later part of the nineteenth century, the focus area has been severely impacted by major large-scale developments; and furthermore several controversial development proposals have increased awareness of the fragility of the heritage precinct, warranting action by professional bodies and academic institutions.

²⁶² See for example *Urban Morphology* (2013) 17 (2) Editorial and Viewpoints; *Built Environment* (2011) 37 (4) Editorial and Essays.

Research & Practice

The significance of urban morphological study has yet to be broadly recognised amongst urbanists; it however occupies an intriguing position at the confluence of current contemplations on how the urban form of cities should be managed, providing a basis for a cross-disciplinary search for relevant urban design methods.

Jeremy Whitehand has for some time now, identified the failure of urban design to draw on urban morphology (Evans, 2005); he nevertheless surmises that 'there has been increasing interest beyond academe, in mapping the 'character' of areas and this interest must surely lead, sooner or later, to strengthening the bridge between urban morphology and urban design (Whitehand, 2005, p3). He posits the justification for urban morphology as having practical utility and intellectual value, while recognising that the townscape has an aesthetic value (Whitehand, 1987, p2). Furthermore the understanding that the 'historical unfolding of the built environment is the starting point in the search for a theoretical basis for the management of urban landscapes in the future' (Whitehand, 1992, p6).

Certainly intensification in this discussion has led to a number of published articles in recent volumes of *Urban Morphology*, see 17(1) and 17(2); as well as a special edition of *Built Environment* journal dedicated to article addressing the theme of 'Urban Morphology and Design' (Marshall and Caliskan, 2011).

ISUF Manifesto – Research & Practice Task Force

'Urban morphology promises to bridge a gap which is currently debilitating both the research and practice of city building' (Moudon, 1997, p8).

The escalation of interest into the question of how research can inform practice? has prompted ISUF to establish a Task Force in 2012, to better bridge between researchers in urban morphology and urban design practitioners, and to draw up a report with concrete suggestions for action (Samuels, 2013).

There are two key interconnected intentions of the draft proposal of the Task Force, they are: to increase the influence of urban morphology by better packaging and marketing, and secondly; raise the level of understanding and application of urban morphology in a range of relevant professions through the channel of education and professional organisations (Samuels, 2013).

Furthermore it is suggested that urban morphology, 'as the science of urban form' (Samuels, 2013, p42), can benefit a range of different sectors, for example: those of whom are concerned with describing and analysing urban form, environmental design professionals, and importantly the clients and employers of both these groups (public authorities and developers).

Arising from this overview four recommendations are made in the preliminary Task Force report:

- the publication of a manifesto;
- the compilation and publication of relevant curricula in different countries;
- the production of a good practice guide, and;
- the creation of an urban morphology toolkit for understanding the past and planning; the future of urban settlements. (Samuels, 2013).

The author's own recent 'viewpoint' in *Urban Morphology* on this issue drew attention to the tension between prescriptive controls for design, versus a more open process of interpretation of research material in design practice (Sanders, 2013). The case study example of Workshop Group 4, from the B2B UDW was led by the author and a leading urban design professional, and will offer a glimpse to how the provision of morphological data can influence the design process.

Brisbane and its river – a brief economic and morphological overview

Brisbane is situated on latitude 27° 28' South, in a sub-tropical climatic region approximately 750 km due north of Sydney.

The first inhabitants and traditional owners of the Brisbane River area are the Aboriginal groups of the Turrbal, and Jagara people (Greenop and Memmott, 2007). Their place values and place-making activities, being points of orientation for spiritual, social and cultural reference and including sites of large gatherings (Greenop and Memmott, 2007), were numerous and widespread throughout the region.

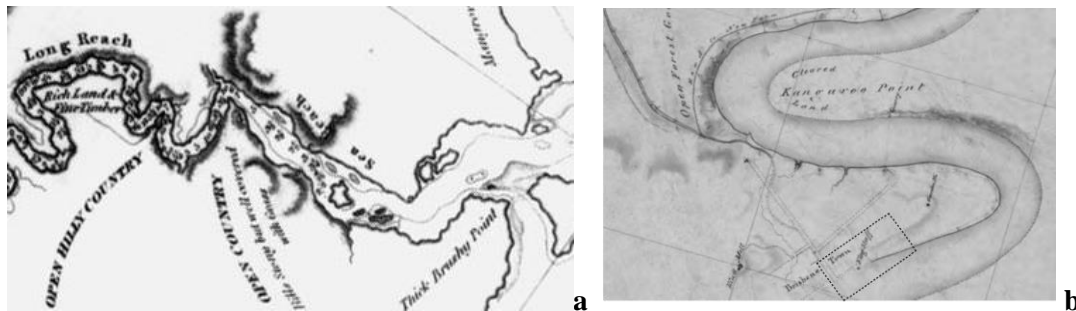


Figure 1. Early surveys of Brisbane River. 1a: Oxley, J (1823) Section from *Plan of River Brisbane and chart of Moreton Bay* (source: National Library of Australia). 1b: Dixon, R (1839) Section from *Plan of Brisbane River and Moreton Bay* (source: State Library of Queensland).

European occupation followed John Oxley's discovery and survey in 1823 of a large tidal river suitable for settlement (Johnson, 1988, 12; Johnson, 1989b). A convict colony, initially known as Moreton Bay Settlement (Johnson, 1989b, 242) was established in 1826 on the banks of the river, some 16 km upstream from the sheltered Moreton Bay; and housed only the hardest of criminals from the penal colony in Sydney.

The initial convict settlement comprised a small number of buildings, the first of which was the Commissariat Officers Quarters, which was a timber cottage that had been relocated from Sydney, and re-assembled in 1826. This was followed soon after by the construction of a Convict Hospital, and establishment of a Timber Lumber Yard in 1827; Prisoners Barracks and Chaplain's quarters in 1828; and Observatory, Windmill and Commissariat Store in 1829 (BrisbaneHistory.com). The latter two are the only remaining structures from this period that have remained; the Commissariat Store located alongside King's Jetty (later renamed Queens Jetty after the accession of Queen Victoria), which was the original place for ships to dock; and the centre of the present day heritage area.

The penal settlement was short-lived and was closed in 1839. Transportation of convicts ceased in 1841, with the official proclamation that ended the penal colony declared shortly after in 1842 (Gough and Ogilvie, 1985; Johnson, 1988; Johnson, 1989a).

Even during the period when the convict settlement was being dis-established, preparations for free-settlement were already well underway. The period of economic development in the new free settlement was initiated in 1841 by free traders and tradesmen who had established shops through leasing space in the former convict premises; this was soon followed by the first sale of land in 1842, by auction in Sydney for £100 per acre (Johnson, 1989a, p261; Gough and Ogilvie, 1985; Johnson, 1988).

The new town experienced a steady growth during its formative decades, with commercial and trading businesses emerging concurrently as the migrant population increased. The first census in 1846 showed that there were 960 people living in Brisbane, and 2258 people spread

across the region; by the 1851 census Brisbane's population had increased to 8375 (Gough and Ogilvie, 1985, p8; Johnson, 1989a, p106).



Figure 2. Morphological development of Brisbane River 1829-1969. B2B UDW study area indicated by dotted lines. 2a: Wade, H (1843) *Plan of the limits of the town of Brisbane* (source: Queensland State Archives). 2b: Ham, T (1863) *Map of the City of Brisbane* (source: State Library of Queensland). 2c: McKellar, A.R. (1898) *McKellar's official map of Brisbane & suburbs*. (source: State Library of Queensland). 2d: Department of Works (1969) *State Government Buildings: Central Brisbane*. (source: Queensland State Archives).

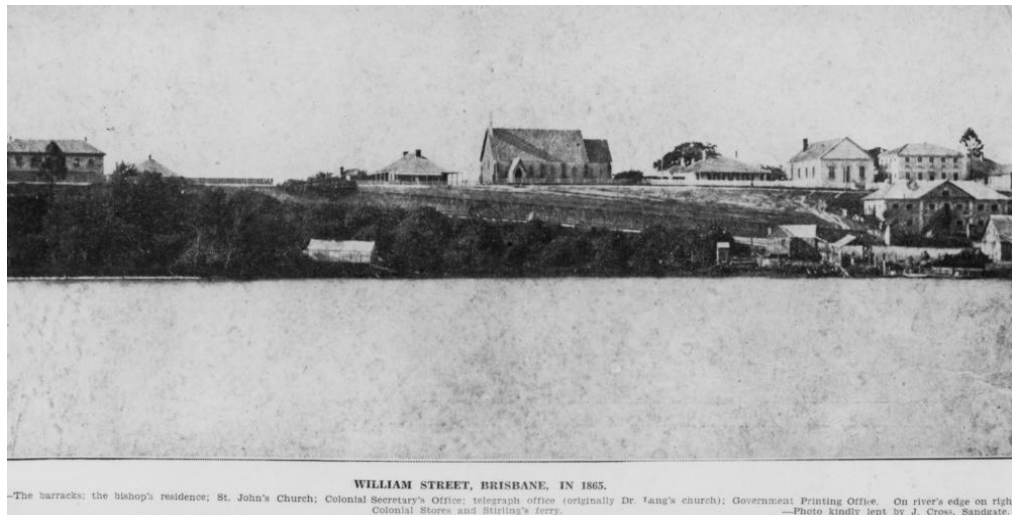


Figure 3. Looking towards William Street from the Brisbane River, 1865. The Commissariat Store and Kings Wharf is to the lower right; Kings Wharf Road leading uphill from right to left. (source. State Library of Queensland).

It was not until 1867 that the settlement underwent its first economic boom following the discovery of gold by James Nash at Gympie, some 170 km north of Brisbane. The huge influx of people that followed triggered an unprecedented growth in primary industries, and a period of prosperity and building activity that would last 15 years, and would not be equalled for a century. It was eventually ended by the cutting out of the gold and the world financial crisis of the early 1890s (Holthouse, 1982, p41).

Brisbane had become a significant shipping port with minerals, rural products and sugar as its primary exports. It was the capital of the annexed state of Queensland, and was to be proclaimed a city in 1902. The population of greater Brisbane at the time of the 1901 census was 119,428 people. The period of economic growth continued up to the advent of World War I (Statistics, 2009).

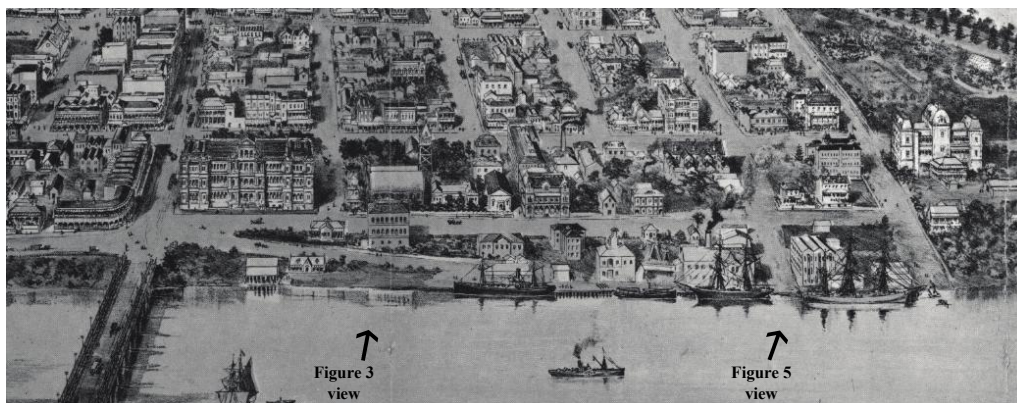


Figure 4. Carson, W.A. (1888) Part section of Balloon eye oblique 'View over Brisbane 1888' (source: Queensland State Archives).

From 1918, Queensland's economic base continued to be mainly foreign trade to the UK (73% of total exports); primary goods being wool (41%), butter (19.5%) and meat products (24.5%). However the impact of this trade was tempered by problems driven by increasingly higher prices for basic goods such as food and clothing.

To accommodate this growth in mercantile trade, wharves lined both sides of the Brisbane River allowing for large-scale docking capacity for ships. Neighbouring the wharves, and imbuing the commercial character of the city were numerous warehouses buildings, which incorporated the storage and office functions of the trading companies who were occupying the buildings.

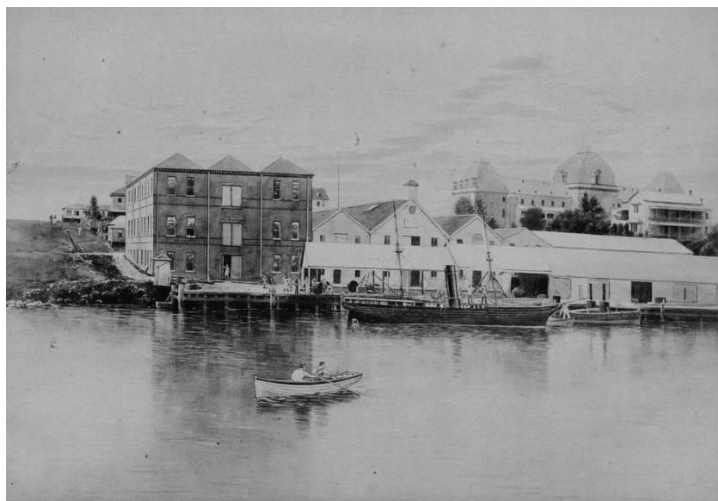


Figure 5. *Sketch of the Brisbane River looking towards the wharf and buildings on Short Street, Brisbane, ca. 1889. The roofs of the Parliament House are visible on the skyline.*
(source: State Library of Queensland).

In 1925, the City of Brisbane Act (1924) came into effect, rationalising civic government by amalgamating 18 former local government areas under a single administration, the Brisbane City Council (Holthouse, 1982, 55). Despite strengthening Brisbane as an economically powerful civic entity, the impact of the Wall Street Crash of 1929 brought about the Great Depression in Australia during the early 1930s. Nevertheless by 1935 Queensland emerged with employment levels restored, stimulated from public works expenditure and the recovery of wool, wheat and metal prices to pre-depression levels (Statistics, 2009). Optimism was short-lived however, due to the onset of World War II which once again stifled economic growth and development in the city.

The post-war decades from 1944 found Brisbane dilapidated and neglected, and it was to recover much more slowly than either Sydney or Melbourne. However in the 1960s, with new mineral discoveries in Queensland, the city finally entered an enduring phase of prosperity from which Brisbane emerged as a modern city through a program of large-scale urban and civil construction, which has been sustained until the present day.

In summary, there have been two significant economic periods in Brisbane's 170-year-old history which have generated two distinct morphological periods of urban development in shaping the form of the city. These are approximately its initial growth from 1840s up to 1914; and then, following fifty years of relative fallow activity, a rapid growth from the 1960s to the present day.

Major urban disfigurements to the Northbank edge of the Brisbane River

Riverside Expressway 1968- 75

A Brisbane Transportation Study was conducted in the mid 1960s, which included recommendations for a number of major road improvements to address increasing traffic

congestion in the city. The Riverside Expressway was a key component of the plan, extending the Pacific Motorway from south of the city, over a new bridge, and extending along the entirety of the Northbank disbursing traffic into and from the CBD, via a complex configuration of ramps (Cole, 1984).

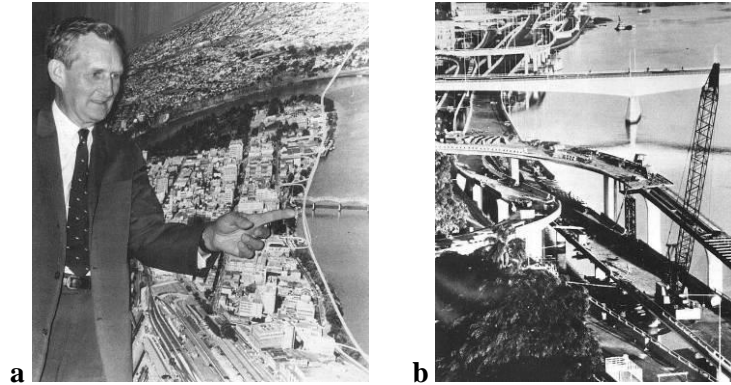


Figure 6. Riverside Expressway traversing the rivers edge. 6a: Wilbur Smith, in 1968 demonstrating the line of the proposed Riverside Expressway, a main feature of the Brisbane Transportation Study. 6b: Construction of the Riverside Expressway nearing completion in 1974. (source: Cole, 1984).

Large-scale demolition was required to enable the new embankment structure to traverse the river edge, and penetrate through fronting built fabric to connect to the existing road grid. In particular the quay and wharf profile was obliterated, replaced with multiple pylons supporting the road platforms; as well as an under-ramp car park that truncated pedestrian connection to the river at ground level (See Figure 7).

The obliteration of the small-scaled quay and wharf typologies occurred with the construction of the Riverside Expressway between 1968-74, and its presence has remained unaltered to the present.

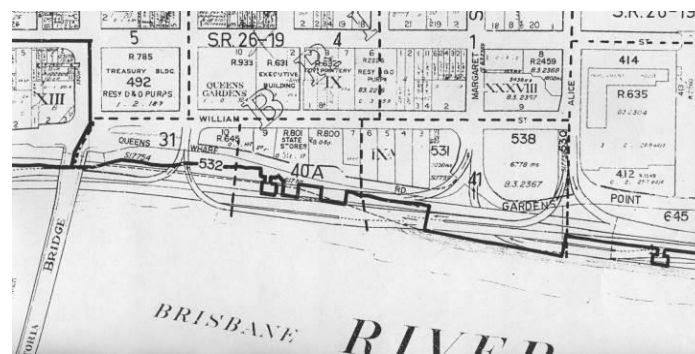


Figure 7. Map depicting the alignment of the Riverside Expressway, and the outline of the river edge profile it replaced. (source: Queensland State Archives).

Queensland Government precinct- construction 1983-87

The Skidmore Owings & Merrill master plan for the State Government Precinct developed in 1976, was to be one of the largest State Government works to be undertaken spanning administrative office spaces across five city block sites (Massey, 2014). It is to be noted that in this proposal all existing heritage buildings on these sites were to be erased to make way for this development.

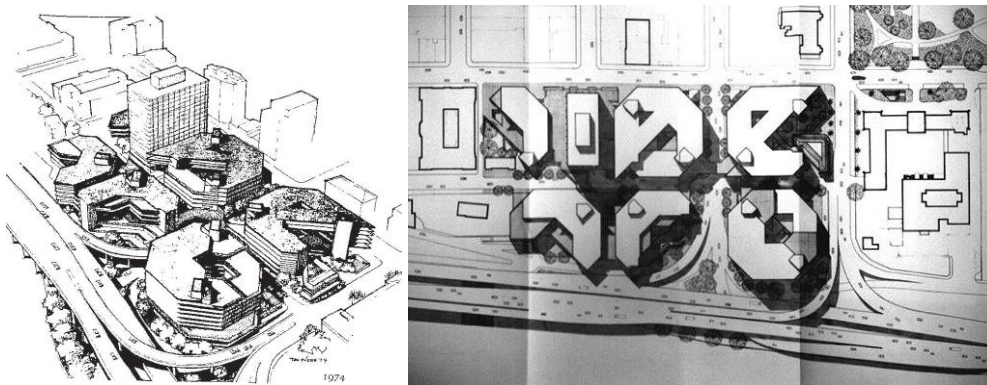


Figure 8. Preliminary sketches of the proposed SOM Masterplan 1976 for the Government Precinct. (source: Massey, 2014).

A reduced scope of building construction was eventually carried out by local architects Lund Hutton Newell Ryan Morton, and building works were completed in 1987 (De Gruchy, 1988). The complex accommodating the Department of Public Works in the new State Works Centre extended across the two sites along George Street and bridged over Margaret Street. Harris Terrace (ca1866) and The Mansions (ca 1889) were both spared and incorporated into the revised design; however the Bellevue Hotel (1886 – Figure 9), an elegant three storey building with cast iron balustrades and full length verandas, was unscrupulously demolished in 1979 under instruction from the State Premier, to make way for the new development.



Figure 9. Bellevue Hotel in 1940. (source: State Library of Queensland).

The controversial loss of the Bellevue Hotel (Follent, 2013) remains an infamous event in the history of Brisbane's development, in that it symbolises the crude and unsophisticated approach to urban growth at that time, an approach that lacked interest in the morphological and architectural significance of many historical areas of the city. Indicative of this attitude is the award of 'Joint Best Building' by the RAIA (QLD) in 1987 to The Government Precinct Building Block 1! (De Gruchy, 1988).

Northbank development proposal – 2008

In 2008, a Queensland Government supported proposal for the 'Northbank' ensured that the historic precinct came under further scrutiny with the release of details to reclaim land into the river to create a new high rise commercial development. The proposal would effectively construe a wall separating the river from its historic relationship to the city, cutting Brisbane off from its past (Robinson, 2007).

Stewart Armstrong, Director of the National Trust warned, "The history still exists, but the

ability to interpret the history and to tell the story of Brisbane will be greatly diminished" (Moore, 2007). Following considerable public outcry, the development proposal was dropped.



Figure 10. Northbank proposal 2007 (source: Brisbane Times).

Queen's Wharf- Government precinct proposal Brisbane – 2013

Most recently in 2013, a new government-led proposal for an 'Integrated Resort Development' was released, this time seeking to develop on the state owned land between George and William Streets; and also including the heritage precinct towards the river. The development is planned to expand the CBD including a mix of new uses such as: six star hotels, casino, retail, restaurant and entertainment zones, theatre and convention facilities and new open spaces.

With the renewed weight of development demand on the heritage precinct; and cognisant of the Queensland Government's record of sponsoring belligerent development, a number of concerned built environment professionals rallied to initiate a design workshop. The aim of the workshop was to give a platform for a collective voice from the design community, with the ambition to influence the trajectory of the State's decision making.

Bridge to Bridge: Ridge to Ridge urban design workshop – 2013

A call was made in July 2013 for participation in an urban design workshop focusing on the significant heritage precinct extending between the Goodwill and Victoria Bridges, and the Brisbane River to George Street: between the bridges, and from the ridge to the river.

Significantly the principal stakeholder groups involved were from practice, industry and academia. The professions were represented by: The Australian Institute of Architects and The Urban Design Alliance of Queensland; while The Brisbane Development Association represented the interests of industry. The three major academic institutions in South East Queensland are: Griffith University, Queensland University of Technology and The University of Queensland; a number of academics and students from their departments of architecture and urban design were also invited to participate in the event.

The organisers of the workshop represented both practice and the academy; Caroline Stalker and John Loneragan are both directors of architecture and urban design practices, while Leigh Shutter is an Associate Professor.

The expectation of the conveners for the workshop, were set out in the invitation flyer with the intention to develop the key urban design principles for the public realm of the precinct, forming the basis of recommendations to be sent to the State Government. The preamble and introduction to the workshop expanded on these general ambitions, articulating eleven specific themes; it is important to note that urban morphology is the third listed.

Design groups were encouraged to take consideration of:

- 1) The precinct's place in the city and connections beyond;
- 2) A network of public spaces;

- 3) Urban morphology;
- 4) Connections to the river;
- 5) Places of significance;
- 6) Traffic and transport (including the river);
- 7) Pedestrians and cyclists;
- 8) Flood mitigation;
- 9) Subtropical landscape;
- 10) Functions and activities in the public realm;
- 11) The experiences of the place. (Stalker et al., 2013).

The prominence of Urban Morphology as a theme can be attributed to the productive partnership that occurred in the programming of the ISUF 2013 Brisbane conference, with the annual Urban Design Alliance Superforum. The two events overlapped with a keynote session and cocktail function. Through this arrangement urban morphology was prominent in many discussions, and several design practitioners registered for the full ISUF conference. Furthermore Brisbane's earliest surviving structure, The Commissariat Store, was poignantly chosen as the venue to host the workshop.

Participants of the workshop were allocated into nine groups that were deliberately organized with a disciplinary mix; as well as a distribution of practitioners, academics and students. Groups were prompted by the conveners to consider several important questions, those with a morphological provocation were: What are the qualities of place that are important? What are the places that contribute most positively to the public realm? How does it fit and contribute as part of Brisbane city? What are the important physical qualities of the buildings and landscape of this precinct? How could this area change or be transformed?



Figure 11. Workshop session at the Commissariat Store. (source: Stalker et al., 2013).

Group 4 – Approach, development & outcomes

The author, an academic, was designated to Group 4 as co-leader with Cameron Davies, an architect and director of a leading urban design and architectural practice. Cameron had been a full delegate at the ISUF 2013 conference the previous month, and was therefore conversant with the themes discussed amongst morphologists at the conference, including the quest for better integration of research and practice; it was therefore an ideal opportunity to test this relationship.

The roles for the working group were discussed and agreed; it was decided that the author would develop mapping diagrams of the morphological evolution of the rivers edge and development of wharf buildings, from the period of urban settlement, up to the present. The drawings would be presented and described as a basis of knowledge to inform the understanding of the contextual condition. It would be for the design team to 'interpret' this information and

distill the significant issues along with the other aspirations and demands of the project; to manifest into the concluding design scheme.

Figure 12b is a composite diagram of the changing river edge over time, with each altered profile being mapped from the archival survey information; therefore articulating the morphological development of the rivers edge. This was the key mapping diagram to inform the design process, it was therefore presented to the group as reference material for the design team to interpret.

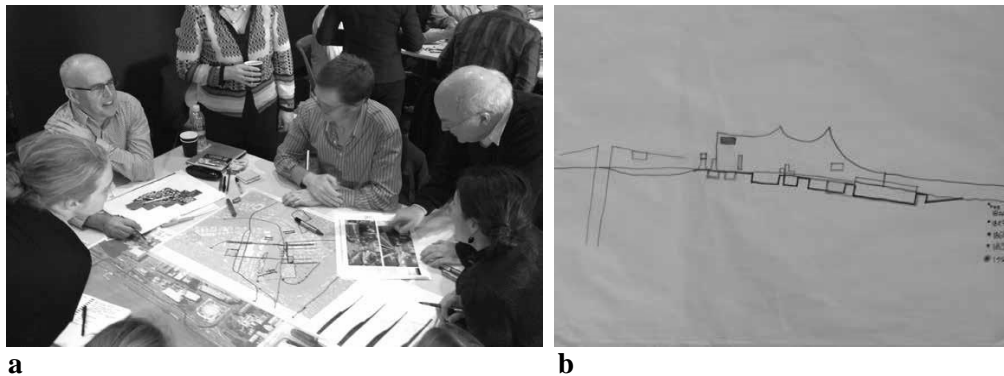


Figure 12a. Group 4 working session. 12b. Composite diagram of changing river edge. (source: Stalker et al., 2013).

The four key principles and recommendation that Group 4 derived from the process were:

- a) Respect, express, celebrate and make accessible to all the rich heritage morphology of the site in its redevelopment;
- b) Create more bridges over the river to connect the city centre to Southbank;
- c) Design the buildings and places to accommodate different uses over long time spans;
- d) Work towards a longer-term redirection of traffic between Alice and Queen Streets so that an 'opening' in the express-way can be created, enabling buildings to link to the river. (Stalker et al., 2013)

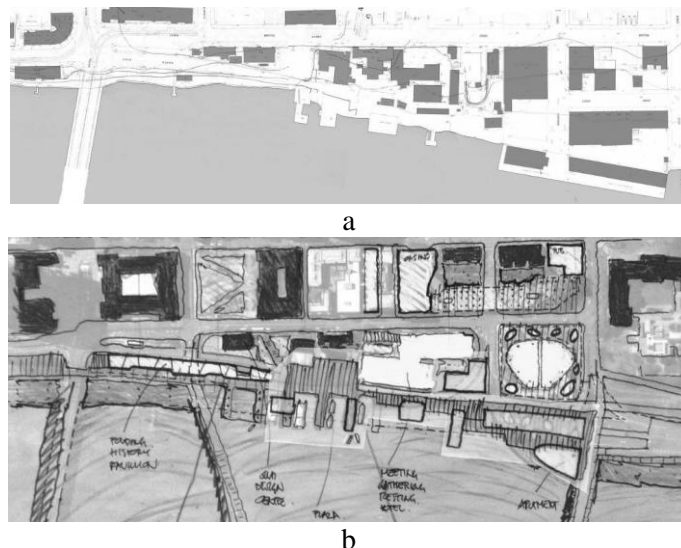


Figure 13a. Adaption of 1913 Water and Sewerage plans. (source: Author/ Brisbane City Archives). 13b. Group 4 final design proposal 2013. (source: Stalker et al., 2013)

Referring to the final Group 4 design proposal (Figure 13b), it is clear that the principles a & d had a profound impact on the direction and outcome of the design project. Furthermore specific aspects 1 and 5 listed below, patently address the lost attributes within the urban form; for example, a corner building of similar scale to the demolished Bellevue Hotel (see Figure 9), and the introduction of a new ‘fragmented deck’ which takes its cue from the original quay and wharf profile, including the design of new dispersed building forms (yellow) which resemble the warehouse structures from the 1913 diagram (Figure 13a).

The specific details of the design proposals included:

1. A new hotel/ pub at the southern end of George Street- (former Bellevue Hotel site)
 2. 80 George redeveloped as two linked towers; if a casino, include it in a tower that opens up Mary St at the ground plane;
 3. Create a great streetscape along William Street;
 4. Adaptively re-use the Neville Bonner building;
 5. Construct a River Quay between Victoria Bridge and QUT which includes a ‘fragmented deck’ whose form interprets the history of the site;
 6. A new design museum in the Old State Library.
- (Stalker et al., 2013).

Outcomes and reflection of the Bridge to Bridge: Ridge to Ridge urban design workshop

Whereas Group 4 undertook a concerted approach to embedding urban morphology into the design process; the outputs from other groups were varied. The following list captures some of the themes in their reports that construe an urban morphological intent within their recommendations.

- Group 1: Respect and enhance the Commissariat Quarter, Brisbane’s most significant heritage precinct located between William Street and Queen’s Wharf Road.
- Group 2: Recognize and celebrate the historic significance of the precinct. Establish a fine grain that creates a destination with character and scale. Recognize and celebrate the historic significance of the precinct; adapt and reuse heritage buildings, provide interpretive facilities, and respect the symbolic importance of the linear spine of George Street. Permit only appropriate scaled buildings adjacent to heritage areas.
- Group 3: Celebrate the historical significance and architectural qualities of the Heritage Precinct. Construct a new Queens Wharf Ferry Terminal (replacing existing) to be sited at its original location on the riverbank in front of the Commissariat Store.
- Group 6: Retain the scale of the heritage precinct – linking it to the river and creating a green space ‘buffer’.
- Group 7: Respect and enhance the heritage quality. Use a development framework (requirements for podiums, a restricted material palette and carefully managed building heights, etc) to achieve these aims.
- Group 8: Manage building heights to enable density while respecting heritage.
- Group 9: Acknowledge area as Brisbane’s first landing site. Restrict building heights around heritage buildings with highest buildings north of George Street.
- (Stalker et al., 2013)

It is encouraging to note that all but one of the nine groups make specific reference for the need to relate new structures closely to the existing heritage buildings: through various approaches, such as: ‘character’, ‘significance’, ‘appropriate scale’, ‘respecting’, ‘acknowledge’ and ‘architectural quality’. These groups thereafter made intuitive design responses to address the strategic intentions indicated above; and not surprisingly the design results from these groups are less explicit than the Group 4 submission. It could be surmised then, that with greater access to morphological data, all groups may have been more specific in design detail towards achieving the intent of the recommendations.

The overall collated outcomes of the workshop have been captured in a wide range of 23 key recommendations; with the three resolutions that best capture morphological aspects as follows:

Development Scale and Form

Preserve the integrity and historic setting of the lower scale heritage buildings by keeping adjacent buildings lower scale and providing buffers to new taller development. Undertake an impact study to determine appropriate scale of new development immediately adjacent to lower scale heritage buildings and nature of required buffers.

The Heritage Precinct

Actively enhance the heritage precinct to improve its enjoyment and accessibility for the people of Queensland. It is the most significant collection of heritage buildings in the state and this should be able to be understood and enjoyed through the design of its setting and its interpretation.

More clearly articulate and demonstrate the experience of the historic relationship between the Commissariat Store and the river in the design of spaces around the building.

The River's Edge

Create a lively, safe and welcoming river's edge. Activate the river's edge with new decks, restaurants, event spaces, cafes and recreation areas in the short term to make it a safe and enjoyable place in the city. Consider noisy activities that can coexist with freeway noise.

Plan for the potential redundancy or staged rerouting of the expressway (including the closure of on/off ramps) so that this highly significant reach of the river can be reconnected to the city in the longer term. (Stalker et al., 2013)

Conclusion

'The attraction to urban morphology from a wide disciplinary base is the nexus of concepts, ideas and approaches' (Samuels, 1990).

The concerted integration of the ISUF Conference event with the local design profession had a positive impact on the urban design workshop, in that the organisers and participants had been made aware of the work of morphologists, and in particular the richness of research data that can provide the knowledge base for designers.

It was also evident that following the willingness of the designers to accommodate research generated knowledge into the briefing and idea formulation stage of a design project, as in the case of Group 4, a clear correlation with the end proposal and important morphological attributes can be achieved.

Therefore it is suggested that research-led design, based on the designers interpretation of the research data, is an effective and accessible method to align theory and practice, and potentially more readily accepted than prescriptive guidelines and controls.

It is hoped that the example presented in this paper will contribute towards the current work that is being undertaken by the ISUF Research and Practice taskforce towards understanding better the *modus-operandi* of practice, and how practical guidelines can be developed to aid the adoption of principles of urban morphology in the process of design.

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Urban form study for better future of the city

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Abstract. *A look at the problems of urban forms from the point of view of the practice of architecture, urban planning and urban design is especially needed today. Contemporary sprawling cities and metropolitan areas require a holistic perspective from the point of view of synthesizing Urban Form while maintaining respect for historical tradition and cultural meanings of the place. The research problem boils down to the question of how, through research on urban form in its historical and spatial complexity we can find or formulate models for good solutions for the coherent and harmonious development of the city. The basis for such a specific approach is : understanding Urban Form Study as crucial for better urban design and spatial planning; recognizing a level of Urban Form as a base level of synthesis; understanding locality as a main determinant of the overall Form of the City; finding basic relations between contemporary Urban Form and possibility of its perception.*

Key words: Krakow, Urban Form design; urban structure; contemporary Urban Form.

Understanding urban form

Contemporary understanding of urban form in the Polish tradition of urban planning has its roots in the ideas of Tadeusz Tołwiński²⁶³. The important contribution made by him was the distinguishing of six *city development factors*.

City development factors are: *natural conditions* (physiography and nature); *economic and social affairs*; *fortifications*; *laws and customs*; *means of communication*; *town-planning composition*.

It is crucial to view the role of town-planning (urban) composition as a factor synthesizing all the others. To quote Tołwiński:

„The town-planning composition factor operates in a similar manner in various cultural epochs – it subordinates the often divergent influence of other factors to a certain general construct from which it derives the appropriate form. It crystallizes either as a result of an individual's creative work or as a product of the collective effort of a number of people or even whole generations. (...) As time passes, some cultural movements develop common types of general urban plans. They result from searching and experiments made over long periods of time (...)”²⁶⁴.

Urban composition is also important for K. Wejchert²⁶⁵. In his book "Elementy kompozycji urbanistycznej" (Elements of Urban Composition), he distinguishes some elements of the city structure which he considers significant. He assigns a particular role to the *elements crystallizing a city plan*. They can vary in nature but they always refer to the basic structural principle of the city fabric.

At another level, he identified *streets, districts, edges, nodes, dominants, outstanding landscape elements and characteristic features*. The classification essentially corresponds to

²⁶³ T. Tołwiński was an active architect an urban planner as well as a professor of architecture (Warsaw, Krakow). He wrote a book summing up the achievements of European urbanism – (Tołwiński, 1948).

²⁶⁴ (Tołwiński, 1948, I) p. 28

²⁶⁵ K. Wejchert – urban planner, professor, Faculty of Architecture, Warsaw University of Technology. Author of post-war reconstruction of small towns and a new city called Nowe Tychy, which is an excellent example of urban superblock development.

K.Lynch's division although in Wejchert's terms it refers to the actual structure rather than the elements of perception of the city's image²⁶⁶.

K. Wejchert also defined a *spatial interior*. "All sorts of restraints create a kind of interior around the observer stopping at a specific point regardless of the absolute dimensions of the perceived section of the surroundings."²⁶⁷

An important Polish approach to the understanding of urban form is its interpretation by prof. Janusz Bogdanowski, a pioneer of Polish landscape architecture, in his work²⁶⁸.

Janusz Bogdanowski²⁶⁹ developed the theory of urban interior (Bogdanowski, Łuczyńska-Bruzda and Novák, 1973): „We get to know landscape through recognizing its particular interiors. The interior in this case are the whole physiognomic surroundings of the place from which landscape is viewed. Of course, there can be an infinite number of such places. However, while studying the area, we can restrict their number to a series of those which most fully characterize individual types and forms of the landscape thus usually constituting its nodal points”²⁷⁰.

In brief, urban interior is a spatial unit which makes possible perception of landscape²⁷¹ - perception through fragments (perception based on the senses through presence).

We are dealing here with two points of view.

On the one hand it is the understanding of space through interiors – it is subjective and changeable depending on the time, person, function and use, form. It is the point of view which, through the synthesizing of impressions and opinions, can lead to studies and generalizations forming a set of issues related to the perception of the environment and research of environmental psychologists.

On the other hand, there is a definite physical structure which can be examined also through the study of specific places defined as urban interiors. The division into urban interiors is neither complete nor complementary. However, we can talk about interrelations between these interiors. Both the recording of the structure of the existing landscape and the design methods are based on a more or less conscious division of the landscape into interiors through the cubature forms that shape them. The perception of space through interiors imposes order and allows sequencing. This is related to the recognizing of the existing forms and the reading of cultural meanings.

This is also what both K. Wejchert and J. Bogdanowski mean by urban interior. This way of thinking complements in a sense the approach presented by K. Lynch, G. Cullen or Y. Ashihara who emphasize the manner of man's reception of space.

It lets us confirm the significance of the two different views – through the examining of the form and structure and through the studying of the principles and possibilities of perception of urban space.

At this point, it is worth mentioning the opinion of Roman Ingarden who writes about a two-layer structure of an architectural object – a spatial form and multiplicity of appearances²⁷².

We also ought to present the concept of a *powerful form* introduced by Jacek Gyurkovich²⁷³. A powerful form differs from its surroundings and has great power of expression „(...) it focuses the observer's whole attention distracting it from other elements which participate in the

²⁶⁶ K. Wejchert carried out studies on the curve of impressions thus joining in the debate over perception of urban space.

²⁶⁷ (Wejchert, 1974) p. 25

²⁶⁸ <http://www.la-congress.pk.edu.pl/rejestra.htm>

²⁶⁹ J. Bogdanowski was professor at the Faculty of Architecture, Cracow University of Technology, a historian, urban planner, landscape architecture and a theorist. He authored a number of studies on the history of Krakow's urban development – its greenery, fortification systems and landscape.

²⁷⁰ (Bogdanowski, Łuczyńska-Bruzda, Novák, 1973) p. 19

²⁷¹ Landscape is the physiognomy of the environment (the earth's surface) which is a synthesis of natural and cultural elements. Ibid, p. 76.

²⁷² Cf. (Ingarden, 1958), (Ingarden, 1981), (Gołaszewska, 1984)

²⁷³ (Gyurkovich, 1999).

creation of spaces and reducing their role to that of a background”²⁷⁴. At the same time, it assumes their meanings and constitutes a basis for the crystallizing of characteristic spatial sequences²⁷⁵. It is attractive and has the power to compose the surroundings. The term form is used here in relation to the space as a whole rather than cubature forms alone. The term can also apply to important public spaces which act as nodes²⁷⁶.

Such an approach to the urban form is presented in the paper (Kantarek, 2013 b) and defined as a *four-dimensional Capacity*:

"A vision of the form of a city as a physical, three-dimensional extension is the basis for understanding numerous theories. It is supported by a realistic attitude which assumes the existence of real, recognizable entities independent of consciousness²⁷⁷. In the most general sense, we can imagine a uniform, three-dimensional universe with a permanent location of points in relation to selected directions. These directions, defined naturally, mean the horizontal (X-Y plane) and the vertical (Z). In such a rationalized space, its initial (only imagined) uniformity practically includes various kinds of realness. It can be a man – a person whose realness is more than physical; there are other forms of matter, too, including visible elements – topography, greenery and architecture. The air is treated involuntarily as a “lack” although it makes a space of the same type as visible matter. The diversity and richness of spatial forms as well as time and the transformations of matter in time overlap on such a basic model. Such an imaginary four-space “stage” is the environment of life in its broadest sense, first and foremost the life of an individual and a community. This approach makes it possible to see the city in a geometrized scheme of inventory and morphological character. Four-dimensional capacity can also establish and assume an unlimited number of other, immaterial dimensions which differ from each other (e.g. in the sphere of meanings, emotions, applications, descriptions, histories etc.). In such a universe, it is also possible to continue defining certain wholes, always with the guarantee of geometrical precision as far as location, distance and size are concerned.

Four-dimensional capacity as an initial vision of the city of complete and holistic character is the basis for many well-known theories. This basis is realistic, not phenomenological.”²⁷⁸

A few words about the contemporary spatial planning in Poland, Krakow case

The present-day system of spatial planning in Poland is far from perfect. It results from the overlapping of some elements of the central planning system which was a rule before 1989 and the policy of openness to private investments in the transforming state economy that ensued. The planning system based on master plans which guaranteed systemic and comprehensive solutions, supplemented with detailed plans, was replaced with the *Study of the Conditions and Directions of the Spatial Management of a Commune - Studium uwarunkowań i kierunków zagospodarowania przestrzennego gminy* which is general and does not act as law. Local legal regulations are executed basing either on *Local Spatial Management Plan - Miejscowy Plan Zagospodarowania Przestrzennego* (which is not obligatory) or administrative decisions. These decisions refer to private investments (*Conditions of Development and Spatial Management – WZiZT Warunki zabudowy i zagospodarowania terenu*) or public investments (*Decision on the Location of Public-Purpose Investments - ULICP Decyzja o ustaleniu lokalizacji inwestycji celu publicznego*) and are separate spatial management decisions with no coordination between one another or other decisions (often the systemic ones concerning communication loads, for example) What is more, their compliance with the *Study*²⁷⁹ is controversial and disputable.

²⁷⁴ Ibid. p. 7.

²⁷⁵ Ibid. p. 169.

²⁷⁶ An interesting comparison can be made in relations to Aldo Rossi's artefacts.

²⁷⁷ (Leksykon, 2000), p. 282

²⁷⁸ (Kantarek, 2013 b), p. 31n

²⁷⁹ *Study* will be used as a shortcut for the *Study of the Conditions and Directions of the Spatial Management of a Commune - Studium uwarunkowań i kierunków zagospodarowania przestrzennego gminy*.

To sum up, it can be said that urban space defragmentation starts already at the stage of the legal system of planning.

It is worth considering certain aspects of the integrity of the spatial structure of Krakow in the light of the legal conditions of recent years. The last binding master plans which referred to the whole city area were made in 1988 and 1994. The 2003 plan was a *Study of the Conditions and Directions of the Spatial Management of a Commune* and as such had no force of local law. The 1988²⁸⁰ Master Spatial Development Plan of the City of Krakow (Miejscowy Plan Ogólny Zagospodarowania Przestrzennego Miasta Krakowa) defined a general spatial policy which the City Council wished to adopt with a view to returning to the traditional urbanism of streets, squares and urban blocks as well as respecting the values of particular districts as reflected in the formula of "a city of small towns".

The plan specified 50 spatial planning zones which were divided by themes into the following groups: landscape and natural resources protection zones; cultural resources protection zones; environmental protection zones; sanitary and protection zones; technical zones; transit services zones; municipal policy zones; investment policy zones; health resort protection zones.

They linked functional requirements with the specification of prohibition, obligation and protection measures.

The 1994²⁸¹ Master Spatial Development Plan of the City of Krakow (Miejscowy Plan Ogólny Zagospodarowania Przestrzennego Miasta Krakowa) uses two clear categories which determine the development. These are *land use* and *conditions of development*.

Land use is defined in terms of 19 different functions /purpose/ while conditions of development are determined by the establishing of spatial management policy zones. They include: the environment and nature protection zone, landscape and cultural heritage protection zone, view protection and view shaping zone, building intensity zone.

The first two zones are the most important ones with prohibitions and restrictions having priority over permissions.

The four zones are further subdivided to reach a total of twenty.

The plan shows a division of the area of Krakow into particular fragments each of which has been ascribed a code that is a combination of the function and obligation to meet the requirements of the 4 basic zones. 344 possible combinations have been distinguished.

The graphic form of the plan shows graphic symbols representing continuity of particular themes (Figures 1, 2).

Although the layout of the plan is legible, logical and safeguards the value of the urban form, designers regarded it as too complicated and employing hermetic terminology. In the late 1990s it was common to think about a city structure in terms of a whole as insignificant. What mattered most in the investment policy of the city authorities at the time (like today, unfortunately) was to give proprietors functional and spatial freedom in developing particular areas, which was seen as the only way to boost economy and growth. As the spatial planning system in Poland changed leaving it to the communes to take up or not to take up planning activities and restricting local plans to small investment areas without precise regulations ensuring compliance of *Local Spatial Management Plans* with the *Study*, the 1994 plan for Krakow was also overridden by the 2003 *Study*.

The 2003 *Study* regulations continue to protect the values contained within previous plans although they are rather general and descriptive.

The plan distinguishes 12 functional possibilities giving investors more freedom to develop the areas.

As for the description of spatial structures, the plan makes clear distinctions between function, form and zoning of the centre and the outskirts.

²⁸⁰ (Plan I, 1988), general designer of the plan is prof. Zygmunt Ziobrowski.

²⁸¹ (Plan II, 1994); as in the case of Plan from 1988 prof. Zygmunt Ziobrowski is the general designer and the coordinator of the plan.

According to the 2003 Study, the spatial structure of Krakow includes: the historical city centre with the surrounding built area; the area of "old" Nowa Huta; complexes of multi family housing; complexes of single family housing; high density industrial areas; transportation system; greenery and open spaces.

The main elements forming the spatial urban structure include: urban centre; main streets; main urban routes; multi functional urban centres; key areas of economic, cultural and technological development; greenery.

An attempt at saving the integrity of the urban space of Krakow was the study which won the competition for Local Revitalization Program for Krakow²⁸². The aim of the study was to present a general idea of revitalization of the city which is necessary because of both social and spatial problems.

Seven levels of revitalization were indicated from retrofitting and scale of a particular building or plot, various urban complexes, through systemic actions in selected areas and integration of the community and space of the whole city. The work resulted in a proposal to draft some necessary documents such as a map of acceptable sizes and a map of significance.

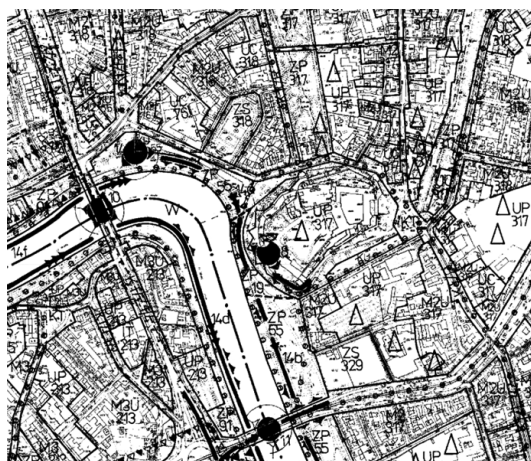


Figure 1. The 1994 plan – fragment of the graphics, (Plan II, 1994).

The authors chose several major areas where revitalization should be carried out. In view of the obvious shortcomings of the urban planning law, the basic level was the scale of the whole city and the need to include in the revitalization program the guidelines referring to the integration of city space and modernization of spatial systems of different nature.

An analysis of urban space was the basis for the assumption that revitalization should cover both "*the central areas of the city and the adjacent sites which showed a lack or insufficiency of use intensity /the ring around the centre of Krakow/, as well as local centres /residential and industrial/ together with systems based on the values of natural and cultural environment.*"²⁸³. Unfortunately, the study was not used at a general level. It allowed identification of the most vulnerable areas designed for revitalization while further administrative procedures resulted in the creation of a bank of particular projects and local interventions basing on the binding urban planning law.

Both the 1994 Plan and the study which won the competition for Local Revitalization Program for Krakow are attempts at a comprehensive approach to the urban form of the city and the establishing of effective rules of urban development that would allow conservation and creative interpretation of the city's cultural heritage.

To what extent is it possible to define such rules given contemporary Polish law? A possible solution could be the strengthening of the role of the *Study of the Conditions and Directions of*

²⁸² (Kantarek A. A., Gołab-Korzeniowska M., Karczmarska E., Motak M., Noworól M. and Tchórzewska A., 2006)

²⁸³ Ibid p. 8

the Spatial Management of a Commune and the extending of the projects which would allow a comprehensive approach to the themes it includes but not in the form of further changes in the document but as a basis for supplementary projects that would specify the general guidelines wherein.

The steps that should be taken in the first place include: the drawing up of a map of acceptable size with the monitoring of views and vistas from important locations, the forecasting of the effects of the decisions concerning function (which is missing in the planning of the city's transit system), the preservation of historical content and meanings of public spaces²⁸⁴ and finding a formula for active construction of a network of the city's public spaces²⁸⁵. Obviously, even the best *Local Spatial Management Plan* cannot enforce decisions that concern the sequencing of public spaces, obligation to buy out spaces and maintain their high standard.²⁸⁶

Visions and ideas

They are extended proposals submitted to the ISUF Manifesto.

1 Urban form research for better urban design and spatial planning	An important research field of urban form is associated with finding models of good solutions for today's tasks in the field of urban design and spatial planning
2 Urban form as a crucial level of synthesis	From the point of view of an architect and urban planner , practitioner and theorist , it is important to look at the form of the city as synthesizing other /and all/ guidelines - from politics to culture, from the community scale to the scale of the individual.
3 Locality and the overall form of the city	Locality is increasingly seen as the only significant scope for the life of the people. Overall reflection says that the body develops in the environment at the same time contributing to this environment . It is therefore a basic range of synthesis . Such an understanding of locality and urban form requires us today to look at the overall form of the city or agglomeration and finding such research tools that are able to describe it in all its complexity and dynamics of development.
4 Urban form and its perception	My point of view is that in urban form research seeking good models for today it is extremely important to carry on the double look – through the description of the structure/form and through the principles of its perception. At the junction of these studies we have an extremely important range of studies related to orientation in space, orientation understood as the basis for use of the space.

Figure 3. Main proposals submitted to the ISUF Manifesto.

²⁸⁴ Lack of regulations concerning protection of unique public spaces leads to their appropriation. An example to the point in Krakow is the current fight for preserving public space integrity and the modernist form of the Cracovia hotel. The new owner of the hotel wants to build over a part of the traditionally shaped public space in front of the hotel which is an element of a sequence of views from Old Town towards green areas on the west of the centre and destroy the valuable modernist architecture..

²⁸⁵ Within the same legal framework, Polish cities deal with spatial planning in different ways. Wrocław is particularly successful in implementing the comprehensive approach of *Study* both as regards decisions about functions and the creation of articulate public spaces.

²⁸⁶ A relevant example in this respect is ul. Cystersów (Cistercian Street) in Krakow which is included in the plan and yet cannot provide the proper standard of its public space for adjacent housing, for which it is designed. (Kantarek, 2013 a)

Wider comment on the proper meaning of the idea of locality is necessary. The text above highlights the significance of this spatial level. The important relationship between an individual and the environment is vital since life is realized at this very level. Individuals and the environment feed on one another.

For man, a four-dimensional environment (physical space + time) is important from the point of view of his growth and self-realization not only at the physiological level but also the psychical, emotional, intellectual and spiritual ones. It is at this level that he develops his axiology and approach to universal values. It is the local-universal relations that matters more than reference to the global scope. In such terms globality is assimilated by locality and not vice versa.

Globalization, which allows multiplication of the processes of tightening relations (including the economic, technological and financial ones) worldwide between countries and nations, fosters exchange of information and gives access to a wider scope of knowledge, can be viewed as a source of many opportunities including a need for compromise and standardization. However, it poses a threat to cultures which are based on locality.

Obviously, today, to a much lesser extent, the environment in which we live are related spatially. Even the spatial environments are often broken up into isolated parts which are separated by the time and sections of travel. However, none of these arguments means that the four-dimensional space and its legible functioning and composition are now less important.

Perhaps the solution would be to develop the *Open Book on Urban Form of The City* (whose scope is inexhaustible so it should be continued and updated) which would have the following aims: to show the complexity of the urban structure as a whole in relations to its history and meanings, also in a broader context (region, nation, country); to show significant established models of development of the elements making up the whole (areas, systems); to show the possibilities of the areas that are not formally shaped or underdeveloped in the shaping of the urban form

An important aspect of such a book is the social and environmental context.

This book should relate to a specific city. *Open Book on Krakow Urban Form* should include the following problems: The starting point ought to be a synthesis of the knowledge about the whole urban structure and the elements of its form in terms of history and meaning. There is a wealth of information on Krakow to be found in numerous studies and encyclopedias as well as the binding *Study*; Significant models in the case of Krakow certainly include: urban block forms that result from the implementation of defined systems and shaped in various historical epochs through the parceling out of streets, modernist housing estates as well as the public spaces of the historical districts of Krakow Old Town and Kazimierz.

This is the least explored scope of the urban form content. Regular studies should start with the determining of the current division of the city into development urban superblocks according to transportation routes and their declared and actual loads (which determine the role of a road in land development – transit or link).

Other areas of research include: categorizing views /sequences of views, sites, kind of stay/; categorizing typo morphological content; defining possibilities of transformations /fabric development/ in relations to the existing and historically legitimate elements/.

Development of a complete study of this kind seems unfeasible in terms of time. However, some things need to be done since they are particularly important for Krakow. These are: conservation, protection and development of complete urban spatial systems; in particular, protection of the network of open and accessible public spaces which emerged within the established historical and functional system of public spaces including protection of public spaces for pedestrians with the accompanying activities; conservation of modernist heritage – both objects and public spaces; preventing urban thinking by isolated functions (gated areas) which get detached from the common public space; protection of the basic street system (including "town entrances") with its legible layout, without acoustic screens and a barrier of advertisements as well as the chaotic visual and functional enclosures. Creation of proper

synthesis of pedestrian traffic and the accompanying activities of street ground levels as well as car traffic, public transport and parking zones is a must.

Such a book should not only be an analytical material for spatial planning and design but should also define good, from the point of view of urban form, ideas of its development and transformation and necessary legal obligation.

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The morphological dimension of planning documents: case study Belgrade, capital of Serbia

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Abstract. *The aim of this paper is to present one of the main issues and tasks of the ISUF – the importance of introducing concepts of urban morphology to professional practice, in a systematic and coherent way, to achieve a better built environment - in the specific context of Belgrade. A review of relevant up-to-date research topics and developed concepts found in the current theoretical discourse presented in the Urban Morphology Journal and ISUF, such as: morphological dimension of municipal plans (Oliveira), the issue of boundaries (Whitehand, Larkham and Morton), the question of scale and key concept – block or tissue (Kropf, Samuels, Hall) will be conducted. A number of major themes in the agenda of the morphological debate, will be examined to establish how existing morphological criteria in the Master plan of Belgrade and related planning documents correspond. It was determined that the morphological dimension of those criteria is questionable and that the real form-based approach in Belgrade's planning documents and procedures were absent which had a detrimental impact on the quality of physical and urban structure. It can be stated that there is a need, firstly, for a detailed theoretical elaboration of relevant concepts of urban morphology and then integrating them into planning documents and procedures in Belgrade and Serbia. The principal conclusion reached is that urban morphologists should have a key role in the prescription of future changes through coordination of design guidance, codes and plans at different scales.*

Key Words: Belgrade, urban morphology, urban form, planning, designing

Introduction

This paper builds on the existing researches dealing with the morphological dimension of urban plans in specific contexts of urban planning, the results of which are a part of contemporary urban morphological discourse exposed within the ISUF research database. The title of the paper directly refers to Oliveira's investigation of morphological dimension of urban plans for the city of Porto (Oliveira, 2006), pointing to the similar method and theoretical background to be used in case study of Belgrade, the capital of Serbia. Linking up and building on the results of past researches in the field of urban morphology provides multiple contributions. On one hand, urbomorphological investigations offer a significant theoretical base and direction for improving planning practices in Belgrade. On the other hand, international framework of urban morphology is expanded and a number of issues are examined in the specific context of discontinued development of Belgrade that is thus put in relation to continuous development of western countries whose experiences are primarily represented within ISUF (Whitehand, 2012.).

In Belgrade, over the past decade significant morphological changes have occurred due to huge pressures for increasing of building capacities, either through planning new or reconstructing the existing physical structure. The pressures mostly come from private investors driven by their economic interests, which become dominant in the decision-making processes. The resulting quality of the built environment is highly unsatisfactory, leading to erosion of character of the existing urban entities. The problem is particularly evident in the central zone of Belgrade which includes the historical city core, the center of New Belgrade and Zemun. In all these parts of the city that have different and specific historical developments, uncritical

interventions have been emerging not taking into consideration the existing urban forms and building typologies.

The existing planning documentation for Belgrade – primarily the current Master Plan of Belgrade 2021 (Urbanistički zavod Beograda, 2003) which acts as the planning basis of a higher level compared to detailed urban plans – recognizes the significance of preservation of the character as well as the opening of possibilities of new development within the existing urban entities. However, the planning guidelines do not offer the way towards achieving these goals, neither can they follow and control the undergoing urban transformations. The problem lies in an insufficient or inadequate direction for the detailed building level, through the planning recommendations that neglect the aspects of the resulting urban form. The question that arises is: in what way would it be possible to enhance the planning documentation and consequently the practice, by using the concepts of urban morphological discourse and recent experiences in linking these theoretical concepts with the practice? The unanswered question is: what happens in case of successful improvement of planning documentation in this way, how to ensure its successful implementation, where the key role of urban morphologists in coordination of design guidance and codes in plans at different scales can be recognized.

Context of the research

Oliveira (2006) puts his research in the context of the attempts to integrate the urban-morphological methods and concepts into the practice of urban design and planning, performed by the members of the contemporary British morphological school – Karl Kropf, Tony Hall and Yvor Samuels – as co-ordinators of urban plans and studies for several settlements in France and England. Then, he conducts a comparative analysis of these documents to the methodology applied in developing the plan of the city of Porto co-ordinated by Fernando Ça who builds on the morphological theory of Gianfranco Caniggia.

Introduction of the specific morphological criteria creates a methodological framework for protection of the existing historical and regional values, as well as for the formation of the new fabric. Based on the comparative analyses of the selected plans, Oliveira notices research topics and issues that are relevant for discussion and establishment of relation between the urban morphology and urban design. He especially highlights the issues of city character, typomorphological approach to zoning, the concern for urban tissue and levels of resolution as well as the question of boundaries.

Oliveira implies the possibility of improving the content of plans by including illustrations of acceptable typologies of plots, buildings and architectural details based on the morphological analyses of surrounding sites. Although these elements are not legally binding, if taken into consideration during implementation, they can contribute to the quality of the built environment because they take into account the relation between the existing and the new urban forms, thus preserving the character and the continual development of the specific areas.

Issue of boundary and scale – character and homogeneity.

The issue of boundary represents one of the key indicators of morphological dimension of plans because it addresses an important planning standpoint – which area is delineated, how and why (Larkham and Morton, 2011, Birkhamshaw, 2006). In accordance with linking urban morphology and planning practice, the boundary that encompasses the subject area should be based on morphological analyses of urban and physical structure. It should display the scope of the area with the homogenous morphological characteristics for which the spatial policies, planning guidelines and design rules have been defined.

Key concept – block or tissue

One of the basic interests of urban morphology in making its knowledge applicable in practice is the definition of the key concept. In that term, Kropf talks about urban tissue as the basic growth and transformation unit (Kropf, 2006, 2011.), while Hall and Samuels suggest block structure (Hall, 2008, McGlynn and Samuels, 2000). The concepts of tissue and block are related in terms that the tissue can be defined as the series of blocks of homogenous structure interrelated with street network. By morphological analysis of a particular area, a continuous expansion of a specific type of block can be identified together with its variations which generate the area of homogenous characteristics. This generative boundary is of special importance in contemporary morphological studies because, unlike the administrative boundaries of municipalities or designed boundary made up for the purposes of design brief, it recognizes morphological – intrinsic qualities of urban structure. In the Conzen's terminology, the generative boundary stands for „fixation line“ (ISUF Glossary). The use of this approach in defining the boundary helps avoid the frequent problem of administrative boundaries intersecting with parts of urban areas with similar morphogenetic characteristics (Whitehand, 2007).

Planning regulations

The design rules can be given explicitly, in the form of quantitative indicators which are obligatory for obtaining building and use permits, or implicit, in the form of qualitative descriptions that offer possibilities for different solutions in designing (Tieben, 2011). The way in which the design rules are formulated and used most directly influence the quality of the built environment. They link the different scales of professional activities, i.e. macro-scale of planning with the micro-scale of designing.

In accordance with the theoretical discourse of urban morphology, the morphological dimension of planning documentation implies the presence of morphological methods and concepts which address planning guidelines to resulting qualities of urban and physical structure. The paper is particularly concerned with the abovementioned topics in the agenda of the morphological debate in order to establish how existing morphological criteria in the Master Plan of Belgrade 2021 and related documents correspond.

The case of Belgrade

The system of planning in Serbia is similar to those in most countries that use the approach of comprehensive planning and principle of hierarchical linking from larger scale of spatial/regional plans towards smaller scale of urban plans. According to the scope of the subject area, urban plans have their own hierarchy to be obeyed: from master plans, via general regulation plans, to detailed regulation plans. The regulatory framework for the planning system is the Law on Planning and Construction (Zakon o planiranju i izgradnji, 2009), Rulebook on the Content, Method and Procedure for development of Planning Documents (Pravilnik o sadržini, načinu i postupku izrade planskih dokumenata, 2010) and Rulebook on General Rules for Land Plotting, Regulation and Building (Pravilnik o opštim pravilima za parcelaciju, regulaciju i izgradnju, 2011).

According to these documents, the integral parts of both spatial and urban plans are the rules of regulating, building rules and graphic part of the plan. The rules of regulating contain the concept of urban development of characteristic zones and entities, urban and other conditions for regulating, building and developing public areas and infrastructure network, measures for protection of natural, cultural values, energy efficiency, standards of accessibility etc. The building rules contain the type and use of structures that can be erected in specific zones, permitted urban parameters, maximum building height as well as conditions for forming a

buildable plot, positioning of buildings on the plot, building other structures on the same building plot and providing the access to plots and parking lots. The graphic part of the plan shows the planned use, regulation and leveling, infrastructural systems, protection of the environment, natural and cultural goods etc. It is done on notarized underlays – cadaster-topographic, cadastral or topographic maps or on updated ortho-photo underlays.

The building procedure starts with the request for issuing the location permit which contains the information on the possibilities and limitations for building on the given plot. The information is excerpted from the detailed regulation plan for the subject area – if it exists. However, since the city territory is not completely covered by detailed regulation plans, the Law enables the issuing of location permits based on the planning documentation of higher degree, such as the Master Plan of Belgrade 2021. Although it is defined as a comprehensive strategic document, it contains the regulatory elements that enable the issuing of location permits for those parts of the city that do not have detailed regulation plans (Fig. 1)²⁸⁷. Besides, the comparative analysis of the planning guidelines from the Master Plan of Belgrade 2021 and the Detailed Regulation Plans for several entities in the inner city centre show that legally binding elements – maximum permitted values of urban parameters – have not been reconsidered while developing more detailed planning documentation in order to adjust it to the specific context of the subject area. The domination of economic interests of private investors always dictate the attaining of maximum building capacity on the plot (Nikovic et al., 2012). The most common situation is that the maximum permitted values of urban parameters are directly and uncritically transferred from the Master Plan to Detailed Regulation plan. Thus, the rules of regulating and building rules defined in the Master Plan of Belgrade 2021 often directly influence the resulting urban and physical structure. Therefore, it is important to question its morphological dimension, considering the exposed objectives, priorities and planning recommendations. It is also possible to assess its influence on the built environment in view of the period when it was adopted.

Morphological dimension of Master Plan of Belgrade 2021

Master Plan of Belgrade 2021 which is still in effect was adopted in 2003. Its development was explained by the needs of a new social system which “develops gradually and requires a new plan that directs its urban development”. The earlier urban plans were qualified as static because they didn’t provide the answer to the dynamic planning process where the priorities needed to be continuously re-evaluated. It is also emphasized that from the period of the 80-ies of the 20th century the loss of control over urban development occurred. It was manifested through different informal and illegal building activities which were taking place not only in the outskirts but in the central zone as well.

The content analysis of the Master Plan of Belgrade 2021 points out the goals that refer to the improvement of quality of the built environment. The urban development of Belgrade is targeted towards achieving the etiquettes such as “urbanistically regulated city”, “city of complex memories”, “city of unified appearance”, “connected and accessible city”. The relevant chapters which are further analyzed in order to find the elaboration of these objectives are as

²⁸⁷ Total area covered by the Master Plan of Belgrade 2021 is 77602 ha, where 84% of that is urban buildable land – 65185,7ha. Fig. 1 shows the scope of detailed regulation plans where: plans adopted by 2003 include the area of 12986,4 ha, which amounts to 19,9% of urban buildable land. Plans adopted after 2003 include the area of 5502,9 ha which amounts to 8,4 % of urban buildable land. That leads to the fact that about 71,7% of the urban buildable land area is not covered with detailed regulation plans, with the notion that for one part of this area obligation for developing detailed regulation plans is set out by the Master Plan. Additional attention should be paid to the fact that the areas ‘not covered’ by the plans are not continuous, they appear as gaps that need to be „filled-in“ and are present in all parts of the city including the most attractive central locations. That additionally calls upon typological approach to zoning and defining the urban rules according to analyses of the existing urban form.

follows: “Boundaries of the Plan, Spatial Entities and Zones”, “Protection of Space”, “Spatial Zones and Urban Entities with Same Building Rules”, “Urban instruments for implementation of the plan” and “Rules for Building and Renewal”.



Figure 1. The urban buildable land of the Master Plan of Belgrade 2021 with the areas covered by Detailed Regulation Plans.

The remainder of this paper examines how existing morphological criteria in the Master Plan of Belgrade 2021 correspond to the underlined urban morphology issues: the question of boundaries and scale of plan units, key concept – block or tissue and the way of defining the urban regulations. For each of these questions, we firstly describe the relevant elements from the plan, secondly we comment on these elements in terms of existence or absence of its morphological dimension, and finally give the recommendations for its adjustment to urban morphology.

Issue of boundary and scale – character and homogeneity

According to the Master Plan of Belgrade 2021, the encompassed territory of Belgrade is divided into 4 spatial zones: Central, Middle, Outer and Edge, that are further split into 57 urban entities. For each entity or group of similar entities spatial distribution and scope, as well as a short summary of characteristics, potentials and role of the entity in the city are given. The program elements are not methodologically treated in the same way in all entities, but are rather given in the scale of general recommendations for group of entities up to detailed guidelines for specific location. It is emphasized that the main operational purpose of this part of Master Plan is to provide a kind of program reminder for the key developmental issues in specific parts of the city in order to preserve its identity. At the same time, based on the graphic part of the plan entitled “Spatial Zones and Urban Entities with Same Building Rules“ it can be assumed that these urban entities should correspond to the definition of the Conzen’s ‘plan unit’ (ISUF Glossary), i.e. they should be a part of urban areas with homogenous morphological characteristics and distinctive character in comparison to the surroundings. Besides, the division of the plan’s territory into spatial zones and urban entities (Fig.2), can lead to the conclusion that the urban development of Belgrade went on continuously through concentric expansion of

its urban and physical structure from the center towards the outskirts. However, examining of both of these assumptions ends up with its denial.

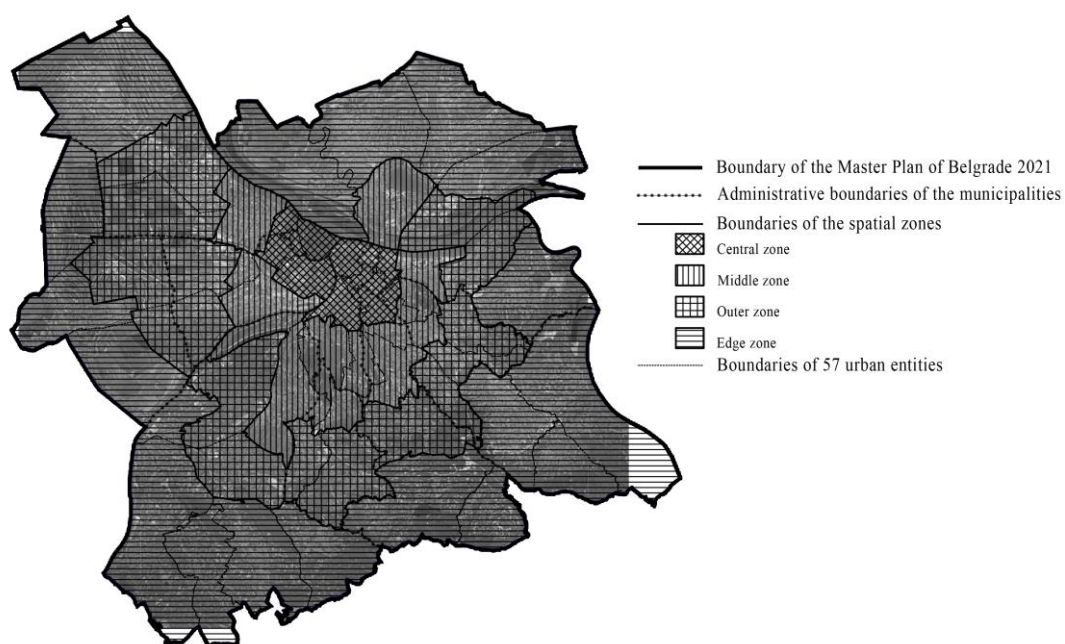


Figure 2. The territory encompassed by the Master Plan of Belgrade 2021 and its division into spatial zones and urban entities.

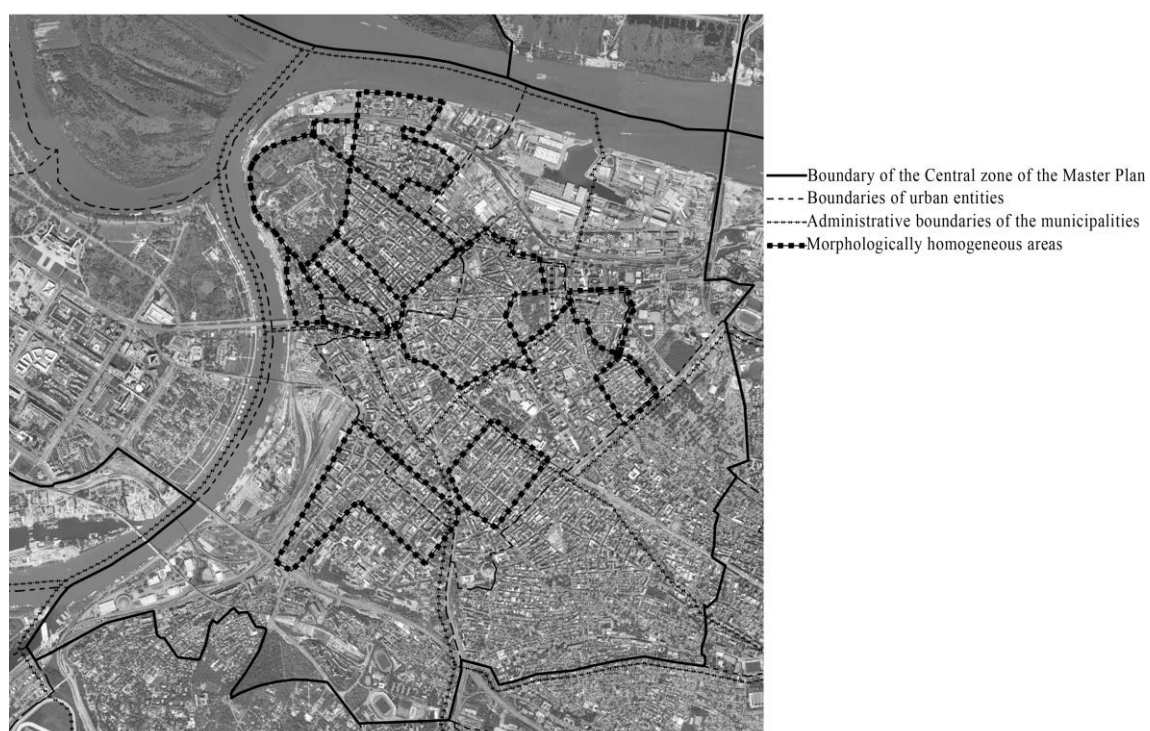


Figure 3. The relation of administrative and plan boundaries to the morphologically homogeneous entities.

Firstly, based on the projection of boundaries in the ortho-photo images as well as via direct observation, it can be noticed that within designated urban entities there are elements of urban and physical structure with heterogeneous morphological characteristics, and that the boundary between the urban entities is frequently cutting through morphologically homogenous areas (Fig.3). One of the explanations of this situation can be found in the plan itself, where it says that the boundaries are partly following the administrative borders of municipalities due to the use of data that are processed at the level of their statistical circles. It is denoted that therefore boundaries can be the subject of future changes.

Secondly, opposed to the assumption of continuous development and concentric expansion of the urban territory, Belgrade's urban development can be described as a set of fragmented interventions, the part of which is evidently aimed towards bypassing the legislation and planning guidelines. Due to illegal construction, the city has for years expanded beyond its limits, for the purpose of building in the cheaper zone, while the central parts remained undeveloped and neglected (Stojanović, 2008.)

The Master Plan of Belgrade 2021 defines urban areas, buildings and conditions that cannot be subject to changes – defined as fixed elements and permanent values of the city. However, this part of the plan has a descriptive character and given recommendations are not obligatory. The protected areas are displayed in the graphic part entitled “Permanent Goods” - not in the main body of the plan but within the documentation basis and are not linked with the abovementioned division to urban entities for which specific building rules are defined.

It can be stated that the division into spatial zones and urban entities, for which the same building rules are applied within the Master Plan of Belgrade 2021, should be reconsidered and upgraded with the urban morphological approach. The boundaries of the urban entities should be generated based on the morphological analysis of the subject area. The scope of the bounded area, i.e. its scale, should be determined by the extent of urban and physical structure with homogenous morphological characteristics, which give the specific character to the urban entity. Also, there is a need for establishing the relationship between the goals of urban design and aspects of physical structure, in which Hall's investigation on the physical manifestation of the planning objectives can be helpful (Hall, 2008).

Key concept – block or tissue

Within the Master Plan of Belgrade 2021 the notions of „tissue“ and the application of morphological criteria can be found in the chapter entitled “Typology of the Residential Tissue” where it is explained that the “types of residential tissue – blocks, included in this MP, are defined on the basis of the morphological criteria”. Accordingly, the planning guidelines for residential use are given on the ground of the following typologies: compact urban blocks, open urban blocks, individual housing blocks, suburban housing blocks and mixed urban blocks. The plan uses the term “residential tissue” for all plots and buildings that are intended for residential use with accompanying public facilities. Since the residential use covers almost 50% of the land intended for building, it can be concluded that proposed typological approach has considerable impact on urban and physical structure of Belgrade.

If the established plan typology of residential tissue is compared to the existing built environment in Belgrade, one can notice numerous flaws and incoherencies between the terms and methods used in the plan with their meaning and application in the urban morphology discourse. The plan shows the tendency to link the planning guidelines with the typology of urban and physical structure, suggesting the type of block as the key concept. However, the proposed typology is too general, based on few characteristics of block structure - the way of grouping and the type of building within a block. Some important block characteristics as elements of typology are avoided. For example, according to recent morphological studies, the shape and the form of block indicate the possibilities of urban development (Siksna, 1997), so it is very important to make a distinction between compact blocks in various parts of the Central Zone of the Master Plan. There are important differences between small square blocks in the

inner city centre and huge elongated rectangular compact blocks on Savska Padina (Perovic, 2008). According to the plan, they both belong to the same type of compact blocks in the central zone intended for residential use. However, their morphogenesis and the existing physical structure differ significantly and require different approach to planning. Also, similar conclusion has been reached when comparing open blocks in New Belgrade to open blocks in the Middle and Outer zone of the Master Plan. This kind of approach to forming the block typology, that doesn't sufficiently take into account the diversities between different parts of the city, leads to the conclusion that the real typological approach to zoning in the plan is absent. The terms such as "morphological criteria" and "tissue" are used in an inconsistent manner. This terminological inconsistency is additionally emphasized by using terms "housing" and "apartment" in accordance to the Habitat Agenda, which has completely different theoretical background.

Morphological criteria in area descriptions and development prescriptions, as well as the used terminology can have proper purpose if they are used in accordance to the urban morphological approach and its methods and concepts. The term of "tissue" should not be linked to the use but to the specific urban entity and its physical characteristics that reflect the homogenous structure of blocks. Also, when defining the typology of blocks it is necessary to conduct a detailed morphological analysis that should result in producing the data on various developmental and physical characteristics of blocks. It is especially important to take into consideration the morphogenesis of blocks, shape and size of blocks, position in wider city entities, topography, etc.

Urban planning regulation

In accordance with the common legislative practice in Serbia, the Master Plan of Belgrade 2021 uses quantitative indicators for determining the building capacity – the Occupancy Index (OI) and the Construction Index (CI) of a lot/block. The permitted values are assigned to specific locations based on the planned use, the position within the city area whether in the central zone or outside the central zone, and in the case of residential use, depending on the type of block. Other guiding indicators for detailed plan elaboration include: population density, employment density, users' density, the ratio between Gross Unfolded Building Floor Area (GUBFA) and commercial use, normatives for open and green areas per inhabitant or per block area.

Apart from determined urban indicators, parameters and regulative elements, in chapters referring to building rules, the Master Plan provides recommendations that are directly linked to the possibilities of energy efficiency, the use of alternative sources of energy, formation of highly standard urban spaces in terms of hygiene and ambiance, establishment of the system of green areas etc. However, these recommendations are not obligatory requirements to be met in designing procedures, as is the case with the permitted values of the OI and CI. Planning guidelines which refer to the elements of urban and physical structure directly connected with qualitative properties of urban space, especially spatially-experiential and visually-aesthetics aspects which are crucial for the city of "complex memories", "unified appearance" etc. are not a decisive factor for the implementation.

The absence of morphological criteria when conceiving the boundaries and typologies of urban and physical structure leads to the application of general rules in the settlements of different character. The application of the Rulebook on General Rules for Land Plotting, Regulation and Building is obligatory only if required by the planning document based on which the location permit is issued. In other words, modification and adjustment of these rules to the specific location is possible in accordance with the conclusions made based on the analysis of the location possibilities during the planning process, reconciled with the higher level planning documentation. It is necessary to improve the regulation in terms of obligation to respect the specific planning and designing context, i.e. examining the effects of application of general rules on a specific planning area. Within the planning documents, there is an open possibility for including the elements which are not legally binding but can be used to the benefit of the good professional results in practice (Oliveira, 2006). This primarily pertains to

the the integrated graphic analysis (McCormack, 2013), through which different solutions of spatial arrangement can be examined and valued. In that way, the insufficiently analyzed solutions, based on overgeneralized or partial approach or one-sided interests can be alleviated, which consequently improves the quality of the built environment.

Conclusions

Theoretical solutions to the problems of relating the qualities of urban form to the planning practice in Belgrade which can be found in urbomorphological discourse of ISUF, have already been recognized in scientific investigations in the field of urbanism in Serbia (Djokic, 2007, 2009). Additionally, it is necessary to bring closer the formerly consolidated knowledge of urban morphology to the professionals in practice. By applying urban morphological methods and concepts to plans, its morphological dimension can be achieved. In the case of the Master Plan of Belgrade 2021 it implies the connection of the promoted goals of character preservation and the identity of urban areas, to typological approach to zoning (Kropf's definition). The special emphasis is given to the recommendations for improving the Master Plan of Belgrade 2021 in accordance with urbomorphological concepts which refers to defining the following: the identification of area boundaries, since the existing division of territory does not recognize the morphologically homogeneous areas in which unified building rules are applied; the key concept, since the proposed typology of residential tissue is too general and does not include important morphological characteristics of the area as the elements of the typology; the building rules, which are explicitly defined in the Plan, in the form of quantitative indicators that mostly influence building procedures.

In addition, urban morphology glossary should be accepted in order to use precise and consistent terminology in planning documents as well as in theory, thus improving the correspondence between theory and practice. Prior to introducing the morphological dimension into the planning documentation of Belgrade and real form-based approach, which can be a long-term process, urban morphology theory can contribute to improving planning practice through raising awareness with regard to the importance of interrelating the various scales of professional activities – planning, designing and building, as well as the possibilities that can be achieved by the existing planning documents. Firstly, there is a proposal to introduce plan elements that are not legally binding but contribute to foreseeing the effects of the implementation of planning guidelines in the subject area. Secondly, through education it is possible to affect the procedures for adopting plans and obtaining building permits to include the elements which are not obligatory, but are related to the quality of space that is planned and built. In these activities, the coordinative role of the professionals, i.e. of urban morphologists, is recognized, in terms of predicting future development, through coordination of planning guidelines and rules in plans of various scales.

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Future urban changes through design guidance: new principles

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Abstract. *The urban condition we are experiencing today shows many changes in terms of the rhythms and exploitation of the city, the modalities of living, working, moving around, and the opportunities for enjoying leisure. The emergence of new typologies of place and changes in the patterns of usage for the existing typologies have given rise to whole new cityscapes: striking juxtapositions and fragmentariness seem to predominate in the wholesale dispersion with which subjects, things and habits coexist, characterised by boundaries which are transparent and yet at times unbreachable. The identity of a place, often at risk due to globalization process and rapid urban changes, expresses a harmonious balance between variant and invariant components, people and urban events, which are intrinsically linked by a reciprocal relationship that makes a specific place unique and recognizable. At the same time, public space is a topic which is increasingly assuming a new emblematic role in contemporary city and many design codes are arising accordingly. Based on these considerations, this work aims to illustrate the "12 principles for place identity enhancement", which were created from a reasoned set of blueprints for the various experiments carried out using the PlaceMaker method of urban analysis and design. The paper describes those principles and the evolution of some of these principles in the Charter of Public Space which was adopted during the II Biennial of Public Space, which was held in Rome in May 2013. The Charter includes both specific principles for place identity safeguarding and enhancement and for public space creation.*

Key Words: place identity, urban landscape, public space, urban principles

Introduction

The emergence of new typologies of place and changes in the patterns of usage for the existing typologies have given rise to whole new cityscapes: striking juxtapositions and fragmentariness seem to predominate in the wholesale dispersion with which subjects, things and habits coexist, characterised by boundaries which are transparent and yet at times unbreachable.

The contemporary city is the place not only of complexity but also of simultaneity and instability, which give rise to situations of mutation and transitoriness. These are often predominantly motivated by economic gain, to the detriment of place identity which becomes increasingly hybrid, compromised or unrecognisable.

The lengthy periods of time required for the perception of the city Kevin Lynch talks about have been altered by the acceleration of the new urban rhythms. Nonetheless it still seems true that: "City design is therefore a temporal art, but it can rarely use the controlled and limited sequences of other temporal arts like music. On different occasions and for different people, the sequences are reversed, interrupted, abandoned, cut across. It is seen in all lights and all weathers. At every instant, there is more than the eye can see, more than the ear can hear, a setting or a view waiting to be explored. Nothing is experience by itself, but always in relation to its surroundings, the sequences of events leading up to it, the memory of past experiences". (Lynch, 1960)

Undoubtedly the people and their activities are as important as the "stationary physical parts", and we are part of the scenario together with the other protagonists. "We are not simply observers of this spectacle, but ourselves a part of it, on the stage with the other participants. Most often, our perception of the city is not sustained, but rather partial, fragmentary, mixed

with concerns. Nearly every sense is in operation, and the image is the composite of them all." (Lynch, 1960)

Placemaking, in the sense of "the art of making places for people" - to paraphrase the definition given by the Cabe and Detr Ministerial Guide "By design: urban design in the planning system" - "includes the way places work and such matters as community safety, as well as how they look. It concerns the connections between people and places, movement and urban form, nature and the built fabric, and the processes for ensuring successful villages, towns and cities".

The city thus becomes the outcome of complex intersections created by a number of operators who modify the system for different reasons. It becomes necessary to identify a microsystem within the macrosystem of the city able to make the urban variants intelligible: place is at once porous and resistant, a receptor for complex interactions.

Accordingly, places are termed "places" and not just "spaces" when they are endowed with identity (Hague, Jenkins, 2005).

Such identity is related to the urban fabric and a series of morphological, natural, historical and cultural invariants. These invariants are closely interrelated to the life of the city and its inhabitants, and also to the perception the latter have of that place. At the same time, colours, materials, smells and sounds become an inseparable part of any one spot in the city, and thus emotional components of the urban image.

The identity of a place expresses a harmonious balance between variant and invariant components, people and urban events, which are intrinsically linked by a reciprocal relationship that makes a specific place unique and recognizable. At the same time, globalization and technological development have contributed to accelerating the rates of change and transforming spaces in the contemporary city. The end result is that cities, places, itineraries, customs and behavioural patterns have all come to resemble one another, contributing to an increasing urban identity crisis.

The sustainability of any place depends on a number of factors which contribute to its liveability, quality and identity (Vale, Warner, 2001; Butina Watson, Bentley, 2007; Cullen, 1961; Jacobs, 1961; Rose, 1995; Osmond, 2010).

Urban, cultural and historical poles of attraction, increasingly bear the imprint of globalization, conveying messages which have developed in an uncontrolled manner and are aimed at conveying their users' patterns of thought and action. The presence of a dense mixture of contrasting elements and perceptions can detract from the image of a city (Carter, Donald, Squires, 1993, Christensen, 1999; Castells, 1997; Nasar, 1998; Appleyard, 1981; Whyte, 1980; Urry, 1995). Furthermore, especially in pedestrian-intensive areas and in public spaces, it can contribute to creating urban decline and a chaotic atmosphere, including increased episodes of street crime. In order to draft an urban project focusing on the conservation, reconstruction and enhancement of place identity in such areas, which are often especially representative of their respective cities, we need methods of analysis and design able to identify, represent and design the urban elements that make up contemporary cities (Carmona, Heath, Oc, Tiesdell, 2010; Oliveira, 2013; Banerjee, Loukaitou-Sideris, 2010; Gospodini, 2004; Gehl, 2001).

Based on these considerations, this work aims to illustrate the "12 principles for place identity enhancement", which were created from a reasoned set of blueprints for the various experiments carried out with the PlaceMaker method (Sepe, 2006a; 2013). PlaceMaker comprises eight phases – five of analysis and three of design – and a Phase 0 that consists in constructing the grid required for the operations which are to be implemented later. This method assembles, elaborates and reconstructs the data deriving from surveys based on physical reconnaissance, sensory perceptions, graphical elaboration, photographic and video records, and sets this data against that provided by an overview of expectations, an analysis based on traditional cartography and two questionnaires administered to local inhabitants. The main products are two final complex maps, one first of analysis and one of design, which represent the place identity and project interventions in order both to establish a dialogue with local people and support planners and administrators in the sustainable urban construction and

transformation. The paper describes in section 2 and 3 respectively the method and those principles, designed as checklists for urban projects with place identity at the core. Furthermore, in section 4, it shows the evolution of some of these principles in the Charter of Public Space (Garau, Lancerin, Sepe; 2013) which was adopted during the II Biennial of Public Space (www.biennalespaziopubblico.it). The Charter, composed by 6 parts devoted to public space - definition, typologies, creation, obstacles, maintenance, management, and enjoyment - includes both specific principles for place identity safeguarding and enhancement and for public space creation. Following the Charter adoption, practical codes are in development in order to realize a Global Toolkit for public space. Section 5 draws the conclusions.

The PlaceMaker Method

The PlaceMaker method, used for the 12 principles construction, comprises eight phases. The first phase of PlaceMaker is devoted to anticipatory analysis aimed at primary investigation of places; after the preliminary choice of the city and of the part(s) to be analyzed, the ideas about that particular area can be described using any type of instrument or tool of expression, using the information known prior to the first inspection. These notes can be represented in different ways and the result of this phase will be a map of the emerging ideas.

The second phase is that of the five surveys. The first, the *denominative* one, consists in collecting data regarding constructed elements (presence of monuments, buildings, etc.), natural elements (presence of urban green areas, trees, animals etc.), transportation mode (presence or transit of cars, buses etc.), people (presence of tourists, residents, etc.). The localization of all these elements and the kind and amount, expressed as a low, medium or high percentage, are indicated. As well as the denominative data base there is a cognitive one which constitutes a kind of flexible input, where it is possible to insert elements which are not decided previously, but deduced during inspection.

The second survey is *perceptive*; a survey is carried out of the smell, sound, taste, touch and visual sensations, and of the global perception, focusing on the localization, type, amount (present in low, medium, high percentage) and quality (non-influential, pleasant, annoying). The survey of the amount and quality of the data, the three options regarding, respectively, the percentage of presence and the feelings induced, are intended to summarise the processing of data that can however be extended during collection.

The next survey is *graphical*: it consists in sketching the places; the sketches will represent the area in question according to a visual-perceptive standpoint and will be supported by annotations where necessary. This operation constitutes a preliminary study for the construction of the graphical symbols for the complex map. *Photographic* and *video* surveys of the whole study area are carried out, taking care to record facts rather than an interpretation of the places. The product of the five surveys is a map visualizing the results obtained from the different surveys.

The third phase involves the analysis of traditional cartography of the selected sites in the city. The types of maps used in this phase derive from different disciplines and depend on the nature of the place; the study is carried out at the urban scale, in order to identify the characteristic elements and their relationships with that particular area, and at the areal scale, in order to identify the relationships between the site and the whole city. The result of this phase is a map identifying the components required for the site description that can be found only through a traditional planimetric reading.

The fourth phase is that of the questionnaire administered to visitors to the area in order to gain an idea of the place as perceived by those who are not involved in the study and are not specialists in related fields, but only perceive the site as users, at various levels: the inhabitant, the passer-by, the tourist. The questionnaire consists of questions asked on the basis of images of the area or an inspection visit with the interviewee. The information deduced from the

questionnaire is transferred onto a map that, like the previous ones, will constitute the basis for the construction of the complex map.

The fifth phase is that of assembling the collected information. In this phase, we test the maps produced, the congruence of the various collected data, and choose the useful elements to construct the final map. The recorded data represent the basis for the construction of the graphical system of symbols to represent the elements of the urban landscape and the elaboration of the complex map of analysis (Sepe, 2006a).

We then have three design phases. The sixth phase is devoted to surveying identity resources in the study area. During this phase, the complex map of analysis drawn up with the PlaceMaker method is used as a basis to detect the resources available for the project.

The sixth phase is realized through three measures. The first is the identification of the identity potential, namely of the elements of the complex map which characterize the area in question in order to recognize those which may assume a focal role in the project. In this respect, both the comprehensive presence of a specific type of element (e.g. how many points of visual perceptions are present) and the quantity is measured for each of them (e.g. such an element is assigned a certain size of symbol depending on its visual importance: namely medium size=presence of a given element in a medium percentage). Then there is the second action where the identity problems are highlighted. The activities are devoted to observing places in the complex map with the presence of unsustainable elements and annoying points of perception. With the aim of identifying these places the relationship among the different elements in the map need to be observed. An element may be sustainable in itself, for example a shop which sells typical products; but the presence of several of them may create a site with a concentration of businesses which is unsustainable with respect to place identity. The goal is to understand the impact of people, things and activities and relative issues. The third action is the survey of identity qualities.

The actions to be performed here involve noting places within the complex map of analysis with the presence of sustainable elements and points of pleasant perception. The elements which contribute to defining that sustainable place or perception will need to be analyzed. In this case the aim is again to detect the impact of people, things and activities and relative relationships which are sustainable for identity of places. The product is a synthesis derived from interpreting the complex map of analysis where the identity resources available for the project are represented: a sort of map of intents, the first step for the construction of the complex map for the identity project in question.

The seventh phase is the survey of the identity resources by users of places, locals, passers-by and tourists. A questionnaire designed to elicit information emerged from the previous phase will be administered. The questions aim to ascertain whether the data observed until now are consistent with aspirations, desires and thoughts of the users of the area in question and to collect further suggestions and proposals. The product of this phase is the fourth partial map which will represent the identity resources from the perspective of users of places and/or privileged actors.

The eighth and last phase consists in the overlay of data collected during the previous four phases and identification of the project proposals. In this phase we identify the places around which the project hypothesis to be conducted to enhance the identity resources are focused and the relative interventions. The products of this phase are a suitable system of symbols which represent the project activities and the construction of the complex map for the identity project. This map is the last step in the planning process, where the information contained in the complex map of analysis, after being filtered and transformed into resources, gives rise to proposals for the construction and enhancement of a sustainable place identity (Sepe, 2013).

The method has been experimented in urban sites in Europe - Barcelona, Helsinki, London, Berlin, Lisbon, Paris, Wien, Rome -, Asia - Kobe, Beijing, Xian -, and USA - Boston, San Francisco, Los Angeles - (Sepe, 2010; 2006b; 2009). The main users targeted by the method are urban designers and planners, and administrators, while a simplified form of the complex maps is designed for local, citizens, place users and visitors.

As regards administrators and city planners, PlaceMaker enables them to understand the potentials and problems relating to any given place, and how the place itself is perceived by its users and residents. This flexible method may be used for different analysis and design purposes, such as: to redefine the identity and image of a place or a public space (e.g. historical identity, commercial identity, identity following post-seismic reconstruction etc...), to assess - and then design - the compatibility of any activity with its identity or again, if the aim is to restore traditional businesses, to gauge whether such recovery is still in line with current demands (e.g. in case of urban regeneration process). Thus, the data contained in the complex maps may be used to create active indices and reference parameters for gauging project sustainability, such as quality of life or pollution thresholds, or sustainability of identity, through assessment of the elements making up urban identity from the viewpoint of sustainability.

As to the citizens, PlaceMaker will enable them to garner a deeper understanding of their city's identity, feel stronger ties to it, hence protect and safeguard it or play a proactive role by proposing improvements to administrators or participating in planning choices.

Lastly, tourists and place users will find the map a tool providing an insight into the city and its public spaces that goes beyond mere identification of major landmarks and captures the complexity of a place identity, including its tangible and intangible elements, both permanent and temporary.

In order to study the urban identity of sites and identify new elements and places, the areas selected for the experiments and which were used for the 12 principles construction are mostly of historical importance and at all events highly representative of the city and of its transformations, alterations and redesign themes.

12 principles for place identity enhancement

The case studies gave rise to 12 principles for place identity enhancement, created from a reasoned set of blueprints for the various experiments carried out using the PlaceMaker method (Gehl, 2010; Jones, Marshall, Boujenko, 2008; Sepe, 2012).

1. Identity resources of a place have to be protected and enhanced so as to give the place in question a distinctive character.

In order to counter the standardization of places which tends to make sites increasingly similar to one another, it becomes ever more necessary to protect identity resources. A site should have elements which make it unique and recognizable. In order to be sustainable, an urban project must be integrated with the identity of places.

2. Place identity has to be determined with ad hoc methods.

Place identity is a complex concept that requires identification of the various factors and elements which make up a place. There are many such elements forming place identity, increasingly compromised by the acceleration of urban change and globalization. In order to make identification as thorough as possible, *ad hoc* methods have to be used both to detect such complexity and specify guidelines for design.

3. Attention to context is to be understood from a social, environmental and urban perspective.

The context of a place has characteristics not only related to its architecture, urban form and culture, but also to the people who live there, and its environment, understood as natural resources. For sustainability in its broadest sense, respect of all these components is required.

4. The maintenance of buildings, roads and public spaces should be programmed.

Roads and public spaces have to be maintained in the same way as buildings. Programmed maintenance should be performed periodically in order to ensure constant quality of public spaces as well as buildings within.

5. Places should perform functions which do not cause intensive use that can damage site quality.

Monofunctional uses can cause damage to place identity. An example of this is the case of pedestrian thoroughfares of historical importance, used only for business. Combined uses of places should be aimed for, provided they do not compromise place identity.

6. Local businesses should be enhanced.

The intensive use of sites by mass tourism leads to businesses that result in rapid consumption of places at the expense of their culture. It is instead necessary to promote local businesses to ensure residents put down roots where they live.

7. Users of a site should be questioned about place identity during both the survey and design phases, taking different needs into account.

Site users, the prime recipients of urban transformation projects, should be interviewed at various stages in the transformation process of an area, with particular attention to the identity of the place in question. The project will thus be more likely to succeed since various needs will have been taken into consideration.

8. Place identity should be monitored periodically.

Given the great acceleration of the rate of urban change, it is important that place identity be periodically monitored in order to understand evolution and change in time and prevent identity being compromised.

9. Vehicle use in areas with heavy pedestrian throughput should be avoided or slowed down.

In emblematic thoroughfares, public spaces and historical centres the use of private vehicles is an annoyance factor. In this respect, in such places vehicle speed should be slowed down with appropriate traffic calming measures, or private vehicles should be banned altogether. The use of bicycles and dedicated lanes should where possible be encouraged.

10. The safety of users is paramount.

The users of streets and public spaces in general need to be protected. In this respect, projects should ensure safety both as regards possible collisions with vehicles, with appropriate separation between the different types of flows, and as regards possible criminal acts, encouraging mixed uses of the places in question during the different times of the day.

11. Proper enjoyment of the physical characteristics and natural beauty of the place should be considered a priority.

We need to create places which foster the enjoyment of the elements that make up the history and culture of the place through projects which stimulate knowledge and sustainable use. By the same token, it is necessary to promote the enjoyment of all natural resources which are part of that place.

12. Respect for place identity should be considered a sine qua non within the framework of a project's quality requirements.

Respect for place identity lends quality to a project. Place identity should thus become an essential aspect of urban planning tools so that it becomes a fundamental requisite for project sustainability.

The charter of public space

The Charter (Garau, Lancerin, Sepe, 2003), which was adopted - as mentioned in the introduction - during the II Biennial of Public Space, which was held in Rome in May 2013 (www.biennalespaziopubblico.it), is composed by 6 parts devoted to public space, namely: I. Definition of Public Space; II. Typologies of Public Space; III. Creation of Public Space; IV. Management of Public Space; V. Enjoyment of Public Space; VI. Obstacles to the Creation, Management and Enjoyment of Public Space.

The main criteria this document is based on are that a) it is useful to formulate a clear and comprehensive definition of public space, b) that public space should be regarded as a public good, c) that the Charter should contain reasonable and shared principles with regard to the conception, the design, the realization, the management and the enjoyment.

The principles which were before described were used as a contribution for the creation of some principles of the Charter, including those which follow.

Definition of Public Space

Public spaces consist of open environments (e.g. streets, sidewalks, squares, gardens, parks) and in sheltered spaces created without a profit motive and for everyone's enjoyment (e.g. public libraries, museums and eco-museums). Both kinds of places, by virtue of possessing a clear identity, can be defined as "places".

Public spaces, whenever safeguards of natural or historical beauty allow, must be made accessible without barriers to the motorial, sensorially and intellectually handicapped.

Typologies of public space

It is opportune to distinguish public spaces in: a) spaces that have a prevalently functional character; b) spaces that presuppose or favour individual or atomized uses; c) spaces that, by mixing of functions, form, meaning and especially in the connection between the built/non-built, have the prevalent role of aggregation and social.

Public spaces:

- b) Host activities of the market and make accessible commercial activities in fixed premises, public venues and other services (collective and not, public and private), in which the socio-economic dimension of the city is always expressed.
- c) Offer precious opportunities for recreation, physical exercise and regeneration for all (parks, gardens, public sports facilities);
- e) Are places of individual and collective memory, in which the identity of the people is mirrored and finds sustenance, growing in the knowledge that it is part of the community;
- g) Are an integral and meaningful part of the urban architecture and landscape, with a determinant role in the overall image of the city;

Management of Public Space

Reducing private automobile traffic in cities is a primary condition for improving environmental conditions, enhancing public spaces and making them more liveable.

In terms of the area they cover, streets, squares, sidewalks constitute the overwhelming portion of the urban space used by the public. It is therefore important for their use to be disciplined to reconcile the different functions they are to perform, granting priority to pedestrian and non-motorized mobility.

It is important to adopt policies that encourage the permanence of artisans and neighbourhood shops, which contribute to the quality of life and to the animation and vivacity of daily-use public spaces.

V. Enjoyment of Public Spaces

- 41. All citizens, regardless of their role, are users of public space. All of them have the right to access and enjoy it in complete freedom, within the rules of civic coexistence. In cities ever more complex and diverse, this requires democratic processes, dialogue and regard for diversity.
- 44. The enjoyment of public space is a fundamental ingredient for determining and applying indicators of the quality of public space, to be employed throughout the entire creation-management-enjoyment cycle.

VI. Constraints on the Creation, Management and Enjoyment of Good Public Spaces

48. The following can be considered constraints on the creation, management and enjoyment of good public spaces:

a. The commoditisation of urban sociality (such as the proliferation of specialized facilities for shopping and leisure, private sports facilities, etc.);

Conclusion

The paper presented the 12 principles for place identity enhancement, which were created from a reasoned set of blueprints for the various experiments carried out using PlaceMaker method for the analysis and design of the contemporary urban landscape. The PlaceMaker method derived from the need to identify the elements and places that are the components of contemporary identity, many of which do not figure in traditional cartography, and to identify principles for their planning and enhancement. The flexibility of the PlaceMaker method enables it to be used in widely varying contexts and for a range of objectives. The investigation protocol can serve as a guide to be adapted and reinforced at some points, according to the characteristics of the place and the intended purposes.

The innovative aspect of this method consists, on one hand, in the integration of different modalities and instruments for obtaining the information required to render objective and measurable even those elements which are subjective and ephemeral, and on the other hand in exploiting the complexity of the data obtained to construct the planning guidelines.

Accordingly, the purpose of the 12 principles is to provide urban planning guidelines for the construction and enhancement of sustainable place identity. The concept of identity is interpreted in line with the definition of Kevin Lynch who refers this concept to the set of characteristics which make a place unique and recognizable.

Although the concept is intended as a set of characteristics in a positive sense, it is also possible that these features are not sustainable or are not consonant with the history and culture of the place itself. Indeed, the set of characteristics may consist, for example, of the shops whose furniture disfigures the ground floors of buildings and prevents appreciation of an urban thoroughfare, but which make that location recognizable. A further example might be the set of elements in a public space which makes that place distinctive but which people in that neighbourhood do not use since it fails to give them a sense of belonging.

The 12 principles aim to provide a check list which a project has to satisfy in order to enhance the identity of the place in question, making sure, however, that place identity is sustainable and is not used for the sole purpose of rapid consumption of intangible heritage. The principles should not be considered static, but dynamic, in keeping with the increasingly rapid rates of change in a place that continually lead to expanding the scope of the concept. These principles in their present form may thus be constantly updated to allow not only for changes in the contemporary city but also for new procedures and requirements in site design.

The principles were used as a contribution for the creation of some principles of the Charter of Public Space which were described in the Charter section of this paper. The whole Charter is composed by 50 principles. The Charter is now in course of further development and transformation in a Global Public Space Toolkit by Un-Habitat and INU, the Italian Planning Urban Planning Institute.

The paper, with the description of both principles, had the final aim to demonstrate the importance of the use of scientific approach to the creation of urban design guidance. Public spaces are a topic which is increasingly assuming a new important role in contemporary city and many design codes are arising accordingly. It is important approaching it with both care and rigorous method in order to obtain suitable and sustainable results able to tackle at the same time the challenges offered by globalization and different kinds of crisis.

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Density, urban form and quality of life

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Abstract. *Within the political context of Switzerland, the contemporary debate on urban morphology has to become central to the implantation of state-wide policy that focuses on the limitation of urban sprawl. This is particularly emphasised because the legal framework focuses primarily on landscape protection rather than on urban development strategy. In fact, if urban sprawl has been a real threat for Switzerland's small territory and attractive natural landscape since the 80's (DFI, 2009), the corollary urban densification within already urbanised areas is threatened by a rejection by the citizens, through legal referendums, primarily triggered by an misunderstanding of the morphological consequences of density targets. In particular, citizens frequently overlap "densification" with "towers". A central challenge to the public planners of the township's association of Morges is then to establish a public communication strategy on the importance of the densification of urban cores, focusing in particular on the relation between density, urban morphology and urban quality. In collaboration with a private consultant office, a comparative analysis on density, urban form and quality of life relying on local case studies has been made, completed with numerous participatory actions aimed at shifting the focus from legal density targets to a shared discussion and debate on the qualitative attributes of neighbourhoods. Local workshops, exhibitions, a website, a booklet and local newspapers publications are among the supports of this communication campaign for decoding the quality and versatility of swiss urban forms. Once the foundation has been laid, we expect to achieve a horizontal dialogue with citizens and developers about the quality of their neighbourhoods in a day-to-day basis and avoiding density numbers and misperceptions. Our practical experience, methodology and results achieved so far with this process are described as well as our ambitions on how the project can evolve and constitute a bridge between theoretical and participatory urban morphology research.*

Key Words: density; public participation; quality of life; urban form; urban practice.

Density, Urban Form and quality of Life

As it has been highlighted by the recent modification of the federal law on land use planning (federal vote of March 3, 2013), densification has been for many years one of the main objectives of the land use planning policies in Switzerland. Formalized as a constitutional principle since 1969, the concept of densification has since then progressively been implemented in the many laws and processes regulating land use.

Being one of the pillars of the federal policy on agglomerations, it has served as one of the guiding principles of the Lausanne-Morges Agglomeration Comprehensive Plan (PALM), within which Region Morges (RM) is one of the districts. Indeed, within the urban growth boundary that has been defined through the PALM, a minimal density of 100 hab. or empl./ha (residents+jobs/ha), equivalent to an FAR of 0,625, has been defined for all future planning. That minimal density is raised to 200 residents+jobs/ha, or a FAR of 1,25, within the boundaries of the strategic areas of the plan.

However, despite having been accepted by the majority of Swiss citizens, mainly on the grounds of protecting the landscape, densification is not well understood, and even fought at the local level: diminishing quality of life, destruction of the last remaining city open spaces, increase of pollution, land speculation, or abandonment of the suburban ideal of the countryside villa, the concentration on the development within the perimeter of the agglomerations, heavily

promoted at the federal and state level, has been made difficult to implement because of regular opposition by local stakeholders groups and citizens.

It is then critical to the success of the planning policies that the notion of densification is well understood if one wants to curb the lack of housing availability, and to manage the population growth in Switzerland while implementing the overarching goals of protecting the landscape and managing resources. This is particularly true in Switzerland, where a unique participatory democratic process allows the population to participate directly to the public legal and regulatory process, and in particular on matters of urban planning and design, through the ability to organize referendums. Within the perimeter of the PALM, many projects have suffered from a lack of understanding of basic notions regarding density, in particular as it had a tendency to associate a specific urban form to density targets, or to associate the debate on density with a debate on highrise buildings. That confusing and relatively sterile debate had the corollary effect that the themes of urban quality and experience have singularly been missing from the conversation. Thankfully, the notion that density is necessarily associated with a loss of quality or with specific urban forms is misguided, and quite to the opposite, densification can be a powerful tool to increase the quality of urban life and experience.

Through a series of examples and a review of the basic planning literature, Region Morges aimed to show through a carefully managed public outreach program that densification is not only a necessity but also an opportunity to debate on the multiple environmental and urban qualities that can be achieved at the 200 residents+jobs/ha target that has been defined at the regulatory level.

What would Region Morges have become if...

The first action of Region Morges was to create powerful images to create surprise, interest and discussion with the population. It was also a way to highlight the correlation between landscape protection, one of the primary goals of the popular vote of March 3, 2013, and its counterpart, the densification of the urban centers. Different development scenarios for the Region Morges have been devised in order to be compared to the current situation:

The first scenario illustrates what the Region could have become if the current population would have been accommodated in a typical suburban sprawl development pattern (single-use residential areas, and office parks along the highway exits) ;

The second scenario illustrates what the Region could have looked like if the current population would have been accommodated in a typical traditional urban pattern, as it can be seen in the historic core of the city of Morges (FAR 3): a contiguous and mixed-use urban pattern, organised along narrow streets, with a typical building height of 3,5 stories.

Extremely realistic city maps were drawn to illustrate each of the scenarios. They were posted on the website of Region Morges, and published in the local press to announce an exhibition on density and quality of life.

Apart from the "shock" generated by the comparison of the illustrative plans, the results of this exercise were also quite telling. The built environment of the Region Morges occupies today 925 ha. However, if at the beginning of the century, the logic of dense urban development had continued, the built environment would only span on 7 times less space, which would mean that a very significant area would have been preserved from urban development, and could have been used for leisure, recreation or more conservation and agricultural production. If instead we all chose to live in villas, we would be dealing with an area increase of 60%. The current situation is therefore much closer to the suburban model than to the traditional pattern of the city of Morges.



Figure 1. Urban footprint of Region Morges. To the left, the current situation, in the centre, the first scenario (suburban pattern), and to the right, the second scenario (traditional urban pattern).

Why should we densify?

Once the discussion had started, it was necessary to formalize with more specific arguments what were the planning benefits of densification. Densification is seen today as a necessity to preserve the landscape and natural resources, but the corollary densification of the urban cores, contrary to the popular belief, can also benefit from the resulting intensification.

Preserving the environment and the landscape: a well understood concept

The popular vote for the new federal law on land use planning was a clear sign that the Swiss people wanted to protect the landscape. It was however necessary to explain in more formal terms why it would be so.

Landscape under stress

The landscape is a fundamental element of the identity of a place or region. Including both "natural" components such as the topography and subtle articulation of wooded area, rivers and agricultural components, and "historic" and cultural components such as old farms, villages or cities, the landscape of a region shapes its inhabitants who are very sensitive to the preservation of its characteristics.

Urban sprawl, i.e. the dissemination of buildings over a wide area, causes significant land consumption for the construction of housing and infrastructure at the expense of natural, agricultural and viticultural areas. This rapid transformation of the landscape erases the legacy of the past and fundamentally negates the perception of the landscape by the inhabitants of the area.

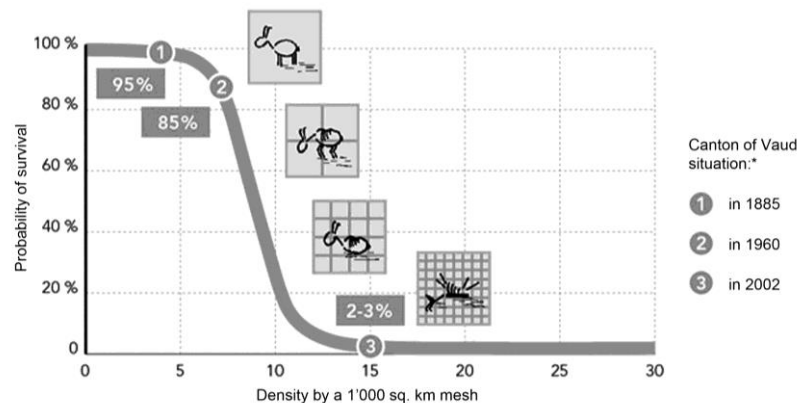
Although primarily an emotional concept, the landscape has a great influence on the individual and collective perception of quality of life. It is therefore necessary to take it into account in order to preserve the area's identity .

Biodiversity under stress

One of the leading causes of biodiversity loss comes from the fragmentation of natural habitats, i.e. interruptions between connected ecosystems. Biodiversity is important to humans because it

guarantees the resilience of our environment. The more animals and plants living in the same environment are numerous and diverse, the more they will be able to withstand external events such as pollution, temperature change or natural disasters. Less diverse environment, once under extreme situations, degrade very quickly and recover a balanced state only after many years.

The construction of a dispersed urban pattern requires the construction of an extensive road infrastructure that often consists of an insurmountable barrier for most species. Subsystems that once evolved in synergy now find themselves completely dissociated. They become favorable to only a small number of specifically adapted plants and animals while most of the others will disappear gradually. The construction of a dispersed urban habitat is one of the key factors causing the general impoverishment of biodiversity.



*Statistic sources are in the origin of this simulation. Results may vary based on location, species, traffic volume, etc.

Figure 2. Landscape fragmentation and species probability of survival. Transportation networks cause an increasing partition of the large biodiversity reserves (source : Figure modified by Jaeger and Holderegger, 2005/ OFS).

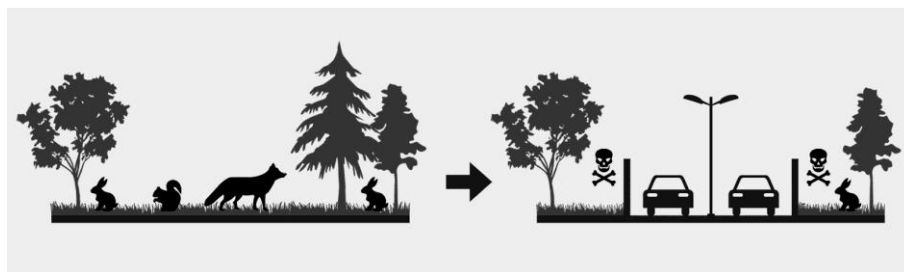


Figure 3. Transportation networks decrease the continuity of biodiversity networks.

Land use conflicts

Historically, agriculture was the key factor that enabled the development of cities. The fields on the outskirts of the city produced foodstuffs needed to feed the urban population. Even today, any agglomeration automatically require some agricultural land to feed its population. Although today, due to the phenomenon of globalization, the Swiss cities are more dependent on foreign goods for their livelihood, local agriculture is nonetheless highly significant both for its production of local goods, and to guarantee the long term maintenance of natural areas. Causing a decrease in available agricultural land, urban sprawl reduces the viability of farms and thus contributes to the progressive dismantling of an essential profession, both for the survival of cities and for the maintenance of the environmental framework.

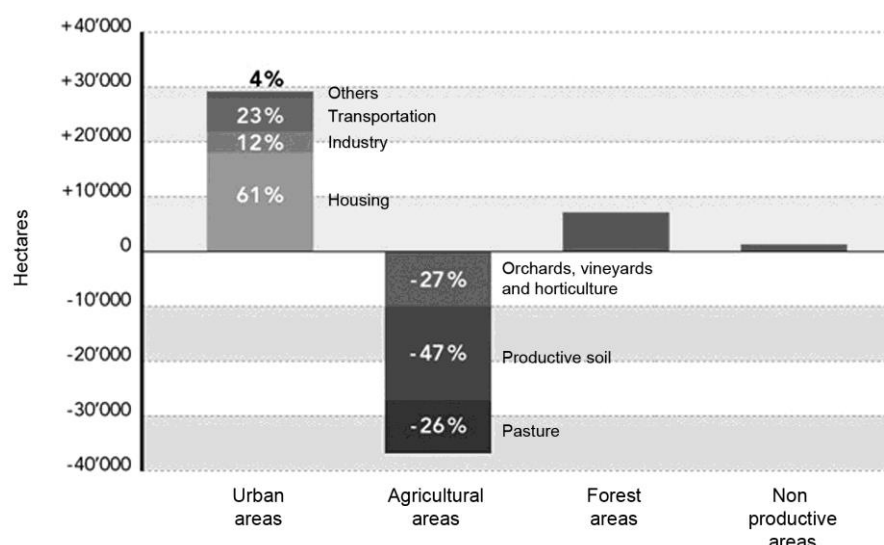


Figure 4. Land use changes in Switzerland (regions of Grisons and Tessin non included)
(source: OFS).

Infrastructure costs and mobility

By encouraging the use of private vehicles to meet the mobility needs, a more dispersed habitat causes an increase of cars on the roads, which leads to congestion and air pollution in and around the agglomerations .

When the housing units are highly scattered, the establishment of an attractive and efficient network of public transport is indeed not possible. Because of that, the only alternative to get to work or to carry out any activity is to use the individual car, thereby increasing the number of vehicles on the road, kilometers traveled and air pollution.

Densification to improve public transportation

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Costs optimization

In addition to the environmental problems it generates, urban sprawl requires the construction of a large transportation and infrastructure network to connect all habitations. By limiting urban sprawl, densification reduces the cost of construction and maintenance of such networks for both public authorities and individuals.

If the democratization of the automobile and the improvement of transportation networks have fundamentally changed the way of life since the beginning of the century by reducing the time required for travel, it has also allowed to expand the settlements further and further away from the workplace, allowing to benefit from a certain quality of life, or from advantageous fiscal conditions, in the countryside while maintaining his workplace in large urban centers.

This pattern generates nevertheless many problems as the expansion, construction and maintenance of kilometers of roads, pipelines or electric network needed to connect the most remote hamlets weight increasingly on finances public authorities. The latter, in high demand in many areas such as health, social or education, often have no other choice but to reduce their benefits or to borrow at the expense of future generations.

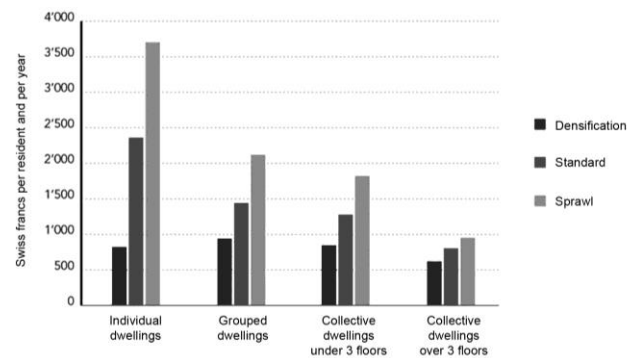


Figure 5. Long-term marginal costs of different urban development forms (source : ECOPLAN, ODT).

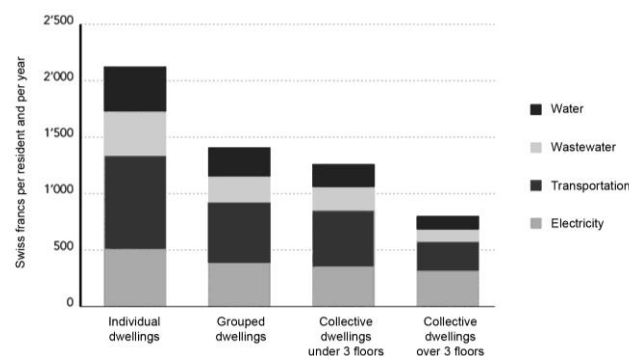


Figure 6. Average costs of infrastructure of different urban forms (source : ECOPLAN ODT)

Mobility is, like telecommunications, one of the foundations of our current ways of life. Every day we go through dozens, hundreds of kilometers to get us on our workplace, our leisure activities, to visit friends, to discover new places or even for the sake of travel. The feeling of freedom that provides the ability to move without being limited by the distance is undeniably an important element of quality of life. But whatever the system of transport, mobility also has both financial and time implications.

Suburban sprawl, where most of the population lives far from his workplace every day, generates important commuting costs, both in terms of car ownership, and in terms of time spent in traffic, that weigh heavily on the household budget. In addition to the visible costs such as the costs necessary for the construction and maintenance of infrastructure or for fuel used during travel, road transport also generate many nuisances that result in hidden costs to the community.

Road accidents, damage to health due to pollution and environmental damage are some examples of costs directly related to the transportation system and supported by public finances. Each year these nuisances generate several billion francs in externalized costs borne by society.

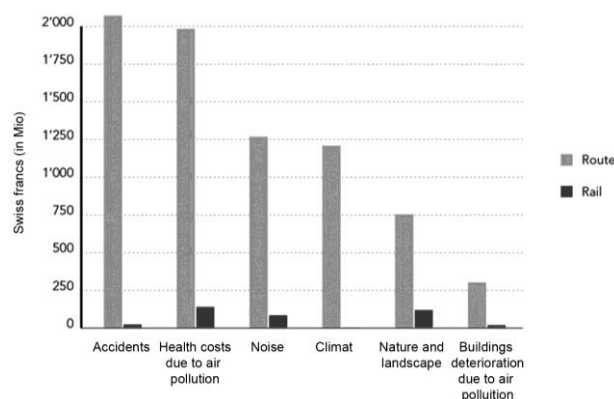


Figure 7. External costs of road and rail transportation in 2009 (source : ARE)

Density is not contradictory to quality of life

Finally, the most widespread misconception remains the supposed antinomy between density and quality of life. To the opposite, Region Morges wished to demonstrate that the densification was a unique way to fulfill the diversity of lifestyles and expectations of the population for their housing choices.

By limiting distances and offering a diverse and efficient transportation system, densification allows to freely choose the most appropriate transportation mode according to its needs, as well as an easy access to a wide variety of goods and services. It thus promotes the autonomy and independence of people who do not have a motor vehicle and offer a choice to everyone.

A lack of transportation choices

Mobility needs in the periphery make the acquisition, maintenance and use of a private vehicle almost indispensable. Indeed, a low density urban environment severely limits the opportunities to build a network of efficient public transport, and the relatively large distances between the points interests discourage the biking or the walking patterns.

A lack of local commercial or services offering

Suburban developments makes it hard for small businesses local services to survive. As most potential customers must necessarily drive to get to shops because of long distances, they generally prefer to go directly to larger shopping centers, destroying any chance of survival of a more diverse commercial ecosystem. The range of choices becomes monocultural and of average quality.

A lack of cultural and public amenities

Access to services and public amenities such as schools, nurseries, postal services, playgrounds, sports facilities, hospitals, theaters and cinemas most often requires, due to distance, to dispose of a motorized vehicle. This configuration limits the autonomy of people do not have a vehicle, like children, adolescents and older people in particular.

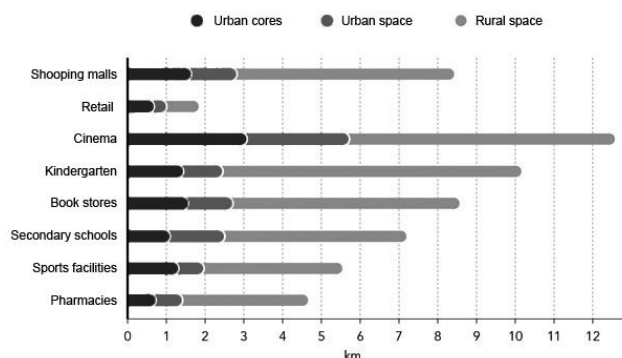


Figure 8. Average distance to the nearest local service in 2001 (source : OFS, 2006 – Services to the population : accessibility 1998-2001)

Density and urban forms

These basic clarifications on the concept of density helped to initiate a shift in the debate on more specific subjects than the usual discussion on the supposed merits of particular FAR or human densities, to initiate a more productive conversation on the qualities of particular neighborhoods.

The densification targets that have been defined in the comprehensive planning tools for Region Morges will in fact leave a very wide choice as to the form of neighborhoods to achieve. Many examples from Morges Region demonstrate the possibility of relatively dense neighborhoods, perfectly in line with the density targets, that are recognized as highly qualitative by the inhabitants of the region.

Where and how will we densify?

Identification of target zones for densification: the “compact perimeter” and the “strategic sites”

In order to promote the densification process, the Lausanne-Morges Agglomeration Comprehensive Plan (PALM) has targeted the expected population growth of the region within the “compact perimeter”, an area consisting of 26 municipalities including, within Region Morges, the municipalities of Denges, Echichens, Echandens Lonay, Lully, Morges, and Préverenges Tolochenaz.

The objective is to accommodate, within this perimeter, 69,000 new residents and 43,000 potential new jobs by 2030. This means that the “compact perimeter” will welcome 83% of new residents and 94% of new jobs of the whole agglomeration. Within this perimeter, some areas with major strengths such as good accessibility by public transport, have been identified as “strategic development sites”. Because of their many advantages, strategic sites are considered a priority for the densification.

Region Morges region includes two strategic sites:

- The site H1 that spans on the municipalities of Denges, Lonay, Morges et Préverenges;
- The site H2 that spans on the municipalities of Morges et Tolochenaz.

By themselves, these two “strategic sites” have sufficient potential to accommodate between 10,800 and 12,200 people and jobs.

Density target

The legally required density targets are measured in terms of people and jobs per hectare (habitants+jobs/h). For simplification, it considers that a person who works at a place generates

the same travel needs, and therefore the same road infrastructure and public transport network, than a resident.

Minimum densities required are based on some typical densities observed today in the Region:

-100 residents jobs per hectare (residents+jobs/ha) within the "compact perimeter", which corresponds today to zones of low to medium density;

-200 residents jobs per hectare (residents+jobs/ha) within the "strategic sites", which corresponds today to zones of medium to high density;

The objectives are thus to promote a low to medium density within the compact perimeter and a greater density within the strategic development sites.

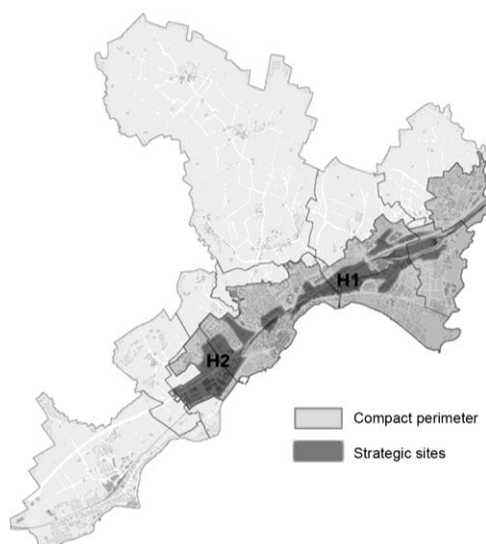


Figure 9. Compact perimeter and strategic sites of Region Morges.

Analysis of 25 existing urban forms

The legally required density targets defined by the PALM only marginally restrict the choice of neighborhood shape and form. Indeed, of the 25 urban forms analyzed:

- Only 6 do not meet the minimal density targets (less than 100 /ha)
- 12 are dense enough to meet the minimal requirements of the "compact perimeter" (between 100 and 200 residents+jobs/ha)
- 7 are dense enough to meet the minimal requirements of the "strategic sites (200 residents+jobs/ha and above)

Thus, contrary to a common public complaint, the density targets of the PALM do not necessarily equate to something that is foreign to what already exists within the existing built environment.

In other words, even if these are only examples, they illustrate the wide range allowed by the density targets, both in the neighborhood patterns, and in terms of building heights.

Relationship between density and building height

A higher density does not necessarily mean building towers! Among the seven examples with the highest density, the average number of stories varies significantly (between 3.4 and 10.7 floors). Also, a low density does not necessarily mean more green spaces.

Density: 100 à 200 residents+jobs/ha

In the region, a big diversity of urban blocks typologies with an average density can be found both in the form or in the height of buildings.

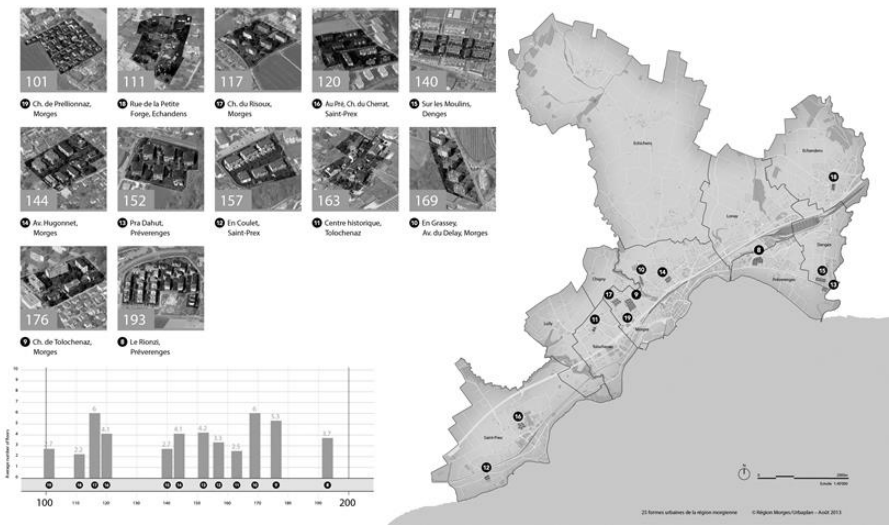


Figure 10. Twelve urban blocks reaching the target density for the “compact perimeter”.

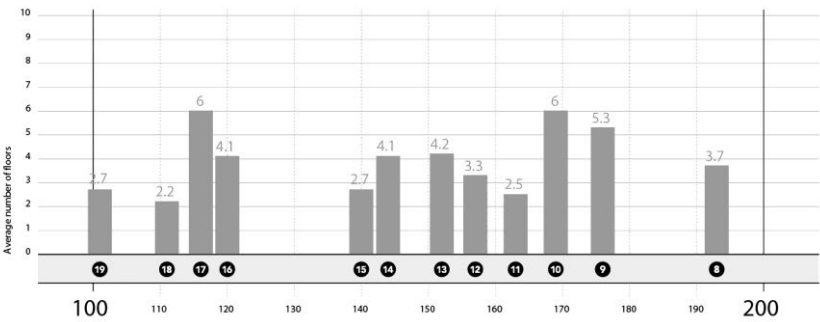


Figure 11. Average number of floors by urban block and density (residents+jobs/ha).

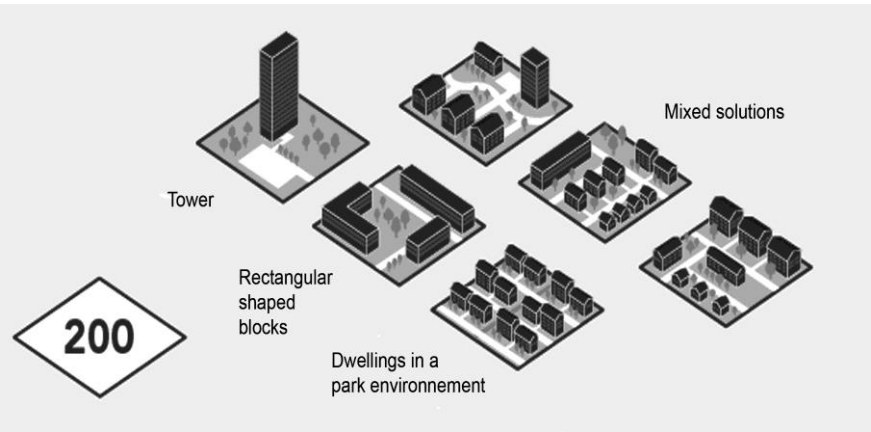


Figure 12. Several possibilities of urban typologies with the target of 200 residents+jobs/ha.

Relationship between density and quality of life

The density does not necessarily impact on the quality of life! Other factors linked with the climate, or the spatial or personal understanding of the environment play a more important role in the perception of quality.

Quality of life within an urban environment

Although the perception of a neighborhood is unique to each individual, planning has an extremely important role for the establishment of the framework conditions affecting the quality of life.

What is quality of life?

The quality of life is undeniably a subjective notion. It depends heavily on personal and cultural representations of each individual, their history and their relationship with their surroundings. However, because of the direct impact on the shaping of the territory, urban planning has a structuring effect that strongly influences our perception of our environment. A reflection on the multiple ways of perceiving urban quality therefore seems essential to enable the realization of favorable developments, not as a dogmatic pursuit of goals to align and standardize behavior, but rather to understand the expression of the diversity of lifestyles in contemporary society. Through an understanding of the different activities that we practice daily in the city, and by structuring the issues at stake at the neighborhood and at the regional level, urban planning and design work helps to promote a qualitative densification for the benefit of the entire population. Some of the key categories allowing an understanding of the neighborhood qualities are described below.



Figure 13. Example of quality analysis of a high density city block.

Consider multiple uses of the public spaces

In a dense environment, a wide variety of activities can potentially happen in the public spaces and should be taken into account when defining the characteristics of these spaces.

Public spaces, in contrast to the private areas, must offer every individual an opportunity to make its own activities without encroaching on the activities of others. Depending on the specific objectives of the neighborhood development, it will be necessary to consider the various possible uses and to integrate them into the space design.

A street, for example, should not be just considered as an axis of movement, but also as a living space where a number of activities can happen. Depending on its location and its relationship with adjacent neighborhoods, a street may be dedicated mainly to vehicles, or instead multiple uses such as walking, shopping, meeting, relaxation or to host events.

Adapt design to environmental conditions

Access to sunlight contributes greatly to our quality of life, which does not prevent us to enjoy some shade during the summer months. Whether wind, rain, temperature, or noise, the built and natural environment may alternatively provide a shelter or a welcome release to take advantage of climatic and seasonal conditions. The inclusion of these criteria in the process of development can result in the creation of environments that are comfortable in all seasons and that will be naturally welcoming to public uses.

Care for the transitions between spaces

The proximity between private and public spaces, between spaces dedicated to relaxation and activity, or between spaces dedicated to circulation and playground areas, can be a source of many conflicts that must be managed by more or less rigid urban transitions.

Although often considered as a default solution, strict separation such as walls, car parks or hedges are not always best suited. They are indeed a response that prevents any opportunity for dialogue and relationship to happen between the different areas constitutive of the urban realm.

Encourage local services and amenities

The development of a complex and differentiated society like ours offers the opportunity to enjoy a multitude of goods and services. The possibility of having, near his house, a playground, a nursery, a school or a grocery store, can be extremely convenient for residents. Other types of activities, such as specialty shops, stadiums, theaters or other large infrastructure should instead be located close to the urban centers to ensure access for all residents.

Facilitate the permeability of neighbourhoods and the freedom of movement

The ability to easily navigate in a dense environment is fundamental to preserving the feeling of freedom. Pedestrian paths and bike should be part of all built environments as they help to promote a public perception of space. The creation of "permeable" neighborhoods, in the sense that they can easily be passed through on foot or bike, is important to promote a high quality of life for both residents and for bystanders.

On the opposite, because of the pollution they generate, motor vehicles should be kept away from some residential areas and concentrated on main thoroughfares.

Remember the visual delight

The visual quality of a building, a neighborhood or a natural landscape is a matter of personal perception. However, urban planning and design can help create a delightful environment, by

taking into account different aspects, such as the harmony of the architectural composition or the visual transitions between spaces, or the staging of landscape vistas.

The landscape vistas in particular, because of the specific views they frame, reinforce the sense of belonging to the region in which we live and work, while the architectural composition and character defines the atmosphere of a neighborhood and promotes the emergence of a certain mindset.

Confrontation of the analysis -dialog with the local residents and population

To complete this analysis of the quality of life in urban areas, it was also necessary to confront this technical approach to the sensible experience of the residents of the area and of the studied neighborhoods.

An open discussion with the residents

In partnership with the local press during two months, one neighborhood a week was put "under the microscope" in an dedicated article. These articles synthesized the analysis that had been made by Regin Morges and its consultant Urbaplan, and completed it with interviews of actual residents. The selected neighborhoods were all representative of a density equal to or above the target density of the regional comprehensive plan (PLAM), yet none of remarks of the inhabitants were about the height or the perceived density of buildings. All were talking about the proximity to public transport, shops, entertainment, views, public spaces, vegetation, etc. These interviews confirmed that the analysis of neighborhoods using a qualitative approach was more appropriate and closer to what the residents felt than a debate on abstract figures and density ratios. In addition, we found that the opinion of the inhabitants were generally very close to the sensible appreciation of the neighborhoods made by the professionals, regardless of the density.

The general public reactions

The last step of the process concluded with a public exhibition on "density and quality of life" in Region Morges. In addition to the three land use scenarios, and the description of the planning advantages of density from a public policy point of view, six contrasting density neighborhoods were presented, illustrating various shapes and densities:

- One single-family villas neighborhood in Lonay, with one-storey high buildings surrounded by a private garden. Average density: 36 residents+jobs /ha.
- One neighborhood composed of six single-standing buildings, 3 storey-high with attic, scattered on a vast open and landscaped garden. Located in St Prex. Average density: 157 residents+jobs /ha
- The traditional village center of Tolochenaz. Comprised of 2,5 storey-high contiguous buildings lined up along a central narrow street. Average density: 161 residents+jobs /ha
- The "Uttins" neighborhood in Préverenges, with a density of 210 residents+jobs /ha. Based on a village structure, it is characterized by buildings of 3 stories + attic. Organized around a large communal space, it is generously landscaped. The architecture is characterized by fairly homogeneous buildings, articulated through changes of shapes and opening of vistas towards the surrounding agricultural area.
- The "Pre-Maudry" neighborhood in Morges, with a density of 227 residents+jobs /ha. Given the height of buildings (8 floors) this density is interestingly low. This is due to the generosity of the large outdoor spaces open to the farmland. The architecture is very simple and the landscape echoes the great scenery surrounding the neighborhood: lake view and farmland.
- The historic center of Morges, the most dense area of Region Morges at 475 residents+jobs /ha. The buildings are 3 floors + attic and are contiguously aligned along narrow streets. The

larger shopping street that crosses the middle of the neighborhood, the immediate proximity of the banks of the lake and of a large sports park make this an extremely pleasant neighborhood.

Visitors were invited to comment on neighborhoods with post-it. None of the comments showed a lack of appreciation of the denser neighborhoods. Quite to the contrary, the most positive opinions have often been given on the densest neighborhoods: the Uttins neighborhood and the historic center of Morges, both being praised for their friendly atmosphere, close to shops and services and the size of communal spaces. On the other end, the least dense neighborhood left an impression of sadness.

If it is not possible to conclude at this stage that denser neighborhoods are the most popular, it has nevertheless been shown that a shifting of the debate from the hard numbers of density, to the qualitative elements of a neighborhood while explaining in simple terms the overarching goals of the urban densification policy, allows a much more nuanced and positive debate on the subject.



Figure 14. Six city blocks chosen for quality analysis and residents interview.

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Study on relationship between urban morphology and policy in China

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Abstract. *Urban form might be described as the result of numerous shaping processes in varying social layers at a given place through time, especially from the power of internal and external economic development and urban policy control. Moreover, urban policy plays very important role particular in China in terms the proprietorship of the land. Therefore, the morphological description is indicative of the different academic disciplines that engage in urban morphology, surely should include the urban policy. Focusing on urban policy in China our project has investigated in urban policy in the State level, provincial level, city management and the coding of the site. At the same time the research explore the policies and regulations which impact of urban form generating process and clarify the correlation of policies and urban forms. Three classifications were made according to the intervention of urban form: directly affect, indirect impact and no impact. Finally, through cases study this paper demonstrated how urban policy intervention the physical urban form and the process, which has shown that study reveals the impact of policies on the specific physical structure of the form, the results has significance for specification revision of urban policy and urban design.*

Key Words: Urban policy, urban morphology, correlation, intervention

Introduction

Urban form might be described as the result of numerous shaping processes in varying social layers at a given place through time, especially from the power of internal and external economic development and urban policy control the role of economic power to urban form is not transferred by people's motivation, but policy guidance is the main factor that people can directly manipulate the urban construction, moreover urban policy plays very important role particular in China in terms the proprietorship of the land. Therefore, the morphological description is indicative of the different academic disciplines that engage in urban morphology, surely should include the urban policy. In the process of rapid urbanization, China's urban policy have very important impact to the control of urban physical spatial form, at the same time of resolving city functions and safety problems, which also affect the generating progress of urban morphology and bring the urban form issues of blocks integration lower, street interface chaos, urban space organization disordered and urban fabric blurred, such as urban fabric of Nanjing is yet chaos, and not as the clear urban fabric of Manhattan (Figure1, Figure2).

So, in this paper, we have investigated in China urban policy in State level, provincial level, city management and the coding of the site, while through cases study, analyzed the correlation between urban morphology and the policy regulation of land use, building layout, urban space and other aspects. This paper demonstrated how urban policy intervention the physical urban form and the process, which has shown that study reveals the impact of policies on the specific physical structure of the form, the results has significance for specification revision of urban policy and urban design.



Figure1. Aerial map of Nanjing.



Figure 2. Aerial map of Manhattan.

Elements of policy controlling to urban spatial morphology

M.R.G.Conzen considered that the town plan is the complex of three plan elements: streets/street-system, plots/street-blocks, buildings/their block-plans (M.R.G.Conzen, 1960). The majority of morphological studies have focused on the street network pattern, the plot pattern and the building pattern or typology (Kropf, 2011), through controlling to urban land use, streets interface, and buildings layout, the urban policy and regulations can directly or indirectly influence the quality of urban space and shape urban fabric form, which reflects the urban space character of street spatial outline, visual variety, and spatial typologies. For example, in American, the urban development are controlled by using zoning codes and in combination with other laws, local government have divided the land under their jurisdiction to different plots, and determined the nature of each plot and the use of conditional permitted mixed-use, while introducing the idea of urban design, they have determined the controlling indicators of architecture and environment in aspects of physical form of land development, such as ratio floor area, ratio of open space, building density, building height and concession, and using legislation as the legal basis for the control of urban development. zoning codes of American, from its generation to implementation to present, from the protection of private property rights to protect public health and safety, which have achieved great results for controlling urban design and shaping urban morphology, and get promoted in many countries and regions. (Tongji, 2011) Such as, Manhattan's regular street grid and relentless orthogonal plat of hundreds of rectangular blocks and the relationship of street and buildings height, and building

out of plot, which is generated by urban codes (Marshall, 2011). Another, in Hong Kong, urban land exploration has been controlled by planning control combining with regulatory controls, through using district plans of legal and non-legal plans, the local government have divided the land to different use, and mainly controlled to the land exploration intensity by controlling to ratio floor area, plot coverage, buildings height along the street, open space and other aspects, which also get great progress and results. (Tongji, 2011) So, urban codes are important, they can significantly shape the character of our urban areas for better or worse (Ben-Joseph, 2005). According to urban coding and planning practice of New York, French, Kyoto, Edinburgh, and other examples, Stephen Marshall summaries that the content of urban codes mainly focus on regulation of physical components, coded elements and relationships among them. He proposes the purpose of codes has three broad categories: first is utilitarian purpose, concerning issues to do with health and safety, second is to do with the nature of the urban fabric, third is to do with social order ends. (Marshall, 2011) So, we think that policy and regulations mainly control urban physical space from the elements of composition and relationships among them (Figure 3).

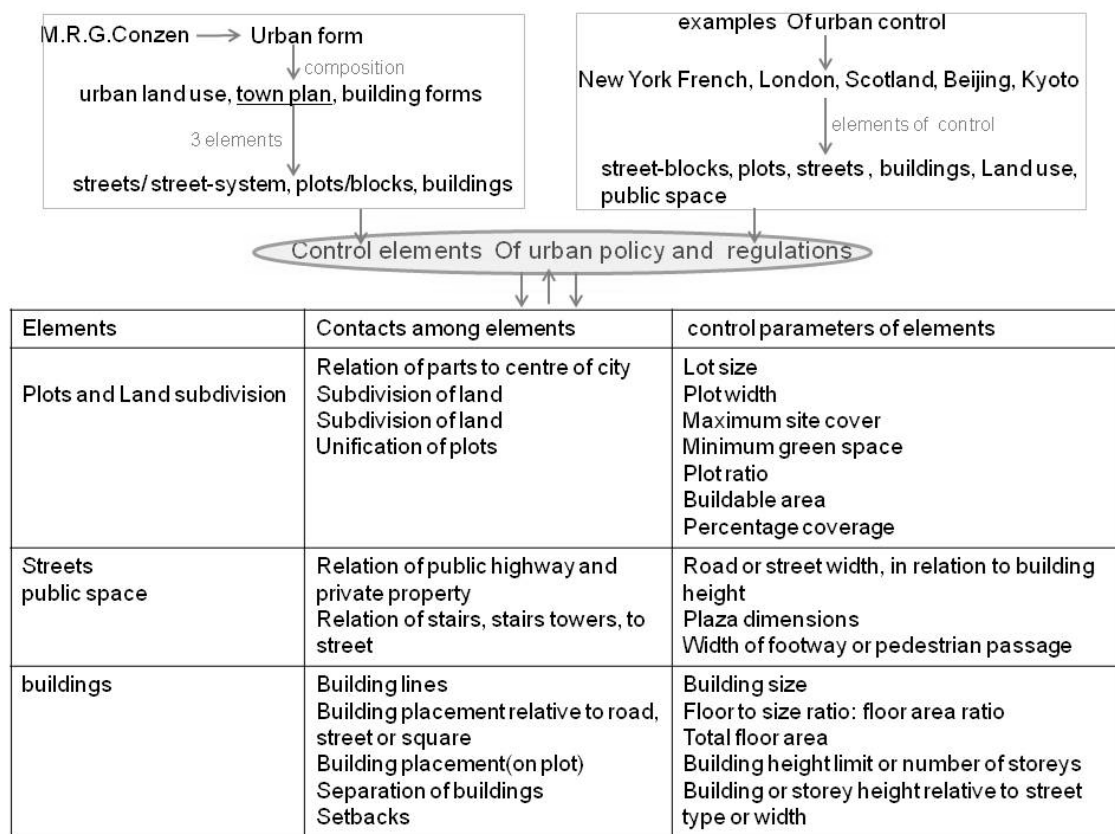


Figure 3. elements of urban policy controlling to urban spatial morphology.

Relevant research status

In relevant research results of urban spatial form controlling, the experts and scholars mainly study the control of urban physical spatial form and city planning from the perspective of history development, geographical context, urban policy and culture heritage. Such as the paper, 'Coding in the French Planning System: From Building Line to Morphological Zoning', mainly studied three core elements of coding in the French planning system---zoning plan, regulations,

mechanism for administering building permits in accordance with the plan and regulations, for exploring the place of coding within the historical development of French planning system and for examining more recent developments of the system that incorporate typhomorphological analysis to make the coding more responsive to local and regional character (Kropf, 2011). Another as the paper, 'How Codes Shaped Development in the United States, and Why They Should Be Changed', it mainly proposed zoning codes, and proposed that in the United States almost all development takes place in accordance with zoning codes, but go far beyond establishing land-use zones to determine how much can be built, where it can be built, and what form development may take--including building height, placement, and total floor area, in the majority of jurisdictions these codes are the most effective planning instruments and the zoning codes define permissible future development for most US communities (Barnett, 2011). Others papers as: 'the Controlling Urban Code of Enlightenment Scotland', 'Machizukuri and Urban Codes in Historical and Contemporary Kyoto', 'Coding as 'Bottom-Up' Planning: Developing a New African Urbanism', and so on. Although these research influence the urban design decision-taking more or less, the current research has not reached an effective level. (McKean, 2011; Baba, 2011)

In China, the relevant academic research has been rarely, only has few research findings. Such as the paper, "Prescribing the Ideal City: Building Codes and Planning Principles in Beijing", interpreted the Chinese building codes in context of design, with a focus on the relationships between architecture and planning within Beijing's history. It casing in traditional courtyard house and imperial buildings, casing in Zhou dynasty city planning, Dadu--Great Capital of Yuan and Forbidden City in the Ming city planning, analyzed the building codes controlling to building size and total floor area of buildings, and controlling to configurations and materials and decorations of building components, analyzed traditional planning principles of streets and city plan pattern. This paper proposed that various studies on Beijing have been published during the past twenty years across a range of disciplines, but what has not been well understood is its planning practice from the perspective of codes(Guo, 2011). More further research finding is the research, 'Nanjing urban morphological study and planning control policy', mainly study the control path and strategy of planning policy to urban form, from the buildings dimension, buildings setback distance, separation of buildings, buildings facade and other ways(Ding, 2007). Other related studies, such as An approach for simulating street spatial patterns(Ding, Tong, 2011) ; Density, height limitation, and plot pattern: quantitative description of the residential plots in Nanjing China (Zhang, Ding, 2012); Urban Plot Characteristics Study: Casing Center District in Nanjing, China (Zhang, Ding, 2012) These research results have get great progress in controlling and shaping urban space form, but which have very few in the controlling effectiveness of urban physical spatial form. So, the body of Chinese codes was large, a systematic study of building codes has not been attempted , and has yet to be fully researched(Guo, 2011). Just under the inspiration of these research results, we are writing this paper.

Investigation of relevant urban policy in China

In China, the specialized urban policy and regulations of controlling urban physical space have no yet, which have some only involved in the related regulations of city planning and administration, from the perspective of rank permissions, the policy related with urban planning and administration mainly include in three levels: laws, regulations, rules and standards, we have completely investigated these urban policy from State level, provincial level, city management and the coding of the site, in these, about the survey of provincial level regulations and local city rules, we have investigated the regulations of Jiangsu province and Nanjing which are related with case analysis of this paper. First, by using the statistical approach, we have collected policy of city planning and administration, according to the intervention of urban

form, we have made three classifications: directly affect, indirect impact and no impact, and statistics the policy regulations of every classification (Table 1, Table 2). Second, with method of mapping (Gauthier, 2006; Ding, 2011), according to the clauses of these relevant regulations directly and indirectly, we have again made two classifications: mandatory clauses and guidance clauses, so which have constituted four quadrants of mapping----directly affect and mandatory, directly affect and guiding, indirect impact and mandatory, indirect impact and guiding (Figure 4).

According to our statistics of policy, as Figure 4 and Figure 5 shown, we conclude that:

First, there are two categories in the policy regulations directly related with urban morphology: the first is Mandatory clauses, which mainly are mandatory provisions of urban land use, buildings position and relevant quantitative indicators, such as building density, floor area ratio, ratio of green land, distance between buildings, distance of buildings back road and river and land boundaries. The second is guiding clauses: which major are guiding regulations of urban space, such as street interface processing, building height, building facades, green, advertising and other aspects. But in these policy regulations, which have been lack in the provisions to plot use nature and exploitation intensity, urban public space, and the area of building back road boundaries.

The indirectly relevant policy provisions of urban morphology, mainly are the regulations about urban planning preparation and approval, each construction certificate approval and issuance, protecting arable land and basic farmland, protecting ecology environment, focusing on sustainable development, remediation city appearance and harmony with urban circumstance. (L-IRNUPO-2007, L-NURPO-2012, P-UGMO-2003, P-URPO-2010, P-OAMM-2010, P-HCTVPO-2010, C-UGO-1992, C-UGPIR-1994, C-IRLAL-1999, C-RWROUP-1999, C-CAMCDPCT-2011) These indirectly relevant urban policy has also related with city image, and also could play a certain macro guiding role to urban land use and building positions, but because of their guiding regulations, and operability no strong, which could not control urban form and resolve urban quality.

Second, the ratio between the policies amount of affecting urban form and total amount of city planning policies is 59.6%. In addition According to our statistics to 99 major policies of affecting urban form, in their policy clauses, the ratio of direct correlation is 18.6%, indirect impact is 30.2%. From the results, we find that in the urban planning policy of national level, provincial level and Nanjing city, actually the policy regulations related with urban land use, building layout and urban space have been more.

Third, in the directly correlation policy clauses, percentage of mandatory clauses is 7.2%, and ratio of guiding clauses is 11.4%. From this, in China's city planning policy, the mandatory regulations of directly affecting urban form are little, such as land use scale, controlling indicators of land exploration intensity, land divisions and indicators of buildings position determining, which mainly been involved in the policy files of province and local city. And most clauses regulation related with urban land use and urban space are guiding, which have mainly been appear in urban policy of three level, especially the national level policy clauses have been basically all guiding regulations, and in these clauses of national level, about the provision of rigid indicators, which all be explained to be carried out by combining with urban planning and management technical regulations.

<p>6 rules land use: land scale, land nature, land classification, indicators of land exploration intensity ---22 clauses building layout---12 clauses Others---3 clauses</p> <p>Nanjing</p> <p>3 rules land use: land scale, land nature, land classification, indicators of land exploration intensity ---6 clauses building layout---4 clauses Others---6 clauses</p> <p>Jiangsu</p> <p>3 rules land use: land scale, land nature, land classification, indicators of land exploration intensity ---6 clauses building layout---4 clauses Others---6 clauses</p> <p>State</p> <p>17 rules and standards land use: land scale, land nature, land classification, indicators of land exploration intensity ---38 clauses building layout---4 clauses Others---30 clauses</p>	<p>4 ordinances land use: land scale, land nature, land classification, indicators of land exploration intensity ---13 clauses building layout---5 clauses Others---5 clauses</p> <p>5 ordinances land use: land scale, land nature, land classification, indicators of land exploration intensity ---11 clauses building layout---2 clauses Others---12 clauses</p> <p>8 ordinances + 10 laws land use: land scale, land nature, land classification, indicators of land exploration intensity ---30 clauses building layout---2 clauses Others---26 clauses</p>	<p>5 rules Land use: urban land layout, urban function zoning and urban style---13 clauses Urban space of street interface, building Facades, building style---17 clauses Advertisement---3 clauses Others---5 clauses</p> <p>4 rules Land use: urban land layout, urban function zoning and urban style---5 clauses Urban space of street interface, building Facades, building style---2 clauses Advertisement---6 clauses Others---4 clauses</p> <p>15 rules and standards Land use: urban land layout, urban function zoning and urban style---12 clauses Urban space of street interface, building Facades, building style---9 clauses Advertisement---3 clauses Others---37 clauses</p>	<p>5 ordinances Land use: urban land layout, urban function zoning and urban style---7 clauses Urban space of street interface, building Facades, building style---14 clauses Advertisement---6 clauses Others---18 clauses</p> <p>8 ordinances Land use: urban land layout, urban function zoning and urban style---17 clauses Urban space of street interface, building Facades, building style---19 clauses Advertisement---5 clauses Others---51 clauses</p> <p>10 ordinances Land use: urban land layout, urban function zoning and urban style---46 clauses Urban space of street interface, building Facades, building style---16 clauses Advertisement---4 clauses Others---93 clauses</p>
<p>Urban policy of directly correlation with urban morphology</p> <p>Urban policy of indirectly correlation with urban morphology</p> <p>4 rules Preparation and approval of urban planning, approval and issuance of construction certificate, land owned-ship and others ---22 clauses</p> <p>Nanjing</p> <p>Jiangsu</p> <p>3 ordinances Preparation and approval of urban planning, approval and issuance of construction certificate, land owned-ship and others ---14 clauses</p> <p>State</p> <p>9 rules and standards Preparation and approval of urban planning, approval and issuance of construction certificate, land owned-ship and others ---38 clauses</p>		<p>6 rules protecting arable land and basic farmland, protecting ecology environment, focusing on sustainable development, remediation city appearance, harmony with circumstance and others---52 clauses</p> <p>1 rules protecting arable land and basic farmland, protecting ecology environment, focusing on sustainable development, remediation city appearance, harmony with circumstance and others---14 clauses</p> <p>18 rules and standards protecting arable land and basic farmland, protecting ecology environment, focusing on sustainable development, remediation city appearance, harmony with circumstance and others---95 clauses</p>	<p>4 ordinances protecting arable land and basic farmland, protecting ecology environment, focusing on sustainable development, remediation city appearance, harmony with circumstance and others---43 clauses</p> <p>7 ordinances protecting arable land and basic farmland, protecting ecology environment, focusing on sustainable development, remediation city appearance, harmony with circumstance and others---83 clauses</p> <p>12 ordinances + 14 laws protecting arable land and basic farmland, protecting ecology environment, focusing on sustainable development, remediation city appearance, harmony with circumstance and others---225 clauses</p>

Figure 4. Mapping of urban policy investigation.

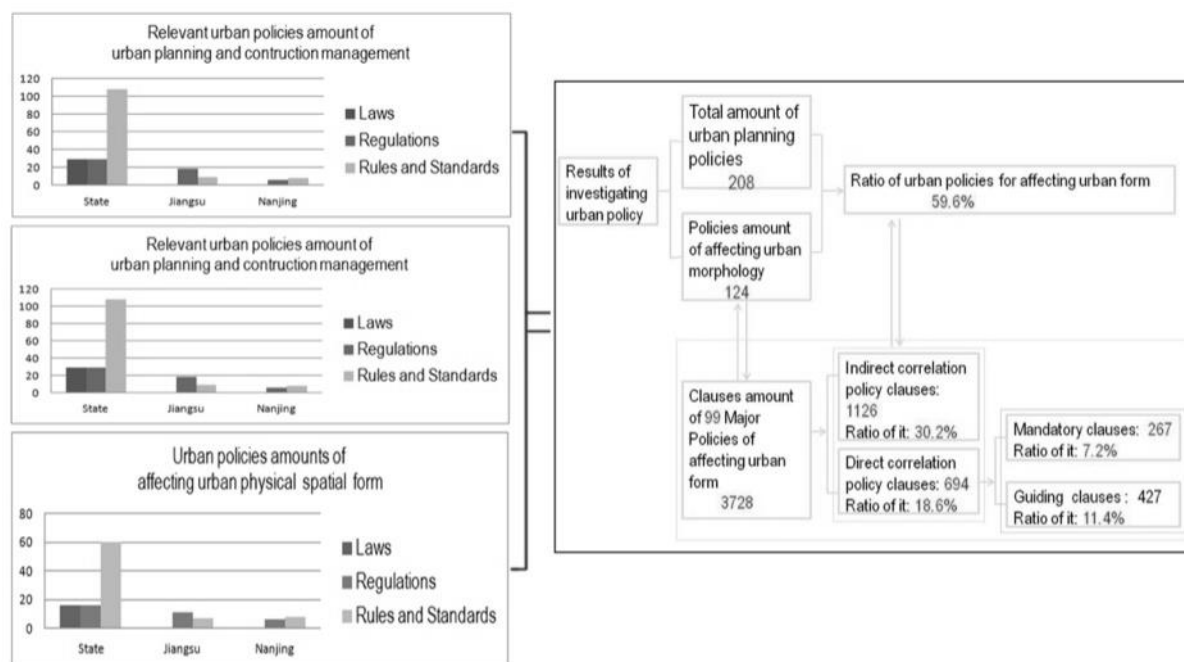


Figure 5. result of urban policy investigation of China.

Table 1. Urban policy documents amount of urban planning and construction management

		Laws	Regulations	Rules and Standards
State	China	29	29	108
Jiangsu Province	Jiangsu		19	9
Local City	Nanjing		6	8
Total		29	54	125
The Whole Total		208		

Table 2 Urban policy documents amount of affecting urban physical spatial morphology

		Laws	Regulations	Rules and Standards
State	China	16	16	60
Jiangsu Province	Jiangsu		11	7
Local City	Nanjing		6	8
Total		16	33	75
The Whole Total		124		

Correlation between urban morphology and regulations of land use

In the policies directly related with urban form in China, the regulations of land use mainly include in three aspects: the first is mandatory rules of land use scale, land nature, land classification and compatibility of construction land nature, cultivated land transfer non-cultivated land, agricultural land transfer to construction land and plots division, for example, in our policy statistics results of Nanjing city, twenty-two clauses in six rules have these mandatory provisions (L-NUPO-1990, L-IRNUPO-2007, L-NURPO-2012, P-TR-2011), although these regulations have rigid requirement to land use, but have not regulations of quantitative indicators, which all to be pointed out to determine in relevant regulatory detailed planning and relevant planning conditions. Such as, Nanjing urban and rural planning ordinance stipulate: 'Construction land should properly and compatible use land in accordance with the principles of intensively using land. The proper construction scope and compatibility requirements of urban land use should be clearly specified in the controlling detailed planning and determined in planning conditions.' (L-NURPO-2012) Which is very probably to lead to irregular of every construction plot fabric, because each controlling detailed planning has no uniform policy basis of reference. The second is guiding rules of urban land layout, urban function zoning. And the third is controlling indicators regulations of land exploration intensity, such as ratio floor area, buildings density, green ratio and other indicators. In our policy statistics, six clauses in four local rules have these provisions of indicators, such as the regulations of 'Buildings layout must comply with relevant planning and management technical regulations about building density, floor area ratio, distance between buildings, building height, distance of buildings back roads, rivers and railways' (L-NUPO-1990), 'Urban construction should be reasonable control of building capacity. The construction projects of providing public open space for city, could appropriately increase their buildings capacity, and the specific indicators should refer to relevant technical regulations of urban planning.' (L-IRNUPO-2007), 'provisions of up limits and low limits controlling approach of building density, floor area ratio and other indicators in residential land, commercial land, and other types of land' 'controlling

indicators regulations about building base area, building density, floor area ratio and its calculating' (P-CDPG-2012) .

In addition, about the provisions of plots, in China, only the rules of a few local city of more developed economies, such as Jiangsu, Guangzhou, Fujian and other provinces, which have the rules of plots division size and the smallest land unit controlled, but have no provisions about plots exploration intensity, relationship between plots geometric shapes and buildings, land subdivision, and other relevant quantitative indicators. While other local city regulations, such as Ningxia, Gansu, which have not covered related provisions about plots use.

Then, in China, the land exploration intensity through indicators controlling is how to affect the urban physical spatial morphology, so we have selected 99 building cases in old city of Nanjing, and statistics breakthrough of up limits requirements of floor area ratio and buildings density, to analyze its relationship with urban spatial morphology. As Figure 6 shown:

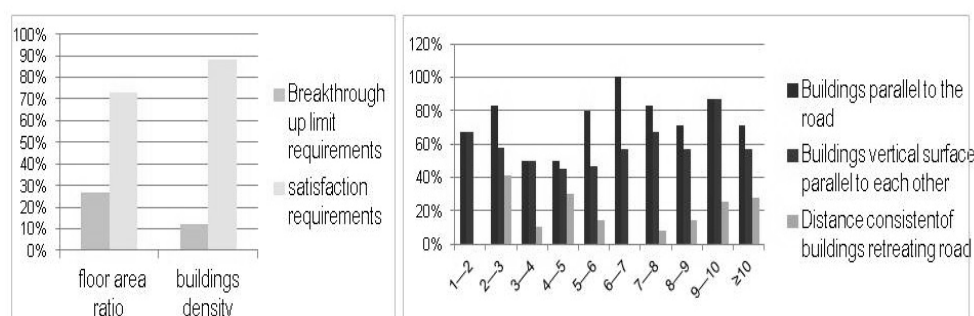


Figure 6. correlation analysis between urban morphology and floor area ratio, buildings density.

Experiment results: 27 indicators of floor area ratio are exceeded, 12 indicators of building density exceeded, and the other comply with policy regulation, which shows that floor area and building density have controlled to the construction amount of land exploration and buildings capacity, and they are effective measures of controlling urban land construction, so also they have certain affect to urban spatial form. In addition, the floor area ratio more higher, the building density is lower, which indicates that the developers comply with the regulation of The implementing rules of Nanjing urban planning: 'the projects of providing public open space for the city, may be appropriate to increase their building capacity', except following the indicators regulation. Thus, although this amount of urban land construction have been controlled, but building height and floor areas could be exceeded, and could affect urban spatial morphology.

Correlation between urban morphology and regulations of buildings layout

The regulations of building layout mainly include in distance of buildings back roads and river, distance of buildings back land boundaries, distance between buildings and. Here, we mainly analyze the impact of buildings retreating road and distance between buildings.

Correlation analysis between urban form and distance between buildings

Now, China's policy regulations related with distance between buildings, which are mainly involved in the regulation of residential buildings spacing. Mainly in the province and local city policy, which have the policy regulations of sunshine spacing factor, sunshine spacing calculation of residential buildings, minimum distance between residential building gables,

minimum distance of layout north and south between residential and non-residential building, and other minimum distance between non-residential buildings. Another, which also have clear regulations about buildings distance of low-rise residential, multi-residential and high-rise residential. (L-IRNUPO-2007,P-TR-2011) These local regulations about sunshine spacing and sunshine standards, directly refer the national rules, "urban residential area planning and design specifications" (GB50180), such as Big Chill date not less than two hours, the winter solstice not less than one hour. Then, the regulation of distance between building is how to affect urban form, so, in old city and east city of Nanjing, we have selected two residential cases, to compare between practical residential plan and planning plan of complying with regulations, as Figure 7 shown.

Experiment results: The residential plan of complying with policy regulation is almost consistent with practical plan fabric morphology, and the residential spatial fabric form appears out neat and clear mechanism features. From this phenomenon, we conclude that these two residential were built with following the policy regulation of distance between buildings, the policy provision have controlled to buildings position in residential, and controlled to urban spatial quality and urban form. However, we have also seen that Ruijin residential of Nanjing, built in 1985, only have ground parking, which would inevitably affect urban spatial land use and spatial quality more or less. And Huayang residential of Nanjing, built in 2000, using underground parking, which has very little interference to urban spatial use and urban form.

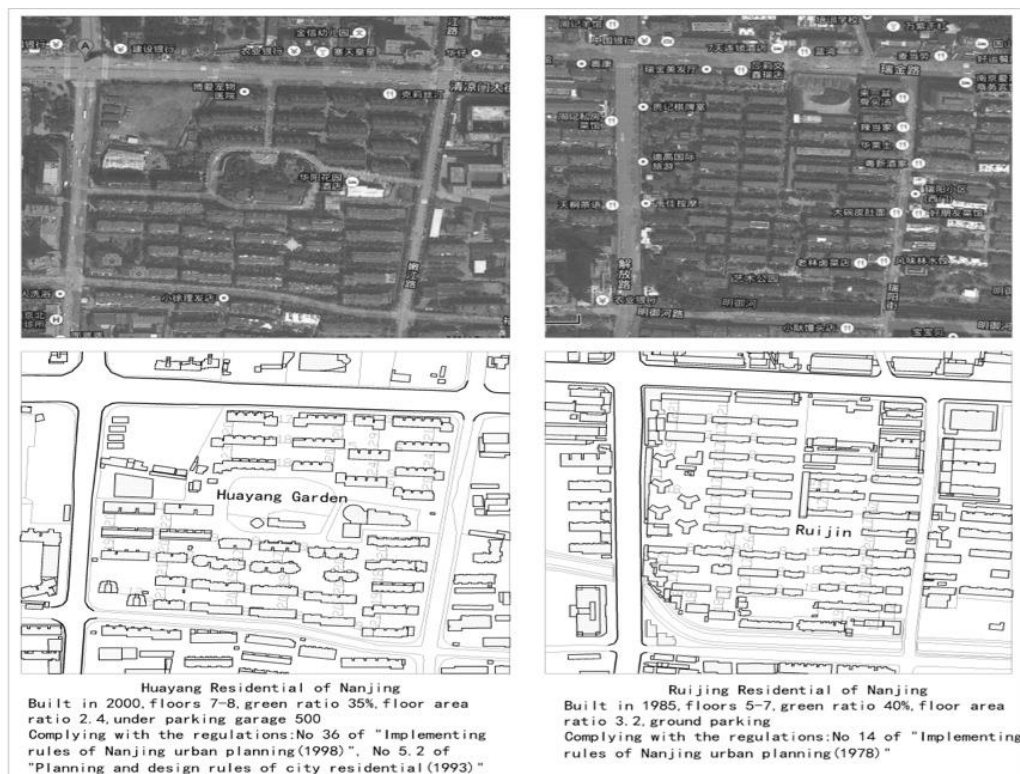


Figure 7. correlation analysis between urban form and regulations of distance among buildings.

Correlation analysis between urban form and buildings back roads

In elements of measuring geometry relationship among the architectural groups, distance is most important, which directly affects the image and scale of groups space. About the provisions of distance of buildings back roads, which are clearly defined in the local

regulations. Case as Nanjing, through investigating urban policy over the past years, we find that the policy of Nanjing's concession streets first appeared in 1928, from 1928 to now, there are three transferring stages: 1928 to 1977--no concession and construction along roads line, 1978 to 1987-- unified concession along roads red line, 1995 to 2007--different concession of different building heights, as shown in Table 3. In these three stages, after analyzing the policy clauses of past several years in Nanjing, we discover that each rules of buildings back roads has all some change, although from beginning they all try to solute road traffic and safety issues at that time, but which affected the cityscape. Because of different regulations of different years, making different generations buildings standing on the same street, so the urban street interface has become very complex, which have caused great impact to urban morphology. Here, we have selected a 946 meters long street from Zhujiang station to Xin jiekou station on Zhongshan Road of Nanjing, to analyze. As Figure 8 shown:

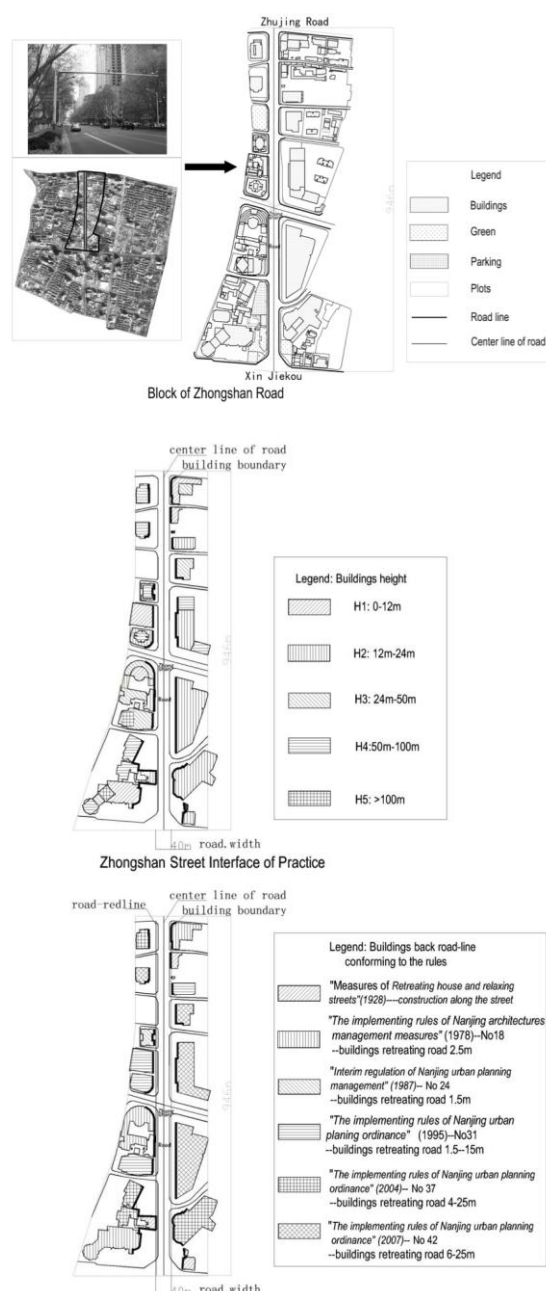


Figure 8. correlation analysis between urban form and distance of buildings back road.

Table 3. From 1928 to now, statistics of policy rules and cases of buildings back roads in Nanjing.

	First stage (1928-1977) construction along roads line	Second stage (1978-1987) Unified concession along roads red line		Third stage (1985-2007) Different concession of different building heights			
Year	1928-1977	1978	1987	1995	1998	2004	2007
Name of Policy rules	Measures of retreating house and relaxing streets of Nanjing city(1928) Buildings rules of Nanjing(1935) Buildings management rules of Nanjing(1948)	Implementi ng rules of Nanjing architectur es manageme nt measures(1 978), No 18	Regulation s of Nanjing urban planning and manageme nt(1987), No 24	Impleme nting rules of Nanjing urban planning ordinanc e(1995), No 31	Impleme nting rules of Nanjing urban planning ordinanc e(1995), No 35	Impleme nting rules of Nanjing urban planning ordinanc e(1995), No 37	Impleme nting rules of Nanjing urban planning ordinanc e(1995), No 42
Concession of comply with rules	No concession	2.5meters	1.5 meters	1.5—15 meters	3—25 meters	4—25 meters	4—25 meters
Cases amount of building Conforming to policy regulation	9	4	6	7	14	17	16
Not Conforming to policy regulation	8	4	5	5	12	13	13
	1	0	1	2	2	4	3
Ratio between cases amount of conforming to policy and total statistics cases amount: 82.2%							

Experiments results:The present status of Zhongshan Street interface is in accordance with the policy regulations of buildings retreating roads. In addition, according to our investigation to 73 cases buildings built differently times (Table 3), 82.2% buildings have been in accordance with the policy regulation of retreating streets. Distance of each different time building retreating roads is satisfied with the policy regulation at that time, the construction more later, the distance of buildings retreating roads id larger, and buildings built before 1978 are construction along the roads. Several buildings built in 2010, such as Kairun Hotel, which retreating the road is more than 15 meters corresponding with policy regulations.

Although the formation of Nanjing Zhongshan street interface is carried out in accordance with policy regulation of buildings concession streets, but from the experiment results, we have seen that the whole Zhongshan street interface shows discontinuous and irregular fabric features 。 So, in China, the relevant policy have controlled the buildings position and affected the urban spatial form, but can't controlled urban streets spatial quality, and its controlling role is ineffective to urban spatial quality.

Third, reasons of causing these status: Changing of different years policies, and the regulation of buildings retreating street belongs to enforced clauses, with higher operational, which made different times buildings standing on a same road, finally forming the status of street interface irregular. In addition, the larger public buildings built after 2007, have retreated the roads more larger distance, on the base of complying with regulations. So, except conforming the regulations of buildings retreating road, they are also complying with other regulation for concession, such as the rules states: 'Urban construction should be reasonable control of building capacity. The construction projects of providing public open space for city,

could appropriately increase their buildings capacity, and the specific indicators should refer to relevant technical regulations of urban planning.' (L-IRNUPO-2007) , while the developers have provided public space in their projects construction, they also have get more floors and improve ratio floor area, and get more economic effect.

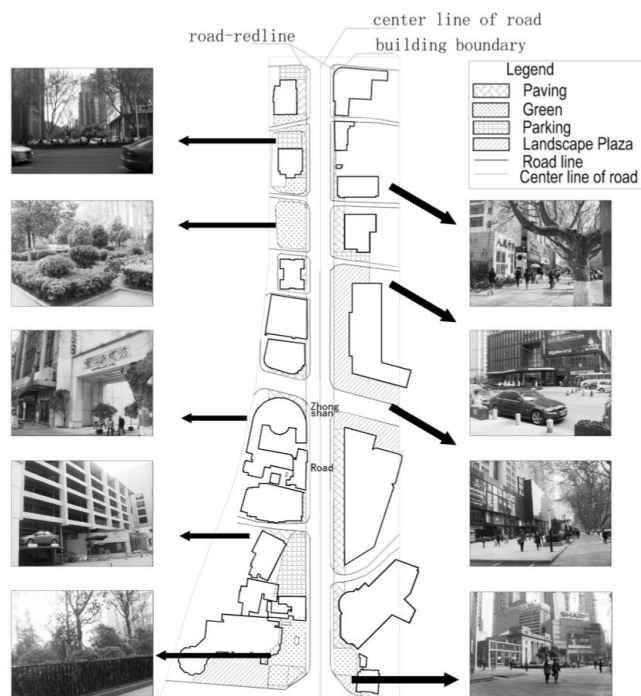


Figure 9. Land use in the redline area of buildings back road.

Another, On Zhongshan street, the redline area left by buildings retreating road, also become a problem, the status chaos (Figure 9), in the red zone, because of the difference ownership between sidewalks and concession area, the same street space are often divided into discrete space by paving or other aspects.

In addition, provisions of all kinds of boundaries mainly include in the regulations of roads, rivers, heritage conservation, green, construction control lines and other boundaries. Such as, No 7.1 of "Jiangsu controlling detailed planning guidelines" (2012) , has clear controlling requirements to the position, width, concession distance and protection distance of urban red lines, yellow lines, blue lines, purple lines and green lines. In national policy regulations, such as "Urban green line management measures", "Urban blue line management approach", "Urban yellow line management approach", "Urban purple line management approach", "Historical and cultural relics protection planning requirements ", and other policies, which also have the controlling requirements to boundaries of green, rivers, historical and cultural blocks and land use, but lack of quantitative indicators.

Correlation between urban form and urban space

In urban policy, the regulations about urban space, mainly include in the provisions of urban spatial organization, urban style and local characteristics, public space, street facades and buildings height, building style and color, urban design of city center and important functions plots, outdoor advertising, historical and cultural districts protection, and other aspects. For example, in our policy investigation of Jiangsu province, nineteen clauses in eight ordinances

are guiding regulations of urban space, and in these regulations, which have been lack of relevant indicators of controlling urban space. (C-UGO-1992, C-AL-1995, C-URPL-2008, L-NUPO-1990, L-MONA-1998, L-IRNUPO-2007, L-NURPO-2012, P-UCAESMO-2004, P-OAMM-2010, P-HCTVPO-2010, C-UAESO-1992). Then, these guiding regulations how to affect urban physical spatial form, from the aspects of street facades and buildings height, building facades and advertisement, we mainly analyze their influence to urban form.

First, the analysis of street facades and buildings height, in relevant local policy, which have the regulations of buildings concession roads according to street width and building height along streets. Such as the prescribe 'The buildings on both sides of the road which width is more than 30 meters or less than 30 meters, must retreat road redline corresponding distance according to buildings height over 24 meters or less than 24 meters (L-IRNUPO-2007). In accordance with this clause regulation, we have drawn out experimental model of street spatial interface, finally find, the road more wider and the building more higher, the distance of building back roads is more larger. So, various types of buildings on both sides of urban roads, because of their different heights, they retreat roads inconsistent distance, which makes urban street spatial interface becoming no uniform (Figure 10, Figure11).

Second, the impact analysis of building facades regulations: No 54 of "Implementing rules of Nanjing urban planning ordinance" states that 'Strictly controlling to the residential construction on both sides of the major road, and where construction should handle street facades well, shall not impede the urban landscape.' (L-IRNUPO-2007) Another, No 57 states that 'Prohibited to set unidirectional retreat floors in north of multi-storey residential and high-rise residential, in order to meet the building spacing concession requirements.' From these two clauses regulations, the provision purpose of No 54 is to improve building facades along the street, but existing two issues: first, lack of the definition limitation of "the major road", limiting the definition whether according to road width, or traffic flow. Second, "handle street facades well" is a relatively vague concept, no operability. According to "Nanjing controlling detailed planning", in the old city of Nanjing, planning public construction land 1195 hectares, which included in commercial land 447 hectares and road land 759 hectares (Ding, 2007). If complying with this provision, both sides of roads are all used for commercial development, the construction is far more than current required, so No 54 is difficult to be implemented. To control the street facades better, it may need more operational policy. Moreover, the regulation 'Prohibited to set unidirectional retreat floors in north' of No 57, is almost impossible, because of sunshine under the premise of the old city land increasingly tense (Figure 12).

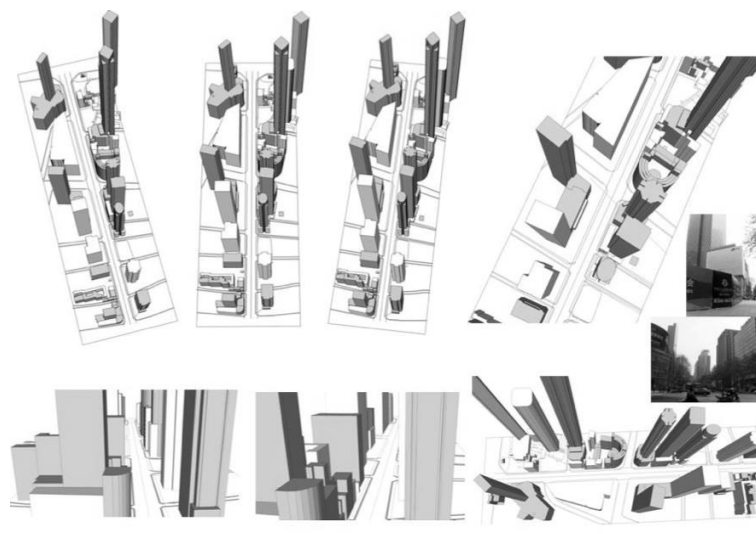


Figure 10. Zhongshan street spatial interface from Zhujiang station to Xin jiekou station.

Third, the influence analysis of advertisement setting: In relevant urban policy, the regulations about advertisement setting mainly are guiding clauses, and no enforced regulation, also no controlling indicators. For example, No 58 of "The implementing rules of Nanjing urban planning ordinance" (2007) states that 'Outdoor advertisement setting and signs facility should be suitably located, proportion coordination, style and scale harmony with the surrounding environment', we know this clause has no operational quantitative indicators.

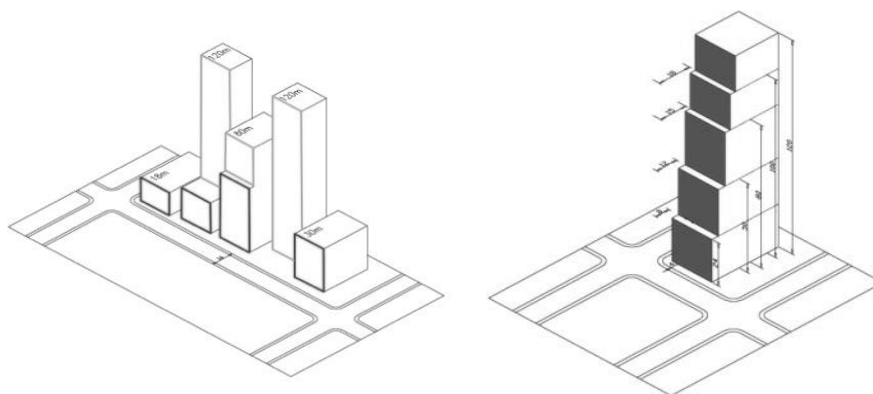


Figure 11. buildings of different height back roads.

Ashihara Yoshinobu proposed that advertisement of side street is the main problem affecting the facade. When sidewalk is less than 3 meters, building facades are obscured by advertising; when sidewalk greater than 11.5 meters, street is a haven for walkers. According to Nanjing city policy of buildings back roads, the minimum distance of buildings retreating road red line is 6 meters, plus the sidewalk, a distance of 11 meters is not difficult, but advertising of Nanjing is still chaos, also affected the street interface morphology. Then, whether advertising could be controlled? We think that urban policy can control advertising sizes, but advertising content is difficult to control (Figure 12), this may be the main reason of advertising not to be resolved on urban streets. In addition, if unifying advertising form and style, and harmony with surrounding environment, which will lose the effect of advertisement catching people's eye. If advertising isn't able to attract people's attention, it also can be counted as a real advertisement?



Figure 12. Retreating floors of building; advertisement along street

Conclusion and Discussion

In this paper, through investigation of urban policy directly or indirectly related with urban physical spatial form, we find that China's relevant policies related with urban spatial form

actually have been more: which mainly include in mandatory regulations of urban land use and building layout, and guiding provisions of urban space. And through the correlation analysis, we concluded that the mandatory regulations have played the controlling role to land development intensity and buildings location, and have the important impact role to urban physical space shaping, but which have not controlled to quality of urban spatial form. Among them, the regulation of playing important role is quantitative indicators, such as building density, floor area ratio, distance between buildings, distance of buildings concession and other indicators. The mandatory provisions have controlled the land exploration intensity and building location, and affect urban space organization, but not control and resolve the quality of urban physical spatial form. So, China's city yet remains the urban form problems of blocks integration lower, street interface chaos, urban space organization disordered and urban fabric form blurred. Through experiments, we think that the main reasons of making these urban form problems mainly have:

First, the indicators regulation, such as building density, floor area ratio, green ratio, distance between buildings, distance of buildings concession and other indicators, is mandatory clauses provision, with a very high operational and implementation efforts. From top to bottom, which could be get consistently implementation, but it is this implementation and policy changes over the past years, different periods buildings retreat street inconsistent distances, these buildings stand on the same street, finally making the street interface chaos and greatly affecting the urban spatial morphology. So, in the improvement of urban landscape and safety and urban functions, adding more elements of urban form controlling may be important,

Second, the policy regulation about urban space of street interface relationship handling, advertising and other aspects, is the most important urban spatial form requirement, however, these regulations only are guiding requirement, no mandatory and no operability, which have not play the controlling role to urban spatial morphology. So, we consider that in these guiding rules, adding quantitative indicators may be help to control urban physical spatial morphology better.

Third, in the relevant urban policy, lack of the follow regulations: No controlling provision about area and angle after buildings retreating road red line; No special and required drawings in programs approval and experts evaluating, which weakening the seriousness of planning approval and experts assessment; Lack of the regulation of architectural surroundings and plots subdivision, which making architect didn't have a high reference as guiding in the design process, so that each single building only based on their own form and developing interest, finally causing urban spatial form chaos.

So, it is completely impossible that only relying on urban policies to control urban physical spatial, it could also need to consider other factors, this may be the our research work in subsequent studies.

Acknowledgments

We would like to thank the supporting of the Scientific Research Foundation of Graduate School of Jiangsu Province (Program No. CXZZ13_0056), and Special Research Found for the Doctoral Program of Higher Education (Program No. 20120091110055).

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A subtropical urban taxonomy: the tension of research informing practice

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Abstract. *Urban Morphology provides an important framework of analysis for understanding growth and change in cities. For the urban design and architecture practitioner however, urban morphology research only provides part of an approach. The task is often to plan for, or design much larger, taller and coarser grained buildings. The demands in new projects with planning efficiencies for lifts, larger floor plates for working and retail make footprints much larger. Accommodating car parking and service vehicles, often above ground, adds complexity to the lower levels of buildings, urban interfaces and public realm. The urban challenge is to fit these projects into existing, usually finer grained blocks, places and buildings. These factors combine to make traditional building types inappropriate for new projects and the sole repetition of traditional urban patterns is not possible. These issues are of a particular challenge for Brisbane, which is a city in search of a subtropical urbanism as a new world city, two aspirations of government visioning for the city. But new buildings can contribute to the city and have good urban manners. Using Brisbane as a case study, this paper proposes a method of creating an urban taxonomy of new urban building and places types that respect the existing city. This work reflects upon recent practice and also draws inspiration from the Form Based Codes movement in the USA, which has a strong emphasis on the essential building types needed to create good urban places. The taxonomy is ongoing research that would benefit from the scrutiny of urban morphology researchers.*

Key Words: Subtropical, taxonomy, new urban building types.

Introduction

Urban Morphology provides an important framework of analysis for understanding growth and change in cities. For the urban design and architecture practitioner however, urban morphology research only provides part of an approach. The task is often to plan for, or design much larger, taller and coarser grained buildings. The demands in new projects with planning efficiencies for lifts, larger floor plates for working and retail make footprints much larger. Accommodating car parking and service vehicles, often above ground, adds complexity to the lower levels of buildings, urban interfaces and public realm. The urban challenge is to fit these projects into existing, usually finer grained blocks, places and buildings. These factors combine to make traditional building types inappropriate for new projects and the sole repetition of traditional urban patterns is not possible. These issues are of a particular challenge for Brisbane, which is a city in search of a subtropical urbanism as a new world city, two aspirations of government visioning for the city.

But new buildings can contribute to the city and have good urban manners. Using the desired Brisbane as a case study, this paper proposes a method of creating an urban taxonomy of new urban building and places types that are a response to the regulatory and policy environment, some market preferences while respecting the existing city. This work draws upon recent research and practice, and the form-based codes movement in the USA, which has a strong emphasis on the essential building types needed to create good urban places.

There is an essential tension in the way that urban morphology research can inform practice. Urban morphology forensically examines urban patterns of blocks, streets and building types that have occurred throughout history and charts a rich and nuanced retrospective of how a

place has come to be. For the practitioner with an interest in urban morphology, this research is fascinating, but it does not necessarily inform what to do next.

Mostly, the task of what to do next is to design different, larger and taller building types that respond to current community and client expectations. These expectations are codified in the higher densities encouraged in town planning schemes and are defined by the construction systems, buildability and design requirements of the construction industry controlled by the Building Code of Australia. In addition, market and client preferences have a major influence of design choices. The practitioner's observation is that this approach may have always been the situation. A pragmatic opportunism influences what we do next. When historical buildings were built as new, they were, most likely, not informed by detailed urban morphology research (partly as the study emerged after the second world war) but by the needs of the day and the conventions of design and construction.

A desire for these larger and taller buildings, the advent of new materials and construction systems like steel and concrete and of course lifts have transformed historic city patterns and continue to do so. However, these buildings did not necessarily destroy the urban fabric, but added another layer to the urban pattern. These buildings still had an urban character and form and contributed well to the urban environment, by doing simple things such as aligning building fronts to streets and filling available frontages. Entries were visible and accessible from streets and in more built up areas a variety of ground floor uses with individual entrances in shop fronts activated streets. Facades had depth and detail, windows and walls were often vertically proportioned and horizontal mouldings broke up the vertical scale. A strong human scale was evident. These attributes are the obvious urban conditions and for a practitioner committed to urbanism, can be readily applied to buildings designed for current needs.

The framework

This paper proposes a framework for an urban taxonomy. Taxonomies are not focused upon uniqueness, but how elements with common characteristics comprise and combine to form identifiable urban patterns. At its core is a range of residential, commercial and mixed-use building types of varying densities that emerge from the current regulatory environment and market preferences. In essence, the types will be a response to the pragmatics of everyday architectural and urban design practice. The essential requirements of the Building Code of Australia, Queensland Planning Policies and town planning schemes that shape design responses are determined. Market preferences that influence the form of development include recognised industry preferences and examples of good practice often as response to the regulatory framework.

Urban blocks are seen as a fundamental ingredient of urbanism. The resultant building types of varying scales and intensities aggregate to form the urban block types. These blocks help define the resultant street patterns and are grouped to make settlement forms of various densities and land-use mixes. These types address the specific issues and opportunities of Brisbane City on the eastern seaboard of Australia, a city of 1million people in a region of 3 million growing to 4 million over the next 25 years. With its latitude of 27.5 ° south of the equator, the resultant urbanism is subtropical reflecting the climate of this region. This work will suggest a taxonomy for a contemporary subtropical urbanism, one that can integrate with traditional urban patterns.

The taxonomy should also include other attributes that make up the urban fabric, such as street types, open spaces, types of plazas, parks and gardens as well as arcades and courtyards within developments. This part of the taxonomy remains underdeveloped. The framework of the taxonomy is described in figure 1.

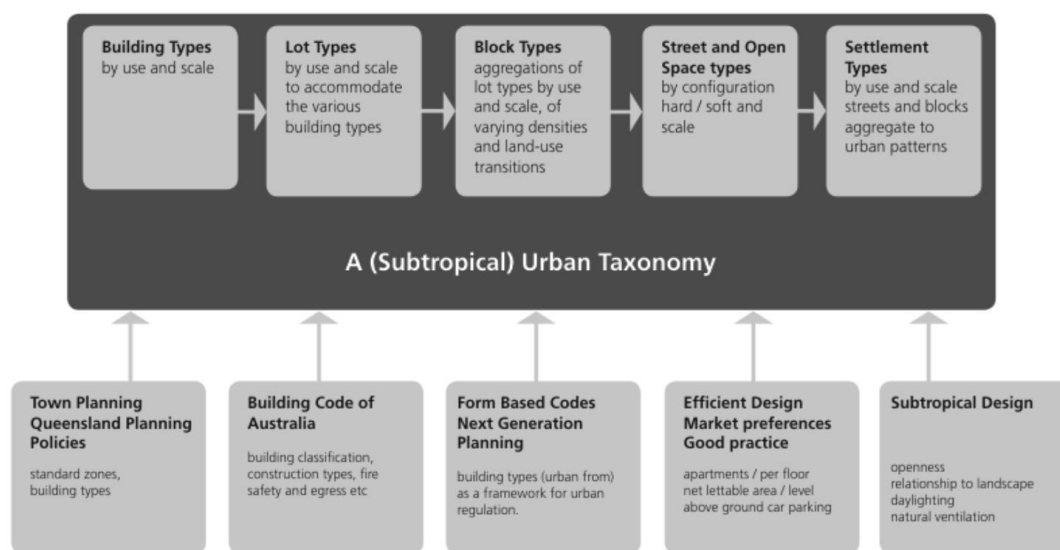


Figure 1. Taxonomy framework.

Town planning: Queensland planning policies

Town Planning regulates land-uses and determines design controls for the resultant preferred development forms for specific locations. In Queensland, town planning schemes are shaped by the Queensland Planning Policy (QPP) framework, which recommends a series of standard zones. (DSDIP, 2013) To achieve consistency throughout the state, the zones have specific colours for each, to be used in planning schemes. The QPP classifies types by both land use and density. Two groups of zones, the residential types and the centres types, strongly influence the resultant urban form.

The residential zones are; rural, low, low medium, medium and high and can include character housing as separate zone. They are coloured in a range of pinks to darker reds. The range of high density is 8-15 storeys, medium density, up to 5, low medium, 2-3, low density and character residential is 1 to 2. The centres zones, from the highest to the lowest, are; principal, major, district, local and neighbourhood. Other primary zones include and industrial uses and community uses that range across all densities. The land-uses with their preferred colours have been arranged in a table with a cross section of built form demonstrating their approximate density. (Figure 2)

Residential Uses

Low density residential provides for predominantly dwelling houses on a range of lot sizes. This development form reflects and enhances the existing low-density scale and character of the area with a maximum building height of 1-2 storeys. Some small-scale non-residential uses that provide local work places and complement local residential amenity can be included.

Low-medium density residential is 2-3 storeys and has a broader mix of dwelling types including dwellings, row houses, small secondary houses and duplexes, villas and small scale multiple dwellings. This development form can include apartments, residential care facility or retirement facility and can be supported by community uses and small-scale services and facilities that cater for local residents. This density facilitates urban consolidation in predominantly residential areas with multiple dwellings and short-term accommodation for visitors encouraged clustered around or near centres and transport nodes. Development provides a high level of amenity and is reflective of the surrounding character of the area.

Medium density development provides for multiple dwellings up to 5 storeys and can include aged care or retirement facilities, hostels, hospitals and short-term accommodation. These uses are clustered around or near centres and transport nodes thus facilitating urban consolidation. A diverse range of community facilities, transport options, employment nodes and commercial and retail hubs support this zone. High density residential provides for higher density multiple dwellings with similar types with medium density, but 8-15 storeys in height. Development provides for high density multiple dwellings in locations clustered around or near centres and transport nodes. Local plans may specify the ultimately heights.

Character residential is sensitive infill of a similar scale and character as well as preserving existing dwellings. The QPP residential Zones are shown in cross section in figure 3.

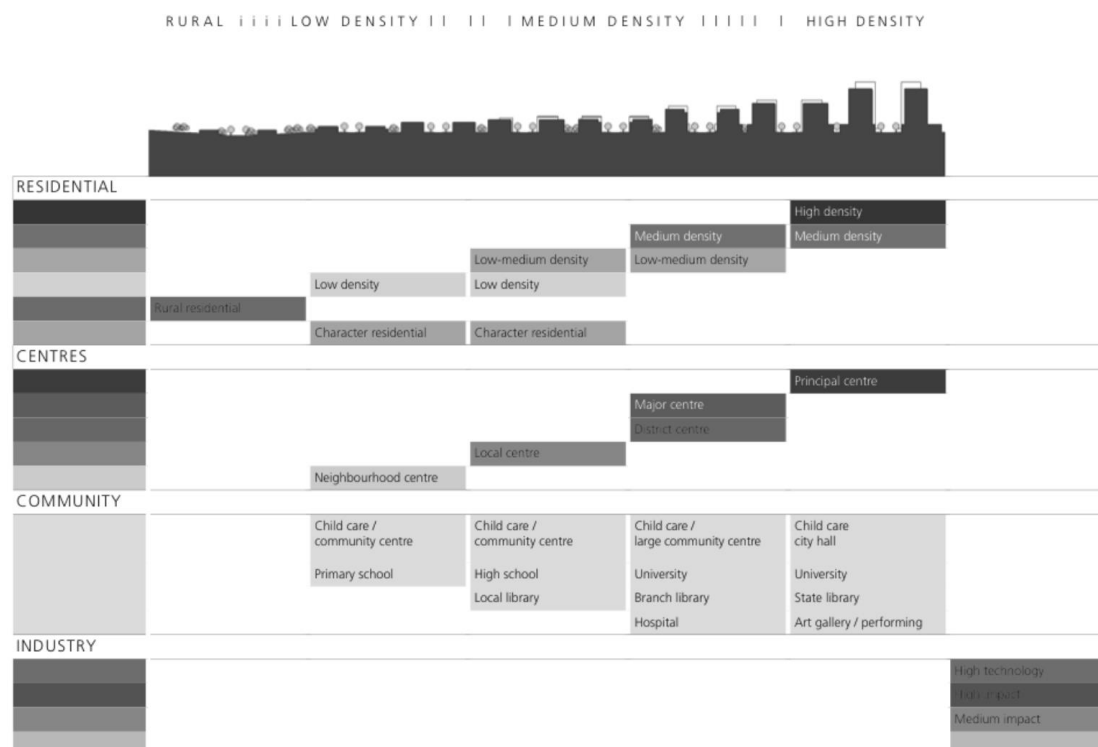


Figure 2. QPP standard zones by type and density.

LEVEL	High density	Medium density	Low-medium density	Low density residential	Character residential
Description	Higher density multiple dwellings supported by community uses and small-scale services and facilities that cater for local residents.	Medium density multiple dwellings supported by community uses and small-scale services and facilities that cater for local residents, in locations clustered around or near centres and transport nodes.	Mix of dwelling types including dwelling houses and multiple dwellings supported by community uses and small-scale services and facilities that cater for local residents.	Predominantly dwelling houses supported by community uses and small-scale services and facilities that cater for local residents.	A predominantly residential area with a particular character supported by community uses and small-scale services and facilities that cater for local residents.
	8 to 15 storeys	3 to 5 storeys	3 storeys	1 to 2 storeys	1 to 2 storeys

Figure 3. Queensland Planning Policy Residential zone definitions by type.

Centres zones are mixed-use, usually with retail or commercial ground floor uses with residential or offices above. Centres are classified as five types, based upon density and uses including varying increments and sizes of retail. They are coloured as a range of blues. From the largest to the smallest these are Principal, Major, District, Local and Neighbourhood.

The Principal centre is the central business district or city centre and has the widest range and highest order of retail, commercial, administrative, community, cultural and entertainment activities. Residential development, short-term accommodation and tourist accommodation is provided at an appropriate scale and integrates with and enhances the fabric of the centre. Service industry uses may be located in the zone. Public open space areas such as malls, plazas, parks and gardens are provided.

Major centres are the next order centres with a mix of uses and activities. It includes concentrations of higher order retail, commercial, offices, residential, administrative and health services, community, cultural and entertainment facilities and other uses capable of servicing a sub-region in the planning scheme area. A broad range of higher order retail, commercial, administrative, community, cultural and entertainment activities is provided. Residential development, short-term accommodation and tourist accommodation is provided at an appropriate scale and integrates with and enhances the fabric of the centre. Service industries may be located in the zone. Public open space areas such as malls, plazas, parks and gardens are provided. Maximum building heights are usually specified by the more detailed neighbourhood plans, but 5 to 8 storeys are typical.

District Centres include a concentration of land uses including retail, commercial, residential, offices, administrative and health services, community, small-scale entertainment and recreational facilities capable of servicing a district. Local centres are smaller again, with limited range of retail, commercial and community activities to service local needs. Neighbourhood Centres are the smallest and contain the least mix of land uses to service residential neighbourhoods. It includes small-scale convenience shopping, professional offices, community services and other uses that directly support the immediate community with development up to 3 storeys. Figure 4 represents the scales of the various centres zones in cross section.

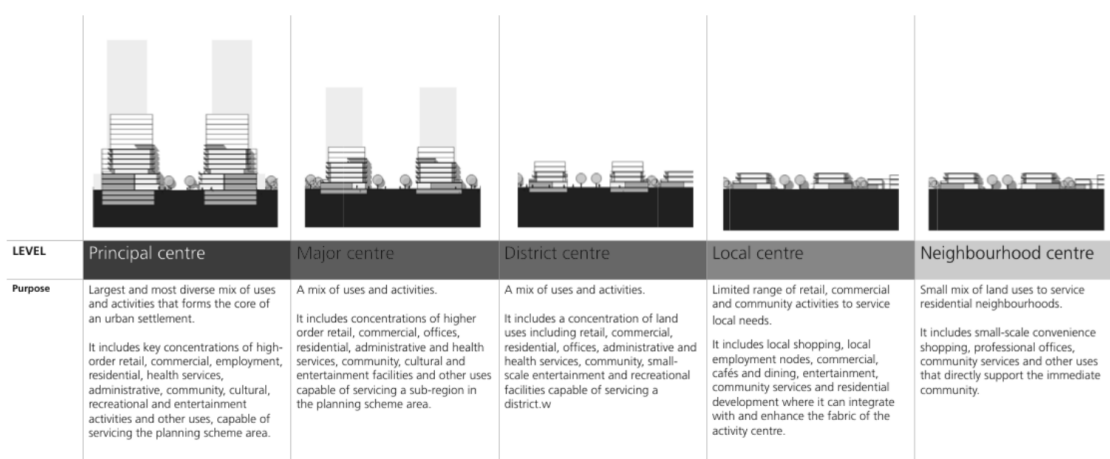


Figure 4. Queensland Planning Policy Centre zone definitions by type.

Building Code of Australia

Like all building codes, the Building Code of Australia (BCA) regulates fire resistance, construction methods, access and egress, health and amenity, which includes day lighting, and

more recently energy efficiency. Requirements change based on use, height, and in some cases floor area. (Australian Building Codes Board, 2014) The BCA utilizes a form of taxonomy and classifies buildings into 10 types. Classes one to four are residential with lower densities the lower numbers. Class five is office and six is retail. Class seven buildings are warehouses and car parks with laboratories and factories class 8. Public buildings are class nine and non-habitable outbuildings are class ten. There are additional requirements for mixed class buildings where the different classifications are located together, either side by side or above. Fire safety, access and egress are a primary determinant of building form and are influenced by the type and height of the building. A key issue is the number, one or more, and types, of escape stairs and whether these stairs are fire enclosed or open.

Offices, Class 5, do not need a lift when up to 3 storeys and the upper floors are less than 200 square metres per level. This is a small footprint a little larger than a house. These buildings do not need to fire enclosed fire stairs either enabling a single open stair. Above 3 storeys and upper floors greater than 200 square metres, lifts are required. At this height, fire stairs need to be fire enclosed, making it a service space and not appropriate for the primary public access in the building. If there is a lift and single stair in an office, each part of a floor needs to be no more than 20 metres from the stair, which limits the floor plate to about 1000 square metres. Larger floor plates usually require 2 or more stairs, which need to be a minimum of 9 metres and a maximum of 60 metre separation. These dimensions will enable larger floor plates of up to 2000 square metres or more.

Residential Buildings

In residential buildings up to 3 storeys with at least one residence on the floor of access, lifts are not required and the fire escape stairs can be open. Above 3 storeys, fire escape stairs need to be fire enclosed, so lifts are usually provided, while not specifically required under the building code. Residential buildings higher than 3 storeys, but below 25 metres to the uppermost floor level, (8 to 9 floors high) can have a single fire enclosed escape stair that is not pressurised. In this case, entrances to each apartment must be 6 metres from the stair entry, limiting the number of apartments per floor to around 5 or 6 or 500 square metres or so. Above 25 metres to the uppermost floor level, two fire stairs are needed and they need to be pressurised and the overall building sprinkled. This significantly adds to cost in Australia.

Like in Class 5 offices, the two fire stairs need to have a minimum of 9 meters separation but a maximum 45 metre between stairs. Entries to apartments are 6 metres from a choice of two directions to the fire stairs. (BCA Part D1.4). The 45 meter separation suggests a maximum footprint of closer to 1,000 to 1,200 square metres. If there is a 3 meter setback for walls along side boundaries, additional fire safety is not needed. At this distance, windows can be incorporated, but it is the town plan that normally determines these setbacks. The Building Code determines the nature of the fire safety and the resultant construction systems. Where balcony access is incorporated in apartment buildings, apartments can obtain light and ventilation from the balcony if there is a 1.5m sill or fire protection to windows.

Cost effective design, market preferences and good practice

The building code requirements can influence design outcomes with certain thresholds for design efficiencies and therefore cost which shape the form of buildings in Queensland. There is a desire to maximize the number of apartments per level while minimising the number of stair and lifts. Apartment buildings below 9 storeys can have a single fire stair and lift with around 5 or 6 apartments per level. Privacy is a strong consideration in higher density design. Different apartments facing each other should have a separation between 18 metres and 24 metres to enable privacy in higher densities. This dimension is the scale of a street, but can be applied

across rear and side boundaries. Building forms should be shaped and site sizes chosen to enable these privacy issues to be addressed while still addressing streets and public spaces.

The apartment configuration is recommended as balcony access with small internal courtyards. This enables cross ventilation and locating a habitable room adjacent to the balcony. This can make apartments two rooms wide, not three rooms, making more efficient plans. Larger apartments are usually located on the ends of buildings where there are two external walls for rooms. Side setbacks of 3 meters enables natural ventilation without fire protection.

In office buildings, there is a commercial imperative for larger floor plates of 2,000 square metres, especially for 'A' grade office space (Destravis, 2013). This potentially can create very deep plans. Day lighting is an important design requirement for all buildings to create better quality internal spaces and better energy efficiency. Good practice office design recommends that 16 metres building depth wall to wall with 12 metres. A desired floor plate efficiency of core to net rentable area is around 85%. (Destravis, 2013)

Car parking is a major contributor to development costs. Higher densities are now more easily achievable as there is a trend for lower car parking rates in urban areas where good public transport is available and cycling and walking is encouraged. Basements are expensive to construct and there is pressure to locate car parking above ground. The above ground requirement presents a number of challenges. Dwellings can be separated from the street thus reducing casual surveillance, unless the parking is sleeved by street fronting apartments. In order to naturally ventilate and light car parking, the three metre setbacks would apply. These responses make sites larger with a depth closer to 35 metres.

Form Based Codes

The form based codes movement in the USA has made a significant contribution to the regulation of future urban form. (Parolek, 2013) A form based code frames urban regulation with a morphological approach utilising building types as the primary structuring element of the code, not land-uses which are the primary focus of town planning schemes. A prominent feature of the form-based code is identifying the range of building types proposed in the place. These types are shown in the code in a line from the least dense to the densest. (City of Santa Ana, 2010). This taxonomy has become a characteristic of the form based codes approach.

Next Generation Planning

The Next Generation Planning (CoMSEQ, 2011) by the South East Queensland Council of Mayors is a policy guideline based on extensive research of local settlement patterns and forms. It utilised in part an urban morphology approach. CoMSEQ is the peak body of all local councils in South East Queensland and the project was conducted with a number of them. Examples of good urbanism identified by the local councils, were measured and recorded with drawings and photographs. Conclusions were made about preferred building types, streets lot sizes and settlement forms that had created these desirable urban places. Underpinning the work was an objective to better define smart growth for South East Queensland.

The NGP proposed a series of urban place types, conceived as neighbourhoods scaled upon a five-minute walkable catchments of 400m diameter. The neighbourhoods had centres, which generally accord with the centres types described in the QPP. The place model was drawn as a cross section from the lowest to the highest intensity. This graphic was inspired by the new urbanist transect developed by the United States urban design firm Duany Plater-Zyberk. (Duany, 2009) The places were: P1, Rural places; P2, Rural townships; P3, Next generation suburban neighbourhoods; P4, Urban neighbourhoods; P5, Centres of activity and P6; Central Business Districts. (Figure 6) The contribution made by the NGP was the idea that each of the centres should be conceived as a neighbourhood, so would have relatively specific arrangements of zones around them within the neighbourhood catchment. Major centres would have higher

density housing nearer the centre with medium towards the edges. Local centres would have low to medium density close by but be predominantly low density. Ranges of community uses of varying scales were distributed in these centres. The land uses were taken from the standard zones from the QPP. The NPG also developed indicative plans for two of these neighbourhood types (Figure 7) (CoMSEQ, 2011).

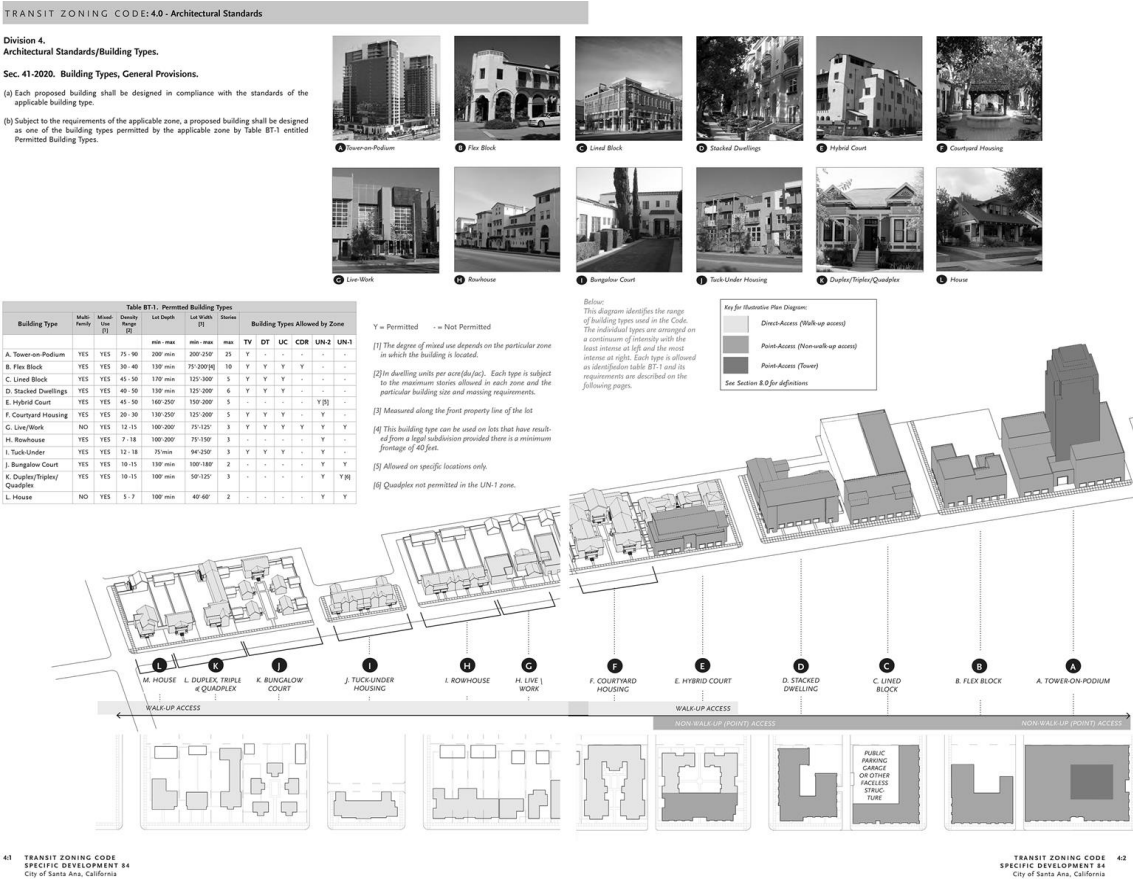


Figure 5. Building types Santa Ana Transit Renaissance Form Based Code.



Figure 6 SEQ Place Model.

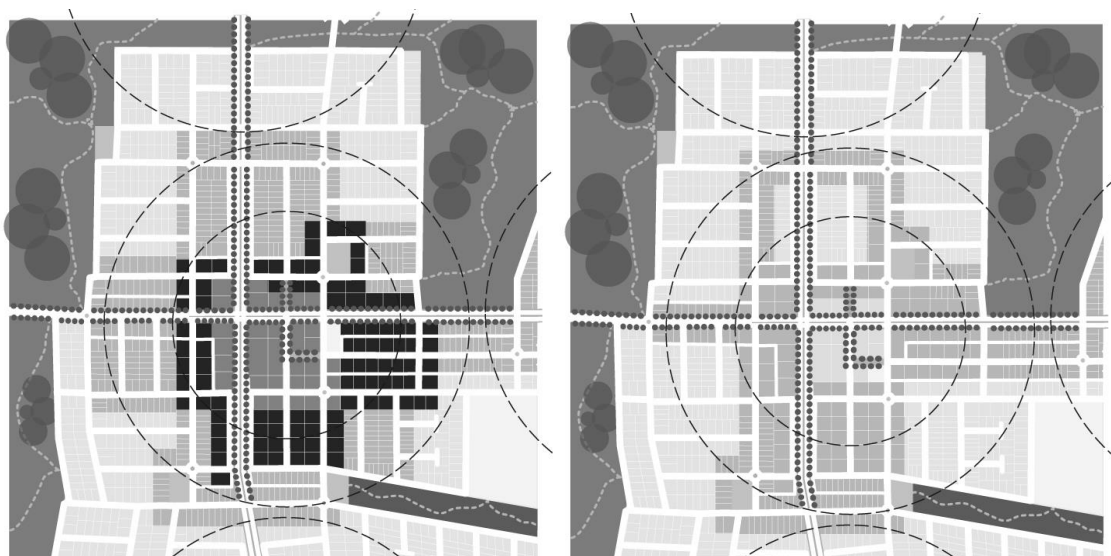


Figure 7. SEQ place types, urban neighbourhoods, next generation suburban neighbourhoods.

Subtropical Design

The philosophy that design can primarily respond to the qualities of place, climate and culture is strong in South East Queensland. A Centre for Subtropical Design was established by the Queensland University of Technology (QUT) and the Brisbane City Council in 2003. The centre has undertaken research into many aspects of subtropical design principles, building types and development forms. Openness and relationship to landscape are two key subtropical design qualities advocated by the centre. Other principles include respect for good orientation, topography, the integration of landscape, opportunities for outdoor living with a strong connection of inside to the outside. Edges between inside and outside are blurred with transition spaces that incorporate verandahs, terraces and courts. Inside spaces can have the character of outdoor spaces and outdoor spaces have the character and enclosure of inside spaces. (Kennedy, 2011)

Subtropical design principles focus on building forms that enable cross ventilation with a priority for narrower buildings and appropriate orientation with the longer sides facing north. Many of these qualities could be interpreted as non-urban and this is one of the challenges in achieving more subtropical design responses in an urban context. In order to enable ventilation within and around dwellings and day lighting, there is a preference for free standing buildings and balcony access apartments.

Detached building aggregating to form an urbanism is a characteristic of subtropical Brisbane. While the city centre has many attached buildings, outside of the city centre much of the city fabric comprises groupings of detached buildings with narrow side and frontage setbacks with larger rear gardens. This includes commercial and retail buildings along main streets. Their primary outlook is front and back irrespective of orientation. These buildings still form streetscapes with urban character, but enable vegetated front gardens and glimpsed views between buildings to green vegetated areas behind. Paddington remains a good exemplar of these patterns, with the main street curving with the ridgeline topography and the grid of residential streets in a relatively orthogonal grid in the valleys. (Figure 5) This characteristic has informed the development of the building types for the taxonomy.



Figure 8. Aerial, overview and detailed view of Paddington, Brisbane, Nearmap, 2014.

The Taxonomy

The taxonomy is framed as series of elements from the more specific scale of buildings to lots, blocks, streets and open spaces to the way these elements combine to form settlement types defined by a 400 metre five minute walk, a neighbourhood scaled urbanism. The settlement types also include the suite of public buildings that provide community focal places and the collective life of the community, but these are not yet described.

The range of building types are not dissimilar to the form based codes array of building types and are described in a series of tables. (Figures 9,10,) There are two types completed, offices and residential/mixed-use. They are arranged from the smallest to the largest, the least dense to the highest density. Plans at the same relative scale are shown. Both tables suggest resultant site sizes to accommodate these buildings. Yellow is used as the colour for useable space, beige for walkways and balconies, darker orange for lifts and stairs and paler orange for service areas, plant rooms etc. Each higher density is coloured as a darker grey tone.

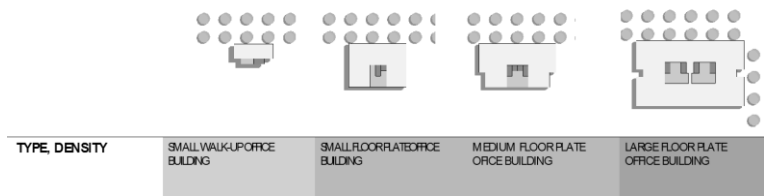


Figure 9. Office building types taxonomy.

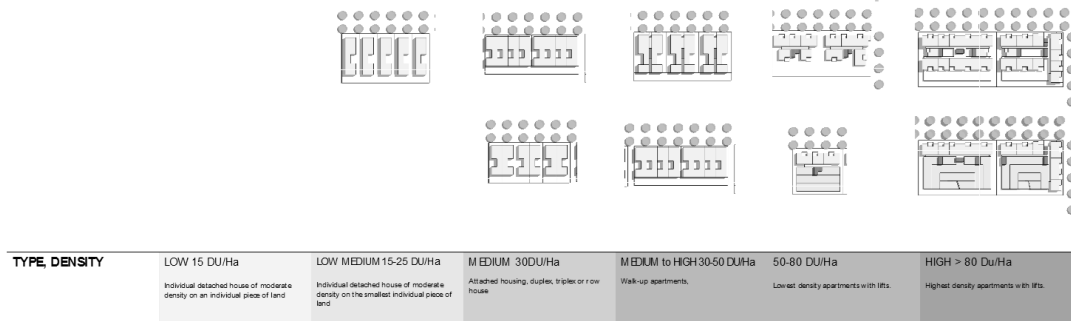


Figure 10. Residential building types taxonomy.

These various building types and densities can be arranged for living, working and mixed-use. Three neighbourhood types are proposed and these are taken from the middle range of the Next Generation Planning document. (CoMSEQ, 2011) The place types are P4, P5 and P6 and for this taxonomy, P4, the Next Generation Suburban Neighbourhood, is just called Suburban. P4, Suburban neighbourhoods, comprise predominately individual dwellings with a small amount of attached housing around a small centre with locally focused community facilities. P5, Urban neighbourhoods, are higher density, walkable, mixed-use neighbourhoods. Their centres are strong community focal places and include mixes of retail, employment and community uses. Housing is generally attached. Urban neighbourhoods can incorporate universities and hospitals. P6, Activity centres, are the primary urban focal places in settlements. Densities and land use mix are high. Significant employment is provided and regional scaled civic, cultural and community uses are included.

Natural and rural areas, the rural townships and the CBD are not included as these do not form significant parts of newer urban areas, where activity centres are the highest order centre. Each neighbourhood type is drawn in cross section with the relative heights of buildings shown. The higher the density, the darker the grey colour. A table has been prepared summarising the residential, centres types, which are commercial and residential mixed use buildings from the lowest to the highest density. The neighbourhood types are located above the development intensities. Suburban neighbourhoods are at the lower end. Activity Centres are at the higher end and urban neighbourhoods are in between.

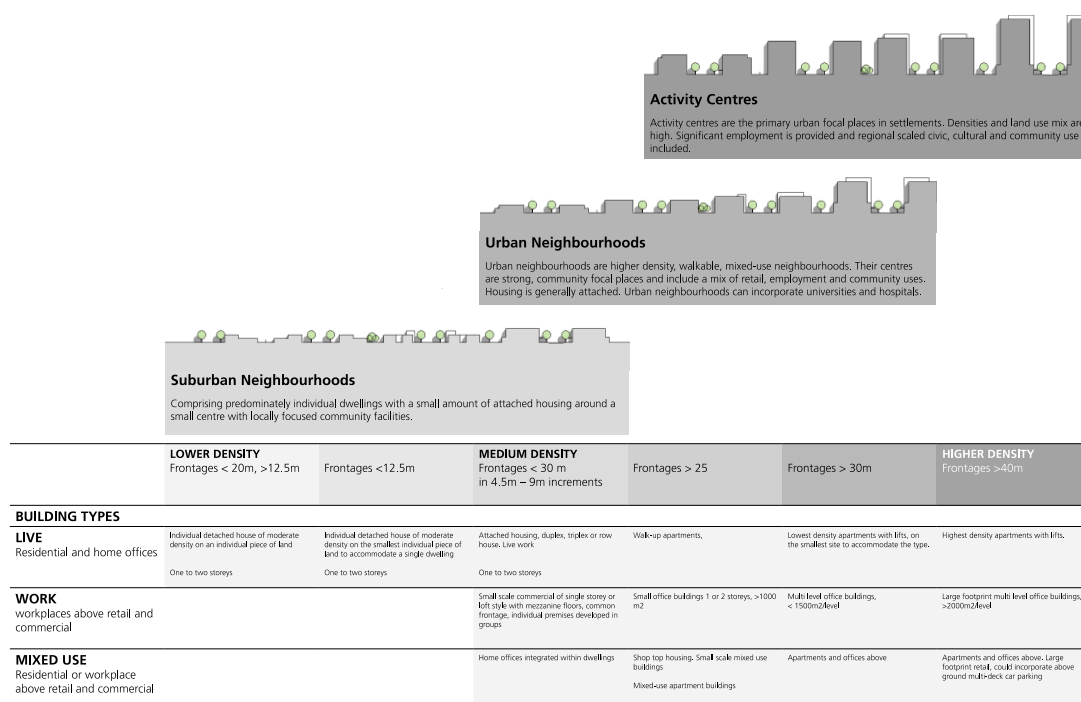


Figure 11. Settlement types form and density, suburban neighbourhoods, urban neighbourhoods, activity centre.

Utilising the approach of the form based codes array of building types, the building types from figures 9 and 10 are arranged as a series of seven generic urban blocks in the form of a figure / ground drawing. The blocks are arranged from the highest density to lowest density and show the transition of building types across the blocks along block edges. The same types face each other across streets, so the transitions are made at the rear of blocks. The highest density blocks have the largest buildings, big footplate offices and high density housing. The lowest comprise predominantly detached housing. Street trees are included as this is a strong

characteristic of subtropical urbanism. The block sizes are all around 150 metres long and between 60 to 75 or 80 metres wide for the larger commercial blocks. (Figure 12)



Figure 12. Settlement types, suburban neighbourhoods, urban neighbourhoods, activity centre.

The settlement or place types then comprise arrangements of these urban blocks within the walkable catchment. The generic blocks have been adapted to respond to each of the neighbourhoods utilising the approach for streets and land-use transitions in the generic blocks. Plazas and parks are also included in these figure ground diagrams to elevate their importance in a subtropical urban context. This suggests an enrichment of the Nolli figure ground drawing including both built form and a coloured landscape.

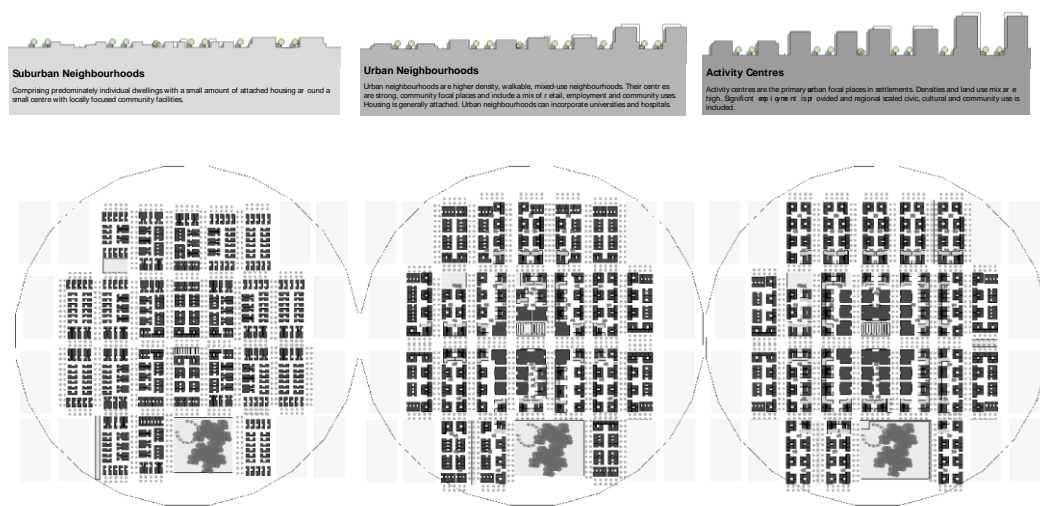


Figure 13. Settlement types, suburban neighbourhoods, urban neighbourhoods, activity centre.

Conclusions

This paper has attempted to represent for the first time a broad range of urban thinking yet remains an incomplete and ongoing piece of work as a taxonomy of urbanism. The research process has combined the local policy and regulatory framework of practice with observations of the Brisbane urban context. This resultant urbanism can represent a settlement form particular to this subtropical place, hence a (subtropical) urban taxonomy.

Some gaps still remain. Street and open space types characteristic of subtropical places have not been identified and described. The building types identified presently do not entirely correspond with the types in the blocks. The regular block structure and street grid does not take into account site features drainage lines, topography or views so would need to be adapted as required.

Despite these issues, the ambition of the research was to combine the elements incorporated as a way to describe urban places. The aim is to continue to locate and make relevant the philosophies of urban morphology within contemporary architectural and design practice.

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Shaping the city. Public space in the (re)construction of Portuguese contemporary city. The case of the Porto metropolitan area waterfront

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Abstract. *Due to the fragmented and discontinuous spread of urbanization, the Portuguese and European cities have seen over the past four decades their urban condition profoundly changed, resulting in the mangling and mutation of the urban landscape around the main urban centres, and in the weakening of the role of public space in structuring new urban expansions. Considering this background, and given the lack of consistent models or paradigms to intervene and design (or plan) the city today, will seek to question if, and how, is it possible continue to confer a “shape” to contemporary City from public space, particularly in its more recent and less consolidated parts (questioning also the nature of that hypothetical ‘shape’). We will seek to highlight the role that the project of public space can (still) play in building the ‘shape of the contemporary city’, recognizing it as a system of spaces with urbanisitic, formal and functional qualities, able to provide meaning and identity to the urban space, and able to restructure and support the growth of the city. Based on this understanding, we will defend (as an hypothesis), the need to consider the project of public space from the concept of urban fragment (recovering the importance of the urban project as the most consistent and appropriate way to approach an intervene in the city), seeking to recognize and systematize (using as case-study recent portuguese public space interventions), the purposes, the methodological principles, and the key architectural and urbanistic criteria which may recover the strategic importance of public space project in defining the ‘shape of the Contemporary city’.*

Key Words: contemporary city, urban design, public space project, urban waterfront

Introduction

Due to the expansion and fragmentation of cities, especially over the twentieth century, the relevant fact we consider important to remark, is the progressive and unstoppable process of disaggregation (both physical and conceptual) between the concepts of city and public space that, until the nineteenth century, were permanently interconnected (if we consider the public space as the one that condensed organically the political, economical and social space).

On the other hand, due to the fragmented and discontinuous spread of urbanization, the Portuguese and European cities have seen over the past four decades their urban condition profoundly changed, resulting in the standardization and disruption of public spaces and urban landscape around the main urban centres.

Taking into account this situation, the general question that this paper will seek to address is the extent to which it becomes possible to confer an exceptional character to urban public space in a time where urban societies seem to claim more individualized, more specialized and more enlarged forms of public space.

How can we design and build these exceptional public spaces in these parts of the city? And to what extent are these singular public spaces relevant to the shape, growth and consolidation of the city of the future, such as structuring components of possible systems of public space in more distended and enlarged urban contexts?

(Re) Shaping the limits: the rediscovery of urban waterfronts as exceptional “public spaces”

It is in this context that we consider key the interventions in the waterfronts, as well as, a reflection on public space projects that materialize these urban operations, and which in recent decades have been developed, particularly in the European context.

We are particularly interested in the examples where we can recognize the architectural and urbanistic attributes able to value these significant and memorable urban spaces, in the sense that they may rescue a collective dimension within a broader metropolitan reality; but we are also interested in those examples and projects which, by considering the geography in its physical concrete dimension, allow the natural elements to project, once again, as an integral part of the development and structuring of the city (rebalancing simultaneously the relationship between man and its natural environment).

The first and possibly the most important problem that arises in these cases to the public space's project will be the ability of intervening in these places (usually of great environmental value) taking into account morphological, urban and geographical characteristics.

The relationship with the natural and geographical elements tends, therefore, to assert itself as the central problem, which, from our point of view, should precede and influence the choices about the character of the program of uses of these public spaces. As Carlos Martí reminds us, if there is something permanent in the city, it is the presence of places, which by being “deeply urban”, simultaneously reveal a “strong bond” with geography.

The second topic, which we think is vital in the design of the “singular public space”, it is the recognition of these spaces as “significant and strategic voids”, open to collective appropriation, whose main attribute should be recognized in their urbanistic, landscape and spatial qualities.

Furthermore, the third key issue we consider critical to consider in urban waterfronts public space design, it is the ability of these urban projects to operate deep changes in strategic sectors of the city, trying to “shape” and “structure” the city (being aware that is impossible to control the shape of the city globally, but on the other hand we can not give up giving a shape and a structure to the city), while giving answers to the problems and concerns that each society poses particularly to public space.

The Porto Metropolitan Area Waterfront: a case Study

With respect to its waterfront, the Porto Metropolitan Area coastline has undergone, especially in the last four decades, a growing urban pressure, due mainly to migration from the interior lands to the coast of the country, that began in the 50s and 60s, and have become more critical in the years 70 and 80.

These dynamics have transformed these sectors in urban areas with considerable use conflicts, leading to a disqualifed and uncontrolled growth, namely on rural pre-existing meshes. In the case of Metropolitan Port this occupation took place, initially, especially with the construction of single family houses (in many cases with a illegal genesis) and more recently with the construction of multi-family dwellings and / or gated communities, supported by relatively poor infrastructures, resulting in the saturation of the use of the waterfront, increasingly pressured by the real estate market.

As a result of this occupation, the urbanization process of the coast has quickly reached a critical stage, that one can see reflected either in terms of the poor quality of roads, public spaces, and urban fabrics, either on the dilapidation of natural resources and landscapes: pollution and degradation of beaches and water lines, destruction of the primary dune, illegal occupations, anarchic parking, etc..

Similarly to numerous port and coastal cities, this cycle of abandonment and degradation also suffered, in the case of AMP a reversal in the 1990s (albeit with a few decades of delay

compared to the first European and American similar examples), which can be proven by the authorities recognition of the potential redevelopment of waterfronts.

In the case of the Porto riverfront, this redevelopment also followed the logic of requalification of major European examples - implementing special projects to develop these strategic areas. That is, taking advantage of exceptional urban renewal programs in order to streamline and enhance the convergence between the financial effort and the political will.

We are referring to the projects and exceptional interventions which not only were crucial to the successful regeneration of key urban sectors, but also become relevant by the project methodologies, and by the (strategic) design options adopted for the materialization of the public space, enhancing a consistent development, and a key role in the structuring of some important urban coastline sections.

These interventions, were mostly carried out (or at least completed) under the Polis Program (National Program for Urban Rehabilitation and Environmental Improvement of Cities, launched in 1999 by the Portuguese government), and took place in the three major municipalities that constitute the Greater Porto Area (being in the case of Porto and Matosinhos physically articulated, and constituting in the case of Gaia an "hinge intervention" which articulates the river front and the sea front).

In line with the premises and strategic objectives adopted by the Polis Program, it was adopted as a fundamental principle of the Polis Program intervention methodology, the elaboration of detailed or urbanization plans, in order to promote, systematically, the technical integration of urbanistic, environmental and design of public space design aspects.

In the specific case the seafront of Porto Metropolitan Area (AMP), the richness and interest of the projects developed under the Program Polis is strongly marked by the intention and consciousness of valuing waterfronts, as an urban and architectural theme, able to contribute to the transformation and consolidation of the shape of the contemporary city, giving it a structure and a global shape (albeit resulting from different urban materials, and different processes/dynamics of city construction).

However, it is perhaps this diversity of shapes and designs, guided by a common purpose - "make city" - (understanding simultaneously the context in which the urban project operates, and understanding the specific and structuring role that interventions on public space can induce in each specific intervention) which makes the analysis of the Porto Metropolitan Seafront even more rich and stimulating.

We do not intend to make here an exhaustive description of the projects and works undertaken. We are, above all, interested in explaining the extent to which a correct (pre) definition of certain purposes, and the adoption of specific urban design criteria, and specific forms for the public space of each intervention, were key in the overall success of interventions; as we also believe it is important to demonstrate to what extent the coordinated and comprehensive conception of these projects was essential to provide a structure and a form to the metropolitan city, being equally sensitive to the specific contexts and geographies of the places where these interventions took place, and responding simultaneously to the dynamics and uses that society claims to public space.

Moreover, will seek to analyse these interventions, and their contribution to a critical review and analysis of the public space project in exceptional areas, as well as a reflection on the definition of the form and content of public space within the more unstable current city; particularly with regard to the ability to create and claim (simultaneously) principles of order, diversity and vitality of urban public space from the renewed consideration of the relations between geography, infrastructure, topography and pre-existence.

In fact, the three interventions to be analysed tackle a difficult and demanding balance between factors of different nature, which is embodied in a coherent synthesis "built form" that does not deny or hide the many roots that "emerge" on the surface of a reality that the authors - use as a matter of project.

From this confrontation and compromise with the existing urban realities (territories without very clear rules), the interventions that were held on urban public spaces thus result in

consistent proposals, able to boost (in the medium and long term) important changes, assuming the construction of the city (and of the public space) with clear urban intentions, through precise and (re)founder gestures, able to exalt the qualities of the sites.

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Empty vacant. Redefining interior's block voids in Guimarães

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Abstract. *This paper aims to analyse how urban form can influence the configuration of a project, based on the thesis "Vazios devolutos – reinterpretações arquitectónicas em quarteirões do centro da cidade de Guimarães", held at the Master Degree in Architecture from the University of Beira Interior. From a methodology strongly based on the contact with the territory, through both insightful observation in situ and their respective experiences, as a rigorous analysis of urban morphology, later graphically systematized, were carried into space: dubbed the "central block". It was also investigated the current needs of the space, upon which was developed a subversion draft of the interior structure thereof. After parallel analysis of current shortcomings in the city, a program based on two fundamental assumptions was built: i) increased parking lot space and; ii) the introduction of public green space in the urban environment. The urban analysis will determine the resolution of the project, whether by the underground floor (parking), that after a "cleaning" of vacant buildings inside the block, it presents itself as a negative of the new configuration limit, transposed to a new level; either by the ground floor (public green space), which sees in all its new extension a green flooring, occasionally marked by "carpets" of different materials originated in the new areas of trade perimeter of existing buildings on the block, as conjugates the memory of old servitude pathways.*

Key Words: *Guimarães, historic center, block, empty vacant, architectural reinterpretation*

Introduction

One cannot propose an intervention on an historic city as Guimarães without having in account: its people, its (mostly) urban heritage preservation, about preserving the identity and the patrimonial authenticity, or the continuity of essential long-term continuities or even on the vernacular architecture. It is also important to be able to deal with the integration of new ways of thinking, new opportunities.

The responsible agencies for developing urban strategies on Guimarães historic city center rehabilitation defended the ban on demolition over concrete, safeguarding the city image, and "forcing us" to [re]think today intervention in the area.

The characteristic protection of the intramural area on which the Guimarães historic city center is in, is translated to the way the streets and the buildings around appear. The block's backyards and the urban voids of this tight and special urban fabric are not exception, presented then closed upon themselves, surrounded by secular national heritage and punctually on vacant state.

This paper has as main objective the study of the distribution and of the configuration of the sets formed by blocks and their intrinsic "empty vacant", in Guimarães historical center, as well as a proposal of an architectural reinterpretation of a specific block.

Urban morphology: the block

The object of study – the block – is the main element on the reflection around the reading and understanding of city's image. It as an element that can generate and be generated by the urban fabric. Costa (2013: 123) points out its importance in "*the local implementation of certain*

model of society, in the design of lifestyles, and in the conformation of the space and of the architecture that builds the city”.

In order to understand how the city blocks appeared in our cities, and influenced its urban fabric, it was explored a theoretical framework, on “urban morphology. The block” theme was carried on, through: 1) individual/comparative analysis and studies; 2) case studies in different cities.

The first analysis aimed the block as a morphological element of the city: a) the generic definitions of the block itself; b) setting its morphological elements; c) and its typological evolution.

The morphological elements of the block

Assuming that architecture is what gives form to cities, and following theoretical urbanism planners, the morphological elements of the block are (Lamas, 2011): a) the street; b) the façade; c) the building; d) the backyard (Figure 1).

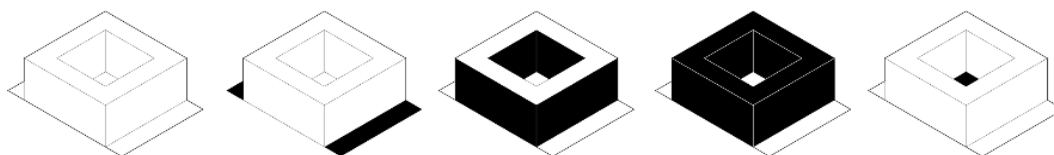


Figure 1. Morphological elements of the block: street, façade, building, backyard (author’s scheme).

Typological evolution of the block

In order to understand the contemporary blocks, we used a typological evolution of it, as an understanding tool. So, we chose 6 types, that represents the major changes through time: the greek block, the roman block, the medieval block, the renaissance block, the industrial block and the vertical/modernist block (Figure 2).

The morphological evolution of the block over time was either associated with its urban evolution, or with the urgent need to rebuild the city.

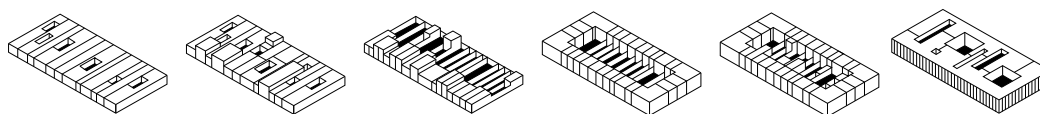


Figure 2. Typological evolution of the block (author’s scheme).

When it comes to issues of permeability, geometry, public/private, and the use of the limit perimeter area and its interior, the configuration of different types of block and its interior space is a literal response to the needs of the time. Although it is a complementary space, the backyard plays a peripheral extension of buildings, without liability to the public space. The intervention in an area with these characteristics must be taken as a new way.

Case studies

This part of the investigation consists on the identification and the interpretation of a set of case studies, which in their nature include a physical occupation of the block where the interventions

have a subversion of the regular structure of the interior of the block. The four examples were chosen according criteria of differentiation in the settlement of the block itself, including its permeability.

This analysis does not aim to make a complete presentation of the project but make known types of intervention of this type of sets, adopting a graphic and abstract analytical model.

In order to arrange these examples, an identity characterization (a keyword) was created, for each one. This analysis has in account key points such as ‘densification’, ‘flow’ and ‘permeability’ of each case.

“Preservation”



Figure 3. Quarteirão Império, Block conversion, Chiado, Lisboa, Portugal, Arch. Gonalo Byrne.

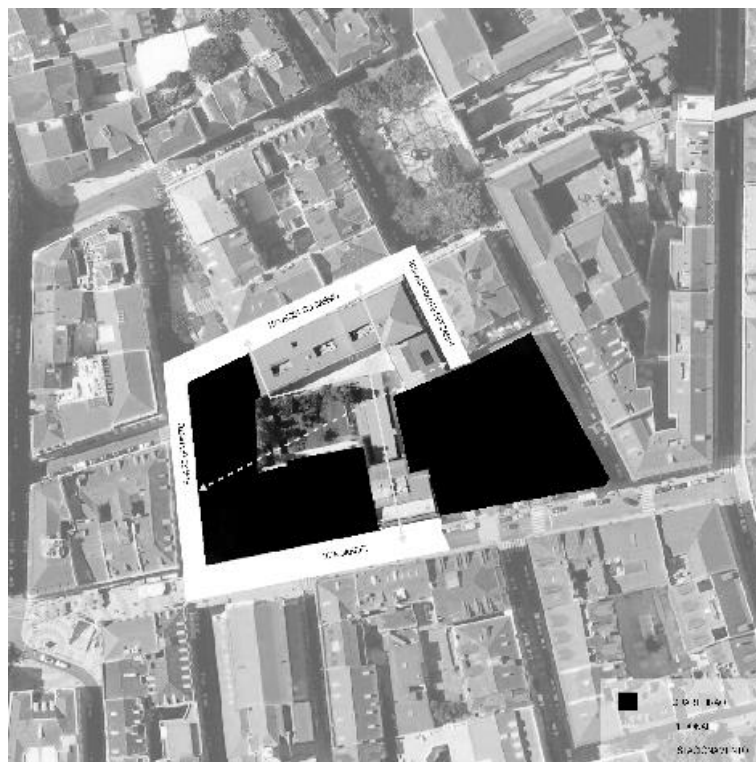


Figure 4. Graphical representation of Quarteirão Império (author’s photographs and scheme).



Figure 5. Rue des Suisses, Housing + Offices + Parking, Paris, France, Arch. Herzog & de Meuron.



Figure 6. Graphical representation of Rue des Suisses (author's photographs and scheme). "WEB".



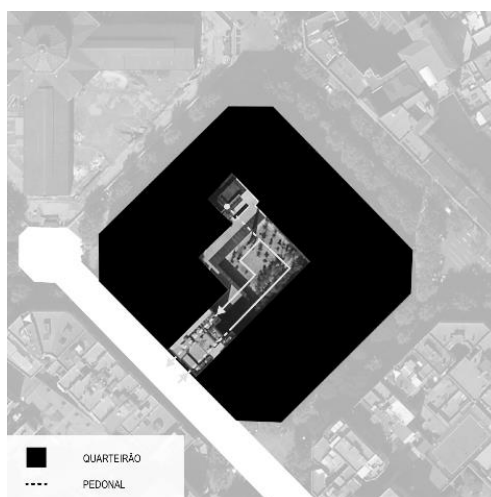
Figure 7. FÜNF HÖFE, Block conversion, Theatinerstraße, Munich, Alemanha, Arch. Herzog & de Meuron.



Figure 8. Graphical representation of Fünf Höfe (author's photographs and scheme).



Figure 9. Library, elderly and public space, Block conversion, Barrio Sant Antoni, Barcelona, Spain, Arch. RCR.



**Figure 10. Graphical representation of RCR library (author's photographs and scheme).
Guimarães urban development**

The intervention in a pre-existence requires an attitude of preservation. The preservation of cultural and historical heritage of a city retains the longevity of the memory of the local people and the actions and interventions in this, are what shape it and keep it “alive”, through time.

The study of Guimarães’ urban evolution is intended to help in conducting a clearer thought and action.

Mattoso (2002) identifies 6 different stages on the evolution of the city (Figure 7): 1) the “Bipolarization” (950-1279); 2) the “Gothic union” (1279-1498); 3) the “Renaissance, Mannerist and Baroque Requalification” (1496-1750); 4) The “Rococo, Pombalin and Neoclassical Reform” (1750-1863); 5) the “Eclecticism and Industrial expansion” (1853-1926); 6) the “Modern-monumental magnification and renewal” (1926-1974).

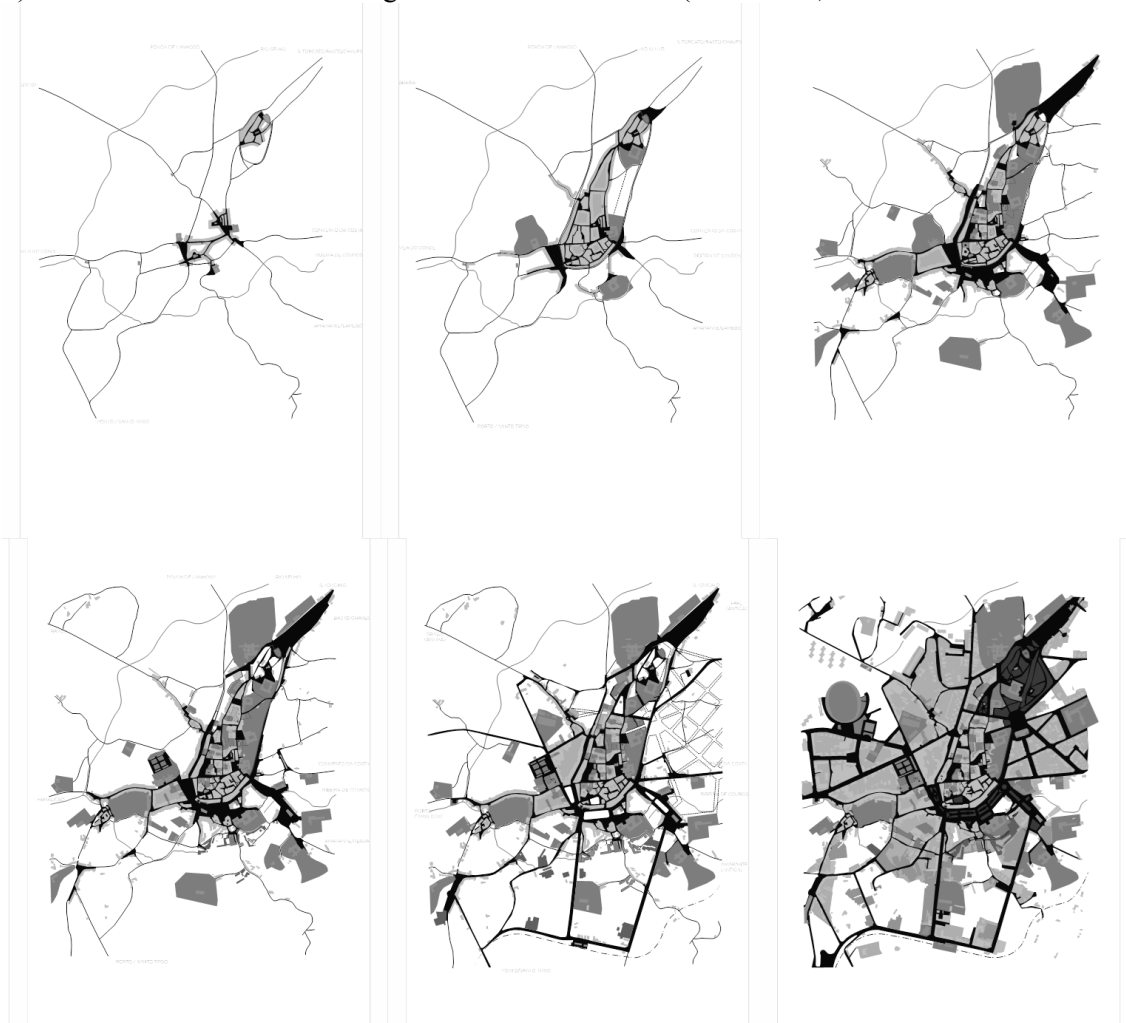


Figure 11. Urban development of Guimarães (author’s scheme).

The contemporary city

Since 1985, and as a response to the management of the recovery process from the historic center, Guimarães has a municipal office responsible for this task (a.k.a. GTL).

Along with the recovery process, the objective of maintaining the resident population and the preservation/restoration of the authenticity of the ways to intervene in the heritage, make part of the scope of GTL. It was intended that operations undertaken by GTL had an exemplary character, thus constituting pedagogical instruments and incentives to private enterprise in the rehabilitation of the historic center.

The GTL, through both internal and central government financing, has structured a set of action that, in addition to the buildings, also focuses on public spaces as a method to induce private capital investment in buildings of those areas.

According to the City Council, while maintaining a specific character of the different epochs of the evolution of the city readable in various architectures, registration matrices and new designs of public spaces, interventions in public spaces gives them greater dignity also through the introduction of new infrastructure structures.

Through the rehabilitation of public spaces, squares and wide streets are returned to the city and to its inhabitants and visitors, that with the continued growth of the city had turned into chaotic parking spaces. Currently, 90% of intramural public spaces are already rehabilitated, mainly areas for pedestrians, motorized pathways and streets with side parking areas. These actions constitute a valuable contribution for the authenticity that has maintained/replaced but also to reinstate the historic city as a cultural meeting place with self-identity.

But Guimarães city council also reports all the current problems in the city, in order to show their future intentions and to improve inhabitants' quality lifetime.

Two of them that captured our attention, due not only to high priority need of action: the lack of public green spaces in the city, as well as the lack of parking spaces.

Intervention – proposal for new green public urban space and parking lot inside a block

The last part of this paper aims to present a practical response to the problems previously reported in the city of Guimarães. The methodology for this part lays in the characterization of the site, through a morphological analysis of the object of study, the presentation of its current status and then the presentation of the intervention developed.

The project-oriented approach as a result of the combination of the initial phase of theoretical research of the evolution of the block, with the analysis of four case studies; the urban development of Guimarães; and the account of the current problems of the urban fabric (lack of green space and parking).

This consists in the development of a strategy for rehabilitation of block voids that pretends to be a plan to revitalize these spaces, applied at an early stage to a single block, and should be understood as a starting point and help for future analysis or proposal development. This strategy is intended to be extended and applied to other city blocks.

As mentioned before, the city of Guimarães suffered a major investment in infrastructure level on time of industrial reform (1850-1900) and therefore a large and disproportionate growth to its peripheral area.

The peripheral expansion relieved not only the city center traffic, but also, with the construction of new public use equipment, the city center importance, that lately started being uninhabited, started decreasing.

Guimarães is also characterized by a strong investment in traditional trading and has gradually suffer from this problem, manifesting itself not only by the abandonment of inhabitants of the historic center, but also of traders disgusted with the lack of movement and high rates rental of their stores.

The programmatic objective of the intervention enshrined as fundamental points of intervention: 1) the cleansing and revitalizing the 'core' of the block; 2) recovery and increase of green areas; 3) systematic urban rehabilitation unit; 4) improving relations with the traditional trade; 5) the introduction of parking lot space; 6) to be a future recovery booster of existing buildings with architectural interest and value.

The “Central Block”

The block that was chosen to be intervened (Figure 12) is located in the central area of the city, in the parish of São Paio, develops in approximately 2.48 ha and is bounded by the following arteries: Rua de Santo António; Largo Navarros de Andrade; Rua Gil Vicente; Rua Paio Galvão

or trade, but also occasionally by vacant buildings. The fact that the object in question has old servitude paths in its interior, was also a configuration criterion for the choose. Openings are “tunnels” that tear ground floor buildings, in order to access its interior and to enjoy these shortcuts (even if you have to “break in” some private properties).

Current situation

The “central” block consists of 68 buildings. Apart from these, there is an amalgam of others, which were built by the owners of the first ones - sheds, outbuildings, factories (now made car garages), warehouses and paths of servitude - sometimes as an extension of own home, or as support for other activities (Figure 14).



Figure 14. Layers of constructions on “central” block (author’s scheme).

As demonstrated above, the 'central' block is permeable, to the extent that there are now ways of public servitude which are understood as shortcuts between streets opposite the block. In addition to the permeability question, are the constructions on old backyards (which can be difficult to access by other inhabitants) that will be shown below (Figure 15).



Figure 15. Example of access tunnels to the blocks’ interior (author’s photographs).

Cleaning

The first step after an analysis of the block and of its elements, towards the intervention, the main objective was to building the 'core'/void of the same. Considering first the nature of them - the fact that they were built in ancient spaces, or appropriations by the perimeter buildings - and later its uses, it was decided (by the author), the total demolition of the same (Figure 16). Since hennery, to vehicles garages, or even a factory quenched with approximately 2000m2 area of deployment, these buildings are strongly characterized by a poor state of repair.

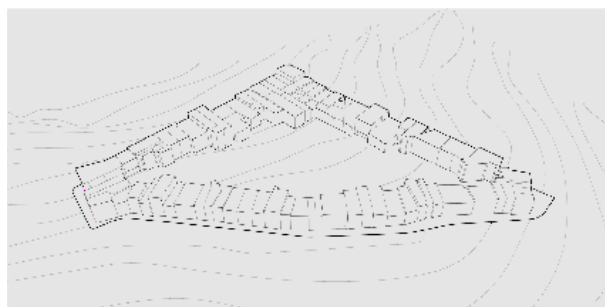


Figure 16. Axonometric representation of final block cleansing (author's drawing).

Proposal

The proposed revitalization for the block is, as previously stated, the resolution of problems of the current urban fabric. The configuration and location of the studied block, along with the introduction of the new program, allows not only to reclaim unused spaces; it also aims to improve the day-to-day lives of residents / visitors; the enhancement of the existing public space; and a better relationship with traditional commerce (via their ennoblement, or the strengthening of its symbolism and historical identity).

The constructive concept basis of the project shall take the cleaning done in the 'core' of the block and transpose it to the new underground car park. Through this step, the interior facades of buildings are delimiters, while defining identity to the new space, with only adjustments in nonsense situations (Figure 17).



Figure 17. Ground level and underground level configuration (author's drawings).

This action of extending interior façade walls' base lines few meters below ground bring the block to the park, although underground and away from all outside movement, has its limits in an urban form common in the city of Guimarães – the irregularity of an urban front.

Admittedly, and as a further attempt to return old living spaces to the block's interior, the natural slope of the ground floor terrain was also transposed (distance parallel) to the floor of the new parking lot. This decision facilitates access to the park because all the ramps have the same slope, since the height inside the park is the same regardless of the dimension of the street outside we meet up.

The block's permeability, previously marked by informal access, now becomes a key point in the project. The old tunnels have now been improved, allowing not only direct pedestrian access to the interior of the block, as they are ramps to the underground floor.

As mentioned before, one of the criteria for choosing this particular block was due to the fact that the entire ground floor is occupied by buildings devoted to commerce / services. This applies now in the proposal stage, to the extent that, by making the 'core' of the low block accessible to all, being totally clean, allows all buildings of this type to gain a second front for the public space. In the case of these spaces are buildings dedicated to commerce, the new front opening allows a new area available for opening terraces, which in all cases is not possible for the outdoor street. These buildings are now referred to as "carpet-buildings".

The ground floor urban treatment consisted on pavement processing, green landscape, permeable entries and vertical access boxes to the car park. Also in relation to commerce-dedicated buildings, these were chosen as the subject of another of the main concepts of the project – “the carpet-buildings”. As the natural unfolding of a carpet after its acquisition, from the back (interior façades of the block) of these buildings, a different pavement arises, guided by the limits of each building, until the building on the interior block opposite façade. This space is essentially reserved for the placement of these terraced buildings (Figure 18).

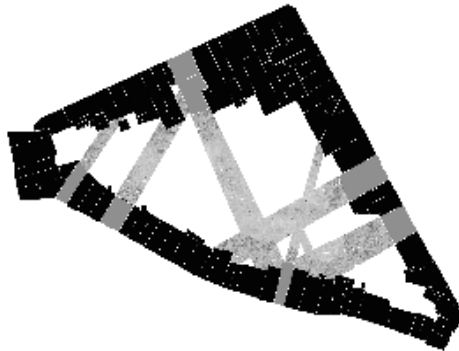


Figure 18. Urbanistic treatment of ground floor (author's drawing).

The used materials intend to continue the identity and the memory of the ones used originally around the block. We are faced with three different types of materials: cobblestone, screed and lawn.

On the ground floor level, almost all of the area, resort to the use of gardens, that are being cut by the 'carpets', initially 'unfold' of the rear of the buildings in cobblestone, changing to screed, when in turn, these intersect the openings for natural underground lightning on slab (Figure 19).

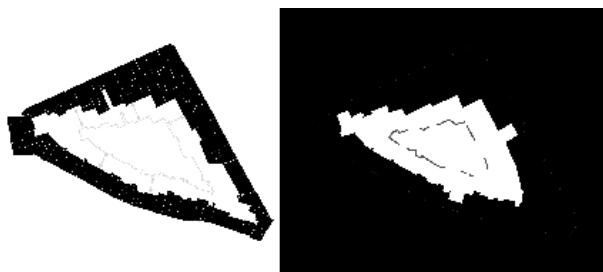


Figure 19. Openings for underground natural lightning (author's drawings).

The slab dividing the two levels work as a dual structure: a first that connects from the block's buildings and stops in tears and a second (larger) to complete the entire interior of the “core” of the block. Both work as green roofs, planned to drain away rainwater (Figure 20).

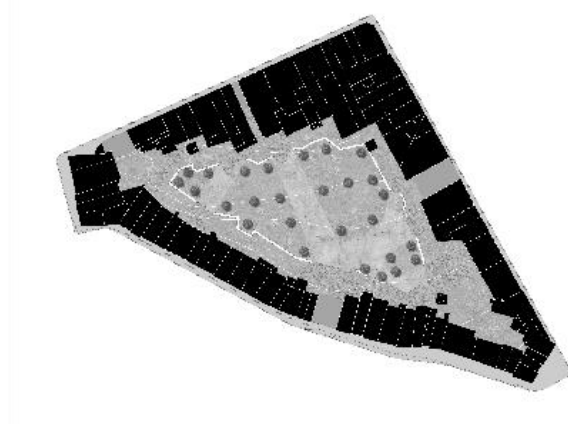


Figure 20. Final ground floor solution (author's drawing).

Conclusion

With the developed proposal, we had shown how urban form can influence the configuration of a project. This proposal also raised important issues related to the experience of contemporary cities, including the appropriations and the uses to which its inhabitants make of urban spaces.

The abandonment of the historic centres by their users, situation that belongs to a cycle connoted with political, social and demographic change, causes morphological structures, their heritage, their identity and its people, to be forgotten and only recorded in the memory of those who lived them.

In the case of a city such as Guimarães, which has agencies responsible for developing strategies for the historic center; and for which interest has been shown (first with the appointment of Cultural Heritage by UNESCO ®, then with the European Capital of Culture, and more recently with the European Capital of Sport), as well as investment, this process has to be caught and new solutions created.

One of the solutions addressed in this paper involves the raw analysis to places that lost their identity over time, either through lack of interest, or a wrong appropriation. This results in problems that need to be clogged, in order to give back its initial strength.

The specific case here focused, in which a void of a completely uncharacteristic block, became not only a driver of change in the surrounding, as returned strong past development factors, helped us to realize how a city dweller can respond to a series of reported problems, turning it into a future high interest practical application.

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Reviving the heart of a historical metropolis: Comparative study between different urban forms in downtown Cairo, Egypt

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Abstract. *In a historical Metropolis like Cairo, where 20 million people live in a city with more than 1000 years of history, many social, economic and environmental problems arise, threatening the historical heritage and the unique urban form that the city have. Downtown Cairo area including Tahrir, Attaba and Opera squares as well garden city area are clear example of this dilemma; these squares and surrounding areas located in the heart of Cairo have suffered from continuous deterioration through the last three decades, with a wide range of complex problems ranging from spread of informal markets, traffic congestion, and most significantly loss of cultural historical values. Through this paper, researcher investigates the existing challenges and issues facing these areas, comparing between its urban form patterns, usage and its effect on the heart of the historical city. The collected data about the current conditions and resident's problems were partly gathered through survey, site visits, and visits to responsible authorities. Data analysis showed that the difference between urban forms between areas is also related to socio-economic and functional aspects. Those aspects raise the need for an integrated urban design proposal which connect between these different urban patterns to solve the congested downtown area problems, with consideration to the continuous radical changes to the function of these areas due to socio-political circumstances. In conclusion, the researcher relate between these areas through integrated urban design trying partly to solve part of the main problems facing downtown area and preserving its rich cultural and historical heritage.*

Key Words: *Downtown Cairo, Tahrir Square, integrated urban design, historical conservation.*

Introduction

The city is the peak of human civilization and the optimal model to represent the human settlement, and any nation's civilization could be measured by their protection of history and the renaissance of their cities.

Cairo is a clear model for this statement, it is not only the capital of Egypt and centre of government, but also considered the biggest metropolitan centre in the middle east, with more than 16 million inhabitants (Egyptian statistics agency, 2006). In addition Cairo is considered as well as a major centre for trade located in the bottom of Nile river delta as shown in figure (1) and also as a well-known tourist destination where wonders of the Egyptian Civilization throughout all its different ages exist.

Cairo as a city with over one thousand years of civilization since its establishment in the reign of the Fatimid state has passed through several changes. One of the most important of these changes is the developments made by Khedive Ismail ruler of Egypt in the late nineteenth century when he wanted to turn Cairo to be Paris of the east, inspired by his French education and preparing the city to be with European flavour to host the opening ceremony of Suez Canal in 1869. The Khedive constructed downtown area including Attaba square, Khedival opera house, Opera square and Azbakiyya Garden with lots of iconic buildings designed by famous Italian and French architects (Aga Khan Trust for Culture, 2004).

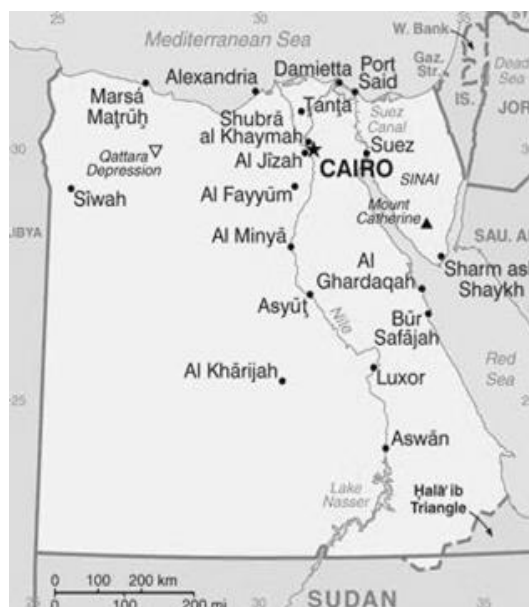


Figure 1. Map of Cairo location within Egypt. Source: University of Texas Library (2013).

Since that date in 1869, the importance of Attaba and Opera area has increased rapidly specifically during 1940s, when it became the real cultural heart of Cairo with the presence of the opera house, national theatre, cultural cafe and cinemas all in one place, surrounded by Islamic monuments from the east and Khedival downtown from the west. During 1940's, Tahrir square (known in that time as al-ismaelia square) was constructed as a place to memorize Khedive Ismail. But it became more important as Tahrir Square was the focal point of political change in Egypt in the last three years through 25th January revolution and its continuous waves, plus that Garden city area constructed around the same time was initially designed to be a place for foreigner diplomats with lots of villas and circular shaped streets

Therefore, focus of this paper will be on Downtown Area highlighted, Attaba /Opera squares area highlighted in green and Tahrir/ Garden City area highlighted in blue as shown in map (2). Furthermore, Cairo overall have passed under some massive changes during the past fifty years, but specifically downtown including Tahrir square, Attaba/Opera and garden city areas has suffered from continuous deterioration of the heritage buildings and the urban form.

That deterioration of the urban form is mainly caused by absence of integrated management of the site, spread of informal markets, traffic congestion pressure and the continuous crisis of the Egyptian economy in the last 20 years.

The paper starts with explanation of used methodology, the theoretical framework followed by morphological analysis of the selected sites in Downtown Cairo area, then comparison between the urban patterns of the sites based on literature review and finally reviewing of the urban renovation projects in the area and ways to integrate between them.

Methodology

A comprehensive methodology is adopted to investigate the existing issues in the area, comparing the urban forms of the different sites leading to formulation of integrated design solutions based on existing and future urban renovation projects. The methodology is based on usage of multiple sources of evidence which are a) fieldwork- survey with different users in Attaba and Opera area including residents; b) observation of the sites current conditions; c) semi-structured interviews with officials from different agencies responsible of the area to get data and their views about the study area situation like (traffic department, antiquities council,

Cairo governorate, etc.); d) different documents from literature about Downtown Cairo development.

Putting into consideration that paper is focusing on Downtown area through reviewing of the revitalization of Khedival Cairo project made by al-ismaelia Company, as well Attaba and Opera squares as it was the study area for a design competition won by the author early 2011. However Garden city area analysis is totally based on aerial maps.



Figure 2. Map showing the case study sites. Source: Map edited by author, extracted from Google Earth (2014).

Morphological analysis of urban pattern for case study sites (Downtown, Attaba / Opera squares, Garden city)

As mentioned by Batty (2008) urban morphology is described as the patterns of urban structure based on the way activities are ordered with respect to their location, based on that definition Downtown Cairo sites with its urban systems is an interesting area for analysis. Mainly because of the different patterns that exist in these areas and how they are connected together. The analysis focus will be on a) Socio-economic changes in the sites, b) Traffic and pedestrian movements, c) Land use and urban pattern and how all of these layers effect on the urban form.

Downtown (wust el balad)

Since its establishment in the 70's of the nineteenth century by Khedive Ismail, Downtown area gained increasing importance from begin the only downtown of historical Cairo where people need to pay to cross Kasr El-Nile bridge to reach it, designed like Paris with roads and wide pedestrian walkways, to be by in the beginning of 21st century one of many downtowns in metropolitan Cairo and centre of government, trade (place of stock market) and vibrant informal markets (Jean-luc.1993).

History

The area with its 160 years history, have gone through many phases which could be explained as follows; a) Construction "attraction of uses" which was during 1870's till World War I, where the elite families and foreign diplomats owned most of the houses in the area specially after British occupation of Egypt in 1882. These foreigners and other residents try to imitate the European life style through urbanisation within the area which increased significantly between 1874 in figure (3) in comparison with status in 1896 in figure (4).



Figure 3. Downtown map in 1874.



Figure 4. Downtown map in 1896.

Second stage between 1919 till end of royal era in 1952 which could be called b) Booming stage, affected by 1919 revolution and reforms in first elected government in 1924, accessibility of the common Egyptians to the area increased as well the economic activities in Downtown, that trend continues till it reached a peak point during World War II, with European immigrating to Egypt, specially Cairo and Alexandria escaping from war, where the Egyptian Kingdom in that time was a safe paradise with stable strong economy for their businesses, where the uses enriched the urban pattern (Jean-luc.1993).

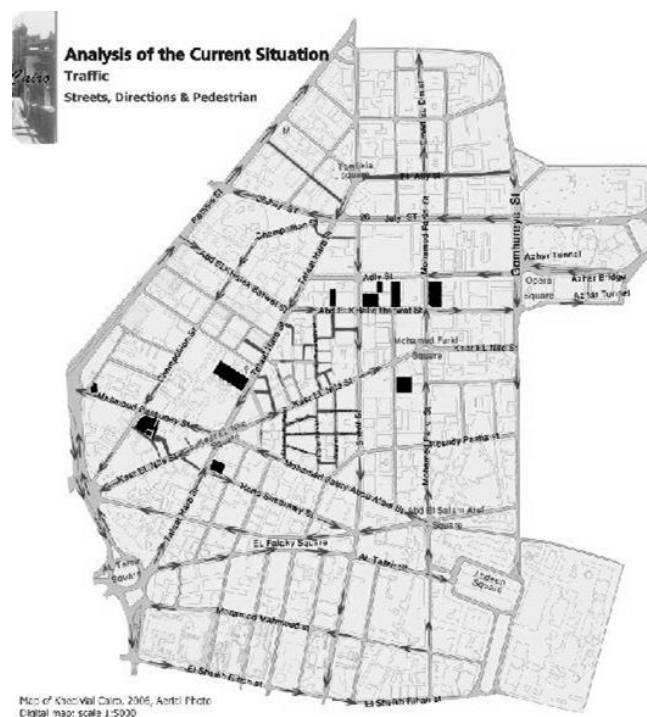
These factors plus innovation of cinema made Downtown centre of entertainment with lots of shops, cinemas and became vibrant centre of culture and shopping destination for elite after 1952 revolution against the royal family and departure of King Farouk. Downtown under revolution rule faced some major changes in its socio-economic structure of residents, where Europeans begin to leave the area and Egypt, scared from political change and socialism

Table 1. Users perception of problems and preferable solutions in Downtown area.

User category	Main problems	Needs and preferable solutions
Residents	The street vendors occupying the area, no recreational places, high traffic congestion	The restoration of historical buildings Transfer of street markets outside the area Give priority for reusing of public spaces rather than commercial activities.
Vendors and Merchants	No stable place for street vendors, negatively affecting the big stores	Design markets that have permanent place for street vendors, free the facades of the main stores from any additions or constraints.
Passengers	Crowded pedestrian ways, Street vendors destroying the pedestrian experience	Transferring street vendors outside the walkways and squares, usage of more traffic signs and renovation of historical buildings
Tourists and others	No services either in accommodation or transportation, plus no care for cultural sites.	Redesign of walkways, preservation of the cultural/ historical sites. Improving the transportation and controlling the informal markets occupying pedestrian walkways

Transportation and pedestrian movement

The traffic movement in downtown area is depending on five main routes for pedestrian and vehicular traffic and where most activities which are 26th July, AbdElkahikSarwat, TalaetHarb, Kasr El Nile, Mohamed Sabri streets highlighted in blue in figure (7). Where traffic using Downtown area to transfer from Tahrir square to Islamic Cairo, Attaba / Opera either through roads or underground metro (Zakaria, M & Institute For International Urban Development, 2010) Although of the radial grid of streets, but the rapid increase of traffic volume is obstructed by informal markets and affected the heritage buildings, which create a major traffic congestion problem.

**Figure 7. Downtown pedestrian and transportation routes map.**

Land use and urban pattern

The land uses is totally related to urban form, figure (8) show the spread of commercial uses, hotels, banks, cinemas and governmental offices around the main routes previously mentioned. It could be observed through figure (9), the main routes highlighted in blue with around 9 meters width, secondary routes in yellow with around 6 meters width and how both of them connect between main squares (red circles) and minor intersections (blue circles). This radial grid divided the area into four main precincts, with minor differences in uses, block sizes and walkways.

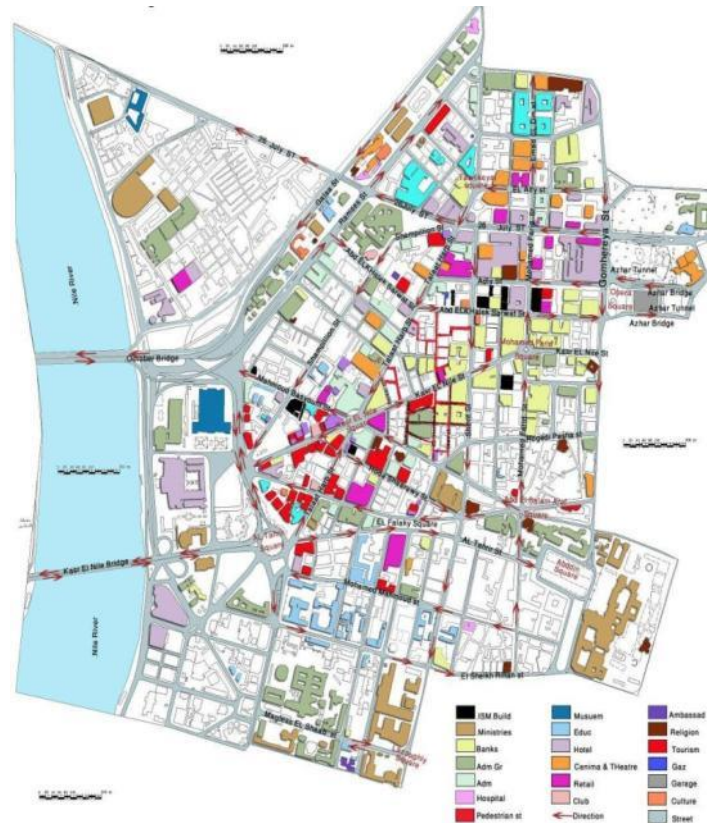


Figure 8. Map of Downtown land uses.

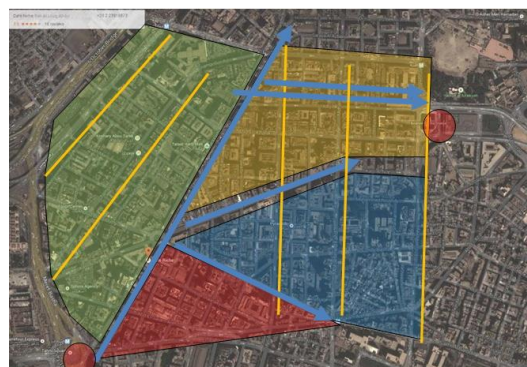


Figure 9. Map showing Downtown urban pattern.
Source: map edited by author, extracted from Google Earth (2014).

Attaba & Opera Square

History

Opera square was constructed during the khedival era where the opera house was constructed in 1869 to memorize the international ceremony of Suez Canal official opening. After a while in 1891, the square changed by transferring Ibrahim Pasha Statue from Attaba to the centre of the new square, in front of opera house to make a landmark of the square in the end of khedival Cairo. Due to the square importance, a hotel named “New hotel” was constructed in front of Azbakiyyah Garden. The square as part of down town so it develop more and more services were constructed nearby it like Attaba telephone central in 1962 and it became important culture transportation space in 1960's (El-Messri, N.,2004).

Attaba square is considered the oldest commercial square in Cairo, since establishment of Azbakiyyah area around the Baraket El-Feill (occupied the area in the Mumluk period). In the Khedive era, a palace was constructed called (Attaba El-Khadria) as a part of modernization plan for Cairo. There were two streets in 1860's one from the north of the square (Attaba Street) and one from the east (Moskhi Street), Then Abd El-Aziz street opened in 1869, followed by Mohamed Ali street in 1875, Prince Farouk (now El-Gheish street) in 1927 and lastly Al-Azhar street in 1930 (El-Messri, N.,2004).

Then the square was formed since then with its present shape, and its importance increased rapidly due to some factors, as follows: The existence of unplanned popular markets (El-Moskhi market) as a commercial potential point between El-Gheish and Moskhi streets, The square being the main centre of transportation trams in beginning of 20th century (as it was the main transportation mean that contact Cairo area with each other through Attaba central station), Destruction of Mixed Court main building which create free space for the square formation as it is now. Existence of many important culture cafes like (Mattatya, Khedive, glass...Etc) where famous great Egyptian authors and writers use it, Existence of many important buildings around the square like Fire station, Cairo Post office, parliament hotel and historical buildings between Mohamed Ali and Al-Azhar Street, existence of some culture icons like Azbakiyyah Theatre (now known as national theatre).

a) Socio-Economic conditions

The socio-economic structure of the area is totally related to the land uses and type of economic activities happening within the area. As shown in Figure 10 based on survey made by the author team, the main activities are entertainment followed by commercial and business, with variety of activities enriching the urban pattern. When related to user classification also shown in Figure 10 show that passengers and street vendors are dominating the area with conflict of interest with residents as shown in table 2 and different set of problems (Ismail, K,2012).

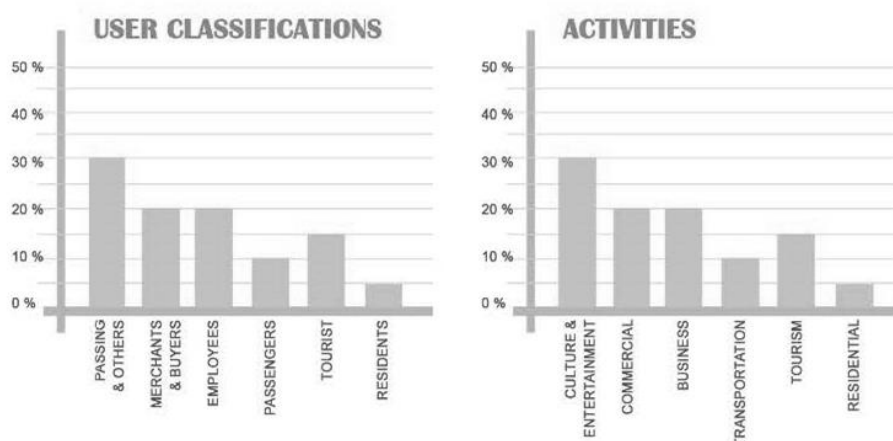


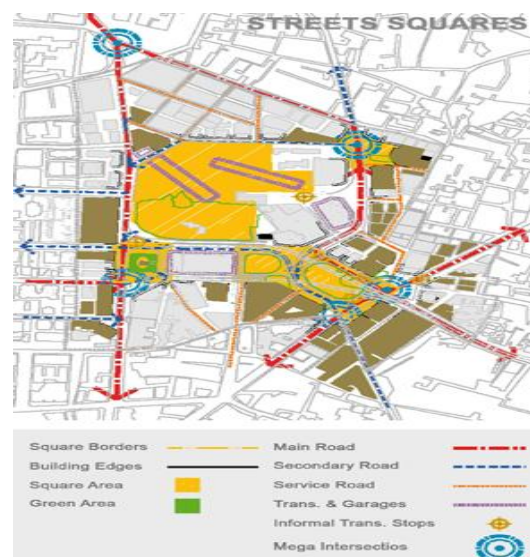
Figure 10. Showing main activities and user classifications in Attaba /Opera square area.

Table 2. Users perception of problems and preferable solutions in Attaba/ Opera squares

User category	Main problems	Needs and preferable solutions
Residents	The street vendors occupying the area, no recreational places, high traffic congestion	Restoration of houses, transferring street vendors to planned markets, and adequate transportation, reusing of public parks and design walkways.
Vendors and Merchants	No stable place for presenting goods, main stores are negatively affected by street vendors	Designed markets that have permanent place for street vendors and free the facades of the main stores from any additions or constraints
Passengers	No safe pedestrian ways and no efficient connection between different transportation means.	Designed walkways connecting between bus, metro and taxi stations in relation with Azibkyyia garden, and the two main squares
Tourists and others	No services either in accommodation or transportation, plus no care for cultural sites.	Adequate transportation services, usage of abounded hotels, improved services and re design of the cultural/ historical sites.

Transportation and pedestrian movement

The transportation congestion in the study area is clearer in points at the end of Downtown and start of Alazhar tunnel as shown in figure (11). The street network in Attaba and opera square is complex, where public, private transportation are mixed with pedestrian walkways creating high level of congestion. The transportation network include as well the underground metro station and lines, and an overfly bridge which connects downtown with Islamic Cairo.

**Figure 11. Map of Attaba/Opera transportation routes.**

Land use and urban pattern

As for land uses, as shown in figure (12), there is a mixture of commercial and residential uses. Beside those uses, there are around 15 listed buildings and cultural buildings as the national theatre; as well, two-multi story parking buildings exist instead of the burned opera house. The

Azzbakyyia park size and location create potential for development of the area to integrate between the main green space and surroundings urban blocks. The reuse of some commercial buildings for the favour of cultural aspect will regain its importance within Cairo fabric.

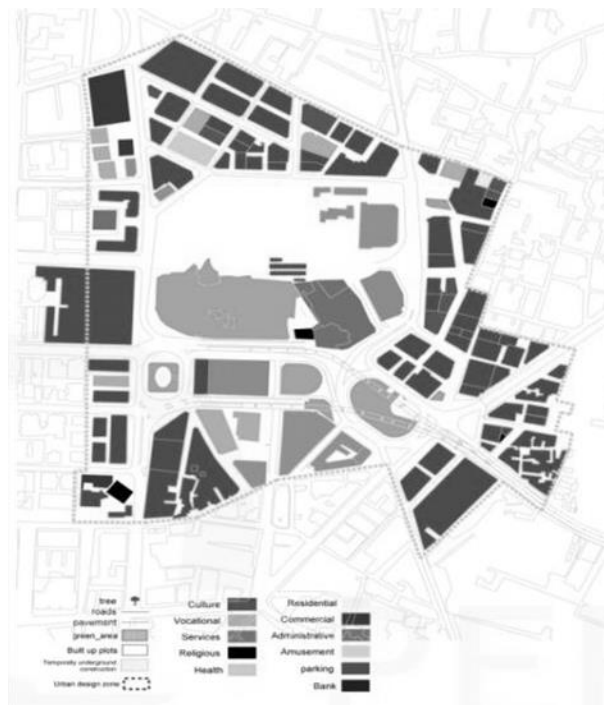


Figure 12. Map of Attaba/Opera area land uses.

As for the urban pattern as shown in map 13 the urban blocks highlighted in red around the squares still retain its original pattern. However, the rest of the area highlighted in yellow have changed to narrow width and irregular structure of streets that effect on the pedestrian experience and size of urban blocks.



Figure 13. Map showing Attaba /Opera urban pattern.
Source: Map edited by author, extracted from Google Earth (2014).

Garden City and Tahrir Square

Garden City was originally designed in 1906 like an English garden suburb to increase security and privacy for its residents. But since then Garden city area has not seen major changes in its urban structure since its establishment that is clear when comparing the urban pattern of the area

in 1904 shown in figure (14) and the current structure shown in figure (15). The circular wide streets dominate the pattern, enriching the pedestrian experience but decreasing the permeability and legibility of the area especially for external users.

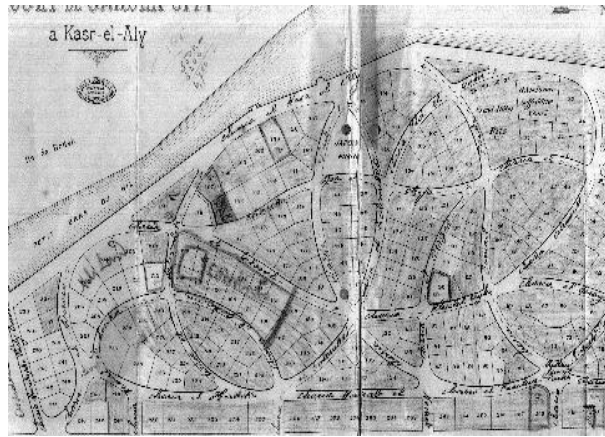


Figure 14. Map showing Garden city plan in 1904.



Figure 15. Map showing Garden city urban pattern. Source: map edited by author, extracted from Google Earth (2014).

. The location on the banks of river Nile made it place for elite Egyptian families' villas the area and for foreign embassies and diplomats due to the privacy that the urban pattern provide for the residents and amount of green space, with controlled linkage with Downtown and Tahrir square through Nile Corniche and Kasr el Nile streets (Attia, S. , 2011).

.Tahrir square in the other hand, have changes its function through its history since its establishment in end of 19th century, from being a beautiful plaza in royal Egypt as shown in figure (16) to be a vibrant public space where millions of Egyptians use as a modern (Agora) arena for political change as shown in figure (17).

.That purpose was clear in 25th January revolution were the square was a mini city within the heart of Cairo, redefining the space and usage of public places.

Comparative Study

SWOT analysis was made for the case study area which is shown in table (3); also the areas suffer from common problems which are as follows: high traffic congestion as the study area

sites are the centre of government, major trade hub and active political arena; deterioration of the urban fabric due to lack of integrated management and development pressures; increase of informal markets and uses, pollution, destruction of the historical parks and lack of green space areas; demolition of the historical listed buildings and significant cultural sites; rapid change in the socio-economic structure which reflects on the land uses and requires modification on the patterns.






Figure 16. Photo showing Tahrir square in 1940's.



Figure 17. Photo showing Tahrir square usage as a modern political agora.

Table 3. SWOT analysis of the case study areas

Area	Streets	Urban Fabric	Location	Example of the urban blocks relationship with streets (Urban Pattern)
Garden City & Tahrir Square	<p>The circular structure of the streets, decrease the permeability and legibility of the area.</p> <p>Effects negatively the accessibility of the users to some places, but allow a different pedestrian experience for users</p>	<p>The concentric grid of the area has helped to increase the privacy and development of residential activity.</p> <p>The pattern allowed spaces for wide walkways and sufficient green areas.</p>	<p>Proximity to the Nile River, as well to the governmental offices, kept the character of the area and its socio-economic structure. The current uses (embassies) have helped the isolation of the area from all surroundings.</p>	

Downtown wust el balad	<p>The linear structure of streets increases the permeability of the area and legibility of the historical buildings.</p> <p>This structure effects positively on the accessibility to/from the area, enrich pedestrian experience of the users.</p>	<p>The radial grid allows more opportunities for increase in buildings heights/ changes in uses and enriches the commercial activities.</p> <p>The design allowed space for walkways, open spaces, but less space for green areas.</p>	<p>The location as a transitional point between Tahrir square and Islamic kept the area as a vibrant downtown.</p> <p>Cinemas and uses increased rapidly the usage of the area, as well the political events happening in Egypt.</p>	
Opera & Attaba Square	<p>The irregular shape of streets decreases the permeability of the area, where urban blocks are totally irregular in shape.</p> <p>That effects on the accessibility and turned lots of the streets to informal pedestrian alleys and create lots of traffic congestion problems.</p>	<p>The irregular grid allowed the spread of informal markets and effect on the socio-economic commercial structure of the area.</p> <p>The street itself converted to be walkway with no open spaces or green areas with the urban pattern.</p>	<p>The location at the end Downtown and Islamic Cairo gives more importance to the area.</p> <p>Moskhi markets and other commercial activities, dominate the area above the cultural activities (national theatre), with lots of traffic congestion and informal markets.</p>	

b) Integrated Projects (Way Forward)

The Revitalization of Khedival Cairo

The goal of this project is to restore the cultural character of Downtown area, through restoration of the historical buildings and redesign of the walkways in the area to improve the pedestrian accessibility. These project master plan shown in figure (18), is mainly depending on turning some routes within Downtown area to be pedestrian only, improving main public spaces within the area like spaces shown in figures (19, 20) including Opera square. The project management and funding is through cooperation between private sector and governmental authorities, aiming towards the preservation of its valuable building stock and restoring its environmental quality.

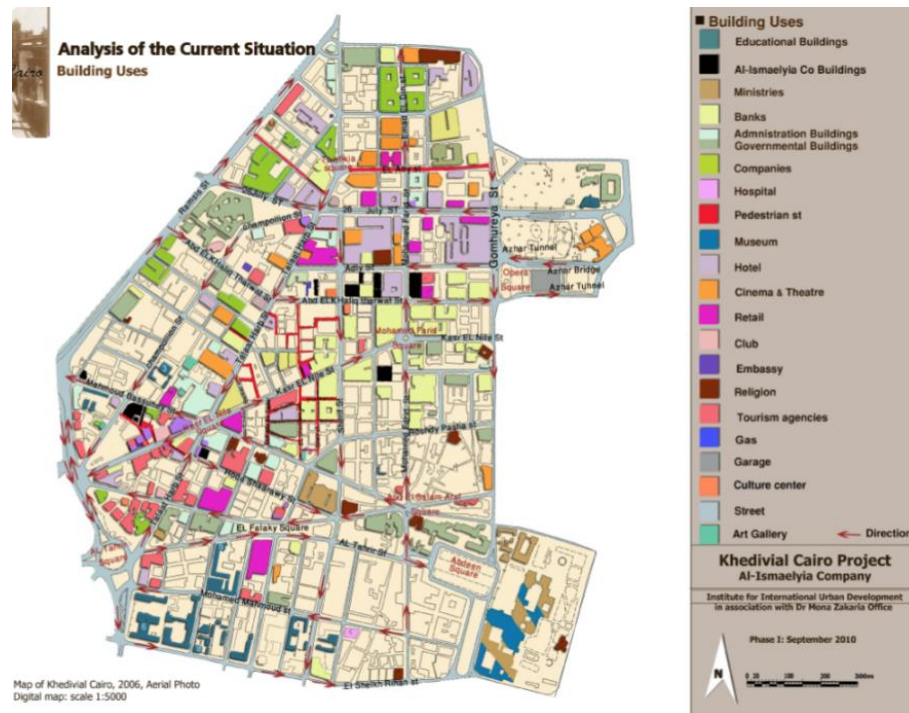


Figure 18. Master plan for revitalization of Khedival Cairo project.

The following four categories of interventions have been selected based on report by Al-Ismaelia for Real Estate Investments (Zakaria, M & Institute For International Urban Development, 2011):

1. Improving the pedestrian circulation network by- widening selected sidewalks and restoring segments of the through block pedestrian passages;
2. Preserving and restoring the facades of historic structures that have suffered from deterioration;
3. Restoring and maintaining the quality of the Area's many late nineteenth and early twentieth century landmark buildings, preservation of the urban pattern;
4. Regeneration of the area economics through presentation of the housing stock and development of the tourism activity (hotels and iconic character of the area).



Figure 19. Photos showing space in from to Cairo high court now and proposed future design.



Figure 20. Photos showing Opera square now and proposed future design.



Figure 21. Aerial perspective of proposed connection between Giza governorate and Downtown area. Source of photos (19, 21, 21) Attia, S (2011) the revitalization of Khedival Cairo, The Winning prize 2001 AC & AECOM

Attaba and Opera Squares “Heart of the Heart”

"Heart of the heart" is the proposed project theme which arises from the fact that Attaba area is considered the heart of Cairo, which is the heart of Egypt. While the main attention was to preserve the area and design the new opera house, it was more important to form an integrated sustainable vision for the area development, which includes both built environment and residents, not only preserving the past through restoration of the historical buildings, enriching the urban form and redesign the area, but also developing the quality of life for residents of the area.

As shown in figure (22), the concept is designed to address the area's problems, and that is through creation of four centres within the three main roads. The location of each centre is integrated with the uses in the surrounding areas, so the transportation centre is related to the Attaba metro station and in proximity to Ramses main train station and nearby Downtown area.

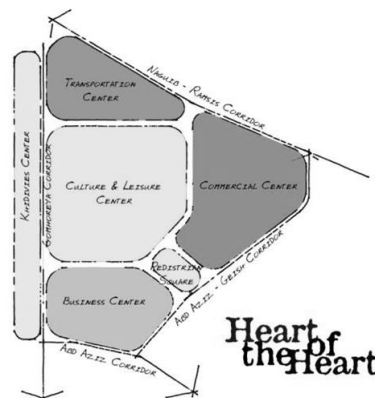


Figure 22. The project main concept.

Furthermore, the commercial centre include accommodating all street vendors using all free land and replacing deteriorated buildings in the north east point in well-designed markets to be as an extension of the Islamic Cairo markets, the business centre is considered as an extension of the business downtown area. The integrated transportation solution shown in figure (23) tries to create alternative routes for vehicular traffic outside the area.



Figure 23. Proposed integrated transportation plan.

And create two main pedestrian plazas (Opera /Attaba), the master plan shown in figure 24, clearly present the proposed development of a complex chain of regulated markets, that is through replacement and refurbishment of some ruined buildings adjacent to the area, and usage of some land-use space to create a developed market to accommodate the wholesale Moskhî market in a civilized manner that preserves the rights of these merchants (Ismail, K, 2012).

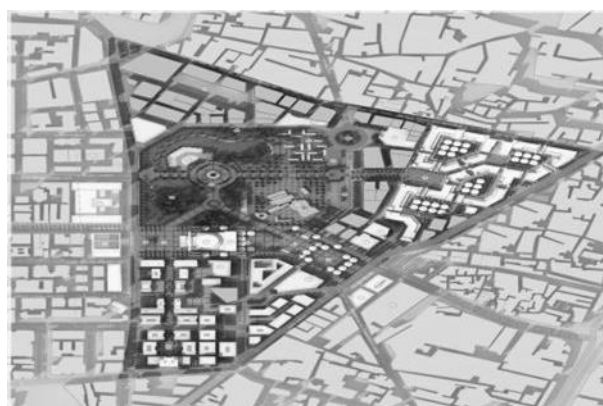


Figure 24. The project master plan.

The Azzbakyyia garden is redesigned in its original size after elimination of all buildings, all keeping the national theatre and the book market to be as a cultural park with an open space theatre in the North West side. The two squares are connected through pedestrian walkways; and the proposed urban patterns as shown in figure (25) are designed to reflect the new

character of the squares which is shown in figure (26) the aerial project perspective (Ismail, K, 2012).



Figure 25. Map showing proposed urban pattern.



Figure 26. Aerial perspective of the proposed design of Attaba/Opera square.

Tahrir square and Garden city future plans

The importance of the square have led many designers to reflect the vibrant character of the place through preserving the public open space and increase pedestrian accessibility to the area as shown in figure 27. However, some other examples focused on increasing the green space to be supporting spaces for the buildings around the square as shown in figure 28. But till now, no concrete competition or plan was made to redesign the square (ICARCH gallery, 2011).



Figure 27. Map showing proposed plan for Tahrir Square.

As for Garden city area, the unique design and existing land uses, has inspired the authorities and local non-governmental organisations to have minimal intervention in changing the area, but rather trying to preserve that unique pattern and connect it with the surrounding neighbourhoods. However, the continuously changing political situation have stooped all efforts to develop the area heritage sites, with evolving threats on the historical listed buildings (ICARCH gallery, 2011)

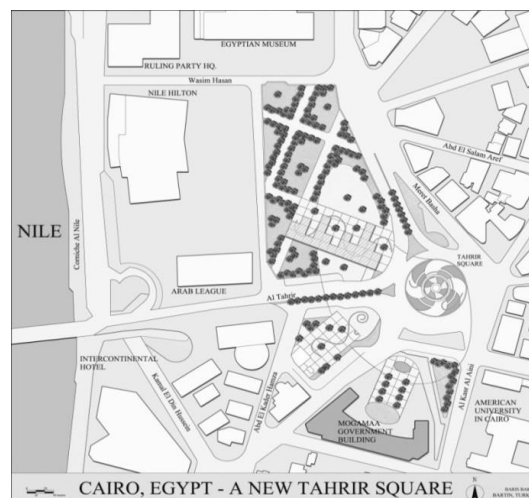


Figure 28. Another example of proposed plan for Tahrir Square.

Conclusion

The structure of downtown Cairo is really complex, populations increase, economic situation and socio-political circumstances add to that complexity. Also that urban form of these complex sites needs to be related to the socio-economic aspects of the residents, which should be included in any future integrated approach that tries to create sustainable, vibrant, and dynamic centre (heart) for the capital. Such centre that emphasis on the need of residents to a safe pedestrian environment with more efficient public transportation patterns. In the same time, the transportation main problems must be solved through elimination of the conflict points between

pedestrian and vehicle movements, integrating them instead through pedestrian pathways that are connected to public and private transportation points.

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Urban design guideline for upgrading environmental quality of Niasar; emphasis on morphological dimension

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Abstract. *Urban design is a kind of process to meliorate environmental quality and it is trying to make desirable place for people. Considering that environmental factors are not measurable directly; so, finding the quality of dimensions, it is necessary to introduce this. Therefore, in this paper firstly, using descriptive-analytical approach and documentary studies, it will provide a framework for investigating of environmental quality with their dimensions. Then, regarding to the morphological aspect is the most tangible and enduring aspect to review other dimensions such as visual, social, temporal, functional and etc, has been paid to exploring the historic city Niasar (one of the historic city of Iran) with gathering data through using observations.*

Thus, recognizing and extracting the unique features of the city texture and applying knowledge of urban design, it will be presented some guidelines to improve the environmental quality and create better place for Residents.

Key Words: *Urban design Guideline, Environmental Quality, Morphology, Niasar*

Introduction

Today, Iran's cities with inefficient and non-responsive development to the needs of contemporary people from one hand and the loss of natural identity and Organic skeleton of the city on the other hand have been lots of problem, This issue has caused to make a fundamental change in its shape and form That does not have any consistency with traditional context. Niasar city with several thousand years old which is breathing in heart of the central desert not an exception as well and requires some exploration in its original concepts and features in addition to meet the quality requirements of modern city.

According to the urban designing purpose which is promoting environmental desirable qualities, "urban design guidelines", introduced as a proper tool to guide the development in these textures. Designing guideline is an accurate guidance document that determines the way on implementation of development program vastly according to the urban strategies of local authorities or other related organizations and most of the time attention to preserve the local distinctiveness" (CABE 2000); Therefore, it is necessary to take an appropriate approach to formulate. Hence, the current article is going to investigate the existing documents related to the issue and has been extracted the effective factors in urban morphology from commentator's point of view through the library based study by the assumption that one of the designer's techniques for identifying the unique characteristics of every city's texture is its morphological analysis to gain the proper pattern for morphological analysis of Niasar and in continue will identify the urban Insufficiency by field impressions and observations made in the city and finally take a small step to improve the of urban desirable quality with offering Urban Design Guidelines.

Urban Design; Meanings, Its Quality & opinions

Urban design is a relatively new term that during recent years has passed various approaches from birth to maturity. The evolution in provided definitions of urban design during last four decades shows that (Table 1) in earl of 20th century, theorists of this profession, considered more the aesthetic aspects and the area appearances of urban and usually, and frequently the processes leading to the production of urban areas were ignored.

Table 1. Some definitions of urban design (source: the authors)

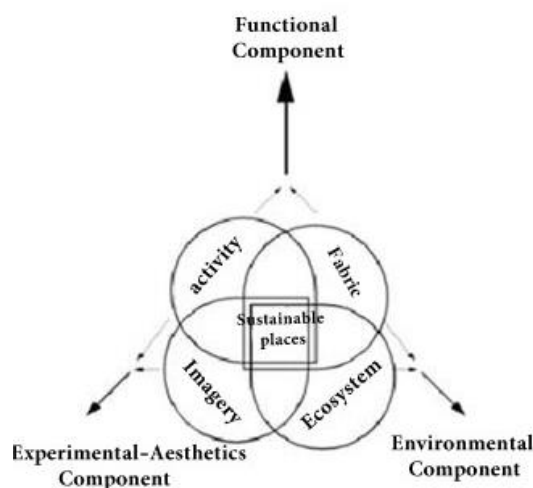
Theorists	Definition of urban design
Gutheim 1963	Urban design is part of urban planning dealing with the aesthetics and determines the order and form of urban.
Lynch 1974	The main objective of urban design, to improve the quality of the physical environment of people and then people's quality of life through it
Michael Southworth 1989	Urban design is a tool for "environmental quality management". Although comprehensive plans and land use plans are an important part of urban planning but without a strong urban design, there is no guarantee that land use plan be able to maintain or improve environmental quality.
Calthorpe 1993	Urban design is something beyond mere aesthetics of the urban environment or artistic establishment of its elements. Urban design deals with creating and maintaining urban places in which the response to ecological issues, economic prosperity and social life are combined in an appropriate manner.
Jon Lang 1994	Urban design is a complicated art, since should simultaneously seek to achieve a set of goals, from providing shelter for activities to create a sense of place, technological enhancement of the built environment, health of financial and biological environment. Hence urban design as the art of creating relationships between elements of the set, is the concern for several professions

From the 70s of A.D onwards, theorists such as Jan Gehl (1971, pp.143-146), by adding the concept of activity to definitions of urban design introduced place as the common factor in all essential activities, community and voluntary. Gehl believed that most of activities other than necessary activities are accomplished only when an appropriate area is provided for them. Based on this view, quality of place plays an important role. This attitude has led to the emergence of a concept under the title of public realm in urban design: which brought place-making approach. This approach seeks to promote more the sustainability of public places with a certain identity, in accordance with the needs and desires of human and social activities in local communities, poses "Quality" as one of the core concepts of urban design. In other word, nowadays the ultimate goal of urban design is to improve environmental qualities, and what leads to achievement is comprehensive understanding of the qualities depend on good urban design which in most urban contexts have been analyzed (Table 2).

Since the quality design of a place, is inevitable about responding to various dimension of that place, it's possible to define the constructive components of quality parallel to the constructive Component of place. So by using the model of sustainable place (Golkar, 2000) that is derived from place model of Punter, Constructive components of urban designing qualities are set in three groups of Functional Experimental-aesthetic and environmental. Therefore, qualities associated with each contrastive components of place can be stated briefly according to the table 3-

Table 2. Good urban design qualities (source: the authors)

Connoisseurs	Qualities of good Urban Design
Lynch	Vitality - Meaning - Compliance - Access - Control
Bentley	Permeability - Variety - Legibility - Flexibility - Visual adaptability - Perceptual richness - Personalization - Energy - Ecosystem
Jacobs	Mixed use - Permeability - flexibility.
Appleyard	Life capability - identity - access to opportunities, imagination and enjoyment - Meaning and authenticity - Social and public life - inclusiveness
Tibbalds	Use and social mixing - human scale - Pedestrian-oriented - legibility - adaptability - visual pleasure
Trancik	Communication - restriction - Edge continuity - axis control - spatial Communication
CABE	Personality - cohesion - restriction - Ease of movement - legibility - adaptability - Variety

**Figure 1. Components of a place making (source: Golkar, 2000).****Table 3. Effective qualities in introduced components (source: the authors).**

Type of place components	Environmental qualities
Environmental component	Compatibility with nature
	Safety
	The environment cleanliness
	Energy Efficiency
Experimental – aesthetic component	Readability
	Visual proportions
	Sensory richness
	Identity and sense of place
Functional component	Belonging color
	Permeability
	Variety
	Inclusiveness
	Climatic comfort
	Safety
	Adaptability
	Flexibility

Principles of urban morphology, opinions and elements

Urban morphology includes variety of definitions such as urban design. For instance, MadaniPour introduce urban morphology as a systematic study of form, shape, map, structure and functions of artifact context of the cities, the origin and mode of evolution of these contexts over time; while according to Hillier, urban morphology is the study of social forms that have been developed in the physical layer of a city or conversely, on how the physical form produce or reproduce social forms (Hillier, 1985). In fact, although urban morphology is focused on the study of city as a physical environment, but also implicitly establishes a link between spatial and material elements of the city and social and economic forces which shapes it (Moudon, 2000). Understanding the Importance of urban morphology for city designers aid them to acquire knowledge and to recognize local patterns of development and the process of change (Carmona, 2003).

Although there are different approaches in relation to the study of urban form, but two main approaches can be introduced in the field of urban geography and architecture. Hence, in order to develop a comprehensive framework to study Niasar urban form, the ideas of theorists in the field of geography from the viewpoint of Conzen, Caniggia, Kropf are examined, and then we examine field of urban architecture from the perspective of Sitte and Moughtin, cullen, Colin Rowe, Transic and Lynch.

Conzen point of view

Morphology of the German school as an organized field in geography began to get formed, and developed by Conzen theories; he sought to explain the current structure of a city with its historical development, he expressed urban form in three aspects of city map, city context and land use (conzen, 1960). According to his view with the growth of the city, blocks and lands patterns, through building accumulation, setbacks of buildings and transformation of land parts pattern change adaptively and increasingly. Thus, he considers a morphologic period as a representation of a stage in city development that creates distinct forms with social-economical needs of society for cultural vision. From this perspective, he categorized morphologic areas into three groups of organic morphologic, morphology of interventions and morphologies in transition.

Caniggia point of view

Italian school of urban morphology which has founded since 1950 by Muratori, and continued by Caniggia with the aim of understanding the built form through the study of historical processes (Koster, 2001). According to him, a kind is recognized by specific morphologic combinations that rule internal organizing and its relations with structures and nearby spaces. In other words, type of usage has not any effect on kind and typology is determined in a specific scale by the features of elements belonged to smaller scale which exist in the same environment. Therefore, for each period of expansion of the city, there is a kind of base housing unit which represents culture, religion, law, technology and economic status of the time period (Mir Moqtadaei, 2006).

Karl Kropf point of view

Karl Kropf, made relation between the concept of Conzen urban morphology with city context of Italian school and expressed the concept of urban form in seven levels including 1-whole city 2-urban parts (blocks and streets) 3-pieces; 4-buildings; 5-rooms and spaces; 6-building's structure such as walls and roofs; 7-raw and construction materials. From this perspective, describing a context with all its details is meant to describe its components and how they are

organizing and the features are used to describe such components are: position, outline and its internal arrangement.

Sitte and Moughtin point of view

Sitte and Moughtin perspective in relation to the study of urban form is aesthetic. They believe in intuitive analysis method and the relationships based on the walking observer for the urban form (Collins, 1986). For this reason, Sitte have studied the characterization of the old cities of Europe Aesthetics emphasizing the importance of public green spaces, squares and streets in the form of a city (Tavalaee, 2000). For this reason, they study the squares by checking the relation between square with buildings and monuments, considering the openness of square, surrounded space, size and form of square and spatial relations of the squares; and consider the streets by analysis of proportionality between the length and width of the street, constituent structures of the body of the street, perspective and how to end street to Monuments. Also about green places he considers decorative plants in order to study the rate of creating pleasant and favorable contrast between artificial arts and freedom nature form (Tavalaee, 2000). Also Moughtin classified based on the ideas of Camillo sitte of streets, boulevards, squares and public parks with and the defining features of the in public domains, and also for analysis of urban aesthetics he listed their discipline, unity, harmony, balance, symmetry, scale, appropriateness, rhythm, contrast and harmony.

Cullen point of view

Cullen knows the possibility of surveying the form of a city through discovering the relations and arrangements of the elements. According to him, space in plan and section contains different senses; in fact, he believes urban landscape as an integral element of the study, and for this reason, he introduced three factors of optics (Serial vision), Place (the reaction of individual towards situations like near/far, here/there and ...) and Content (Color, context, type and ...). According to Gosling, Cullen's idea regarding to changing of the centrality of the histrionics into concentration on the common observer and his findings from environment, he added some words to design the concepts such as wall face, street face and floor face (Gosling, 1996). Pakzad considers Cullen, coherence, being trapped, identity, balance, unity, visibility, confidence, complexity, connectivity, proximity, memorabilia, openness, Adornment and incitement to explore as the features of favorable urban form (Pakzad, 2007). Bentley believes that Cullen considers the appropriateness of relative isolation by a subtle expression, and tries by designing of a visual structure to give clarity and character to the city. In a simple conclusion, according to Cullen view, the main function of city is social unity; Based on this, city should be open and accessible for public and this is possible only through linking significant and population attractive points, maintaining important element and attractive views, keeping hierarchy between old and new, public and private domain, by constructing family of buildings and places.

Colin Rowe point of view

Another key tool for analysis of city form is figure-ground diagram, which Cullen was one of its first fans (Zekavat and Farshad, 2011). In an urban environment, buildings form the shape and environment forms the ground. Urban areas come to eye when their surroundings were surrounded by joint or nearby buildings. If the distance between buildings become more the buildings will be departed; in this view, it is not possible to create a positive phase, and the relation between figure and ground disappears. To avoid such a thing, the buildings and areas should have equal value in urban studies and the quarrel between piles and areas or form-floor turn into cohesion, coexistence and complementarity in urban design (Zekavat and Farshad, 2011)

Roger Trancik point of view

Trancik perspective about the way of city investigation and its physical intervention comprises three Major theories:

1- Figure-ground theory that it related to two-dimensional Analysis of plan and consider six types of grid, angular, curvilinear, Curvilinear, Radial Concentric, Axial and organic for relation of Mass - Space in Traditional city.(Golkar, 2009)

2- Linkage theory that discuss about linking lines Connection Including sidewalks, open linear spaces and ...; and indicate 3 general form of compositional, mega, and group form for Spatial relationships of urban elements.

3- Place theory which is based on understanding of Cultural and human characteristics of physical space.

Lynch and Radwin point of view

Lynch assumes the Figure of the City as a text that must be able to read it or return the readability to it. He introduced six criteria of types and species the elements, quantity of elements, density, texture, central structures and overall distribution of space with Radwin in 1958 to collect and analysis of city form.

Proposed framework of the research

As it mentioned before, the main goal of urban planning is improving the environmental qualities through the constructive dimension of place. According to the issue these mentioned has been investigated in urban morphological studies with different excretion ,it can be claimed that, morphology as the most tangible and enduring aspects, provides the possibility of adopting coherent approach to identify the unique characteristics of environment and using them in creating better places for people.

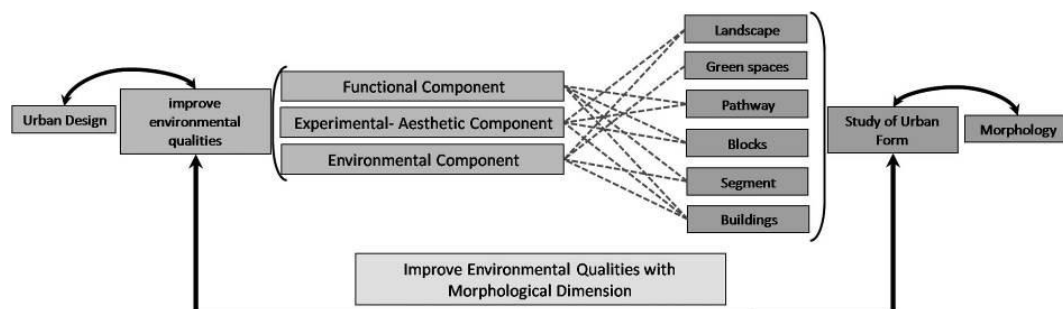


Figure 2. The relationship of urban morphology and urban planning (source: the authors).

So, this paper studies the city in three scales of macro, middle and micro by urban morphological technique in a way that is coming continue:

A: Macro scale

This level by investigation of urban background in three section of back ground, middle ground and fore ground has studied the Spatial arrangement and interactions of natural and artificial environments and tries to determine the mode of changing the morphologic areas in addition to the identifying the morphological areas by study of main structure and the way of urban development in different eras.

B: middle scale

In this level, studying super-blocks that are made by segmentation of city's body by main streets is taking to consideration. To this, after classification of super-blocks based on their shape, morphological areas and major applicability of their manufacture, the study about the way of super-block's connection, morphology of the most important remained public spaces and the amount of influences of each one.

In fact, this level of studies is sealing with finding responses to qualities like Legibility of environment (by examining the basic structure of the city and placement of key elements), permeability and security through the exploration of the super-blocks, the number of domestic routes), Variety (distribution of land uses), local identity and harmony with nature (through checking the super block shapes and how they interact with their natural substrate).

C: Micro scale

This step of studies is dealing with block's morphology in their pathways, pattern's parts and location of establishment. So, by the studying, the way of combination of mass and space in each urban block, Shape of the Surrounding passages, Pattern of each block's constructive parts, trend of change and the extent of its comp ability with the place of establishment, passages and open space, safety of environment will be investigated; and in the next steps, by evaluating the block's dimension, existence of visual indicators or activities or variety of uses on that, qualities such permeability, legibility and Variety will be study. In a step, by evaluating the place of establishment in pieces and used materials in construction's pattern and qualities like climate comfortably, local identity and ecological compatibility will be study.

Morphological study of Niasar

According to what brought in previous, the morphological study of Niasar has been done in three parts. But from the limitation of writing on one hand, and because of the paper's emphasize on improving the public arena's quality on the other hand, two Scales of macro and middle will be analyzed in this part.

Macro-scale

Niasar is located in Isfahan Province and The western part of Kashan and has been formed completely affected by natural substrate.

As is evident in the pictures below it can be say that the physics of this city is ended to mountain and from the other direction is ended to gardens and Plains.

Therefore, the main structure of the city can be divided into two natural and artificial parts in which Mountains, gardens, waterfalls and surrounded greenery spaces, the main elements of natural structure, and two north-south streets of Valiasr and Montazeri, 10 Existing districts with Chaleqab tower, the holy area of Chartaghi, Safaviyeh Kooshk, and collection of halls form the main elements of artificial structure of city.

Evaluating the map of historical evolution of the city shows that, it started to shape into two waterfalls as Confluence of natural and man-made environment in North-South slope. So, many religious signs and symbols constructed on the top of the waterfall and dominant morphological is organic. Gradually, by new developments and expansion of the city morphology of intervention have emerged and change the form of the development of the city from central to linear form. The southern and north-eastern part of the city in new areas transitional morphology has begun to appear. This significant cause uneven distribution of mass

construction and gradually will take out the shape of the city from the visual and functional balance.

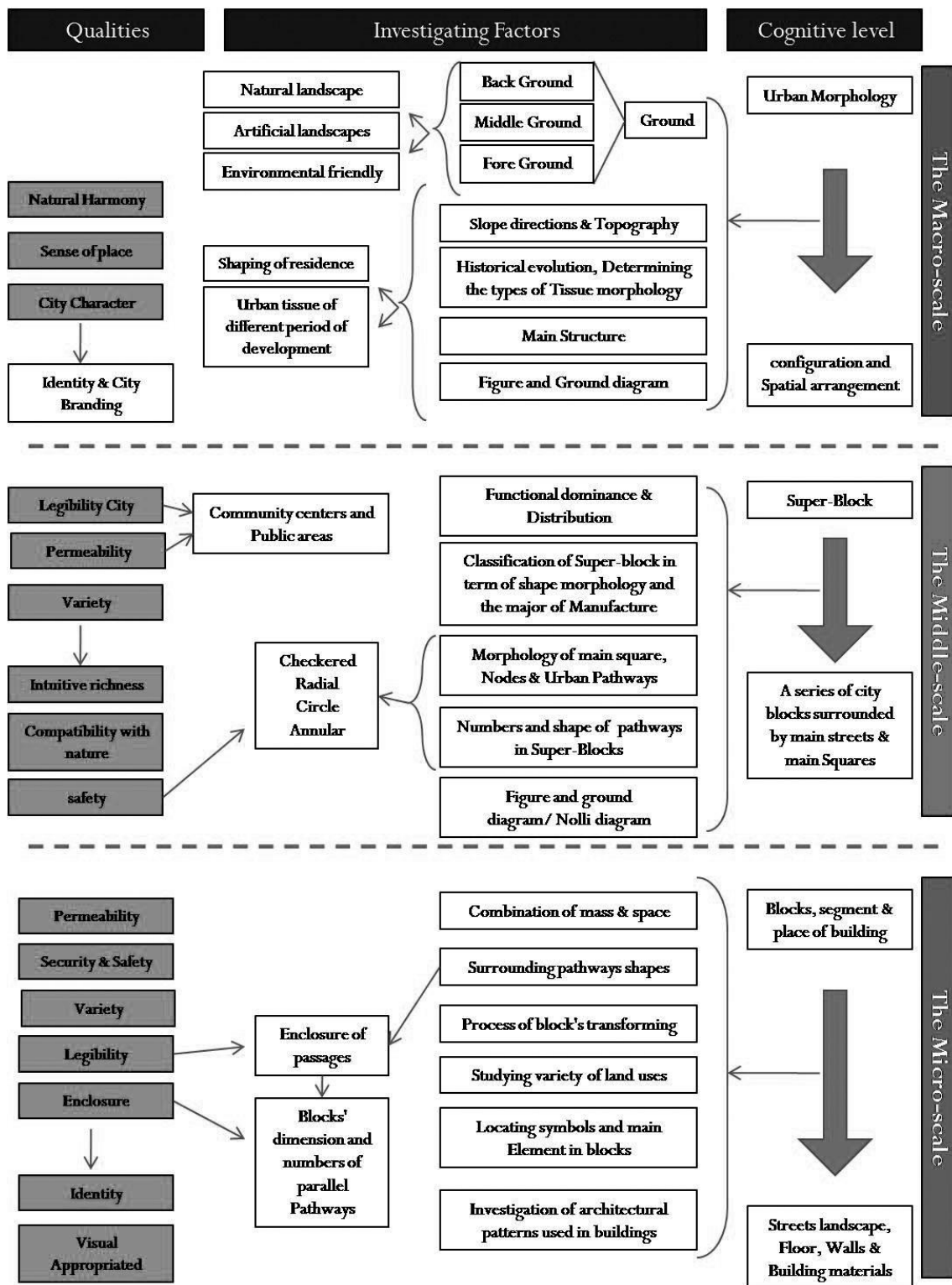


Figure 3. Final pattern of urban morphological analysis (source: the authors).



Figure 4. Geographical location of Niasar.

Location of strategic view



Figure 5. The investigation of urban ground in macro-scale (source: the authors).



Figure 6. The main structure of the city, mixing nature and man-made (source: the authors).

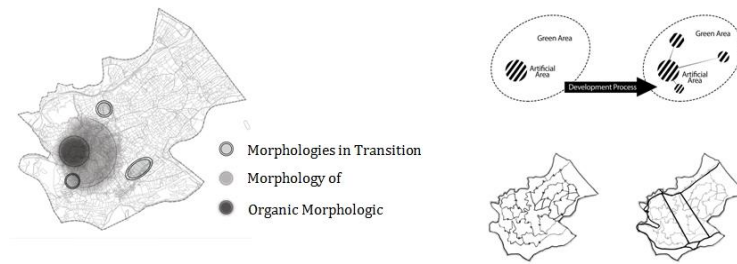


Figure 7. Form of urban development

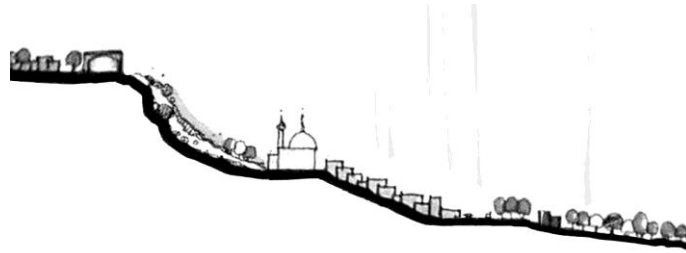


Figure 8. Accumulations of urban indicators in heights (source: the authors).

The middle scale

As mentioned earlier, the main elements which are analyzed in this section include:

- Urban super-blocks that are made by main pathways and old pathways of city as well (discriminant gardens of green area that change their essence to the main streets in development process.
- Squares and Nodes that have been created in interaction with main streets

As it's shown in following maps, the structure of main pathways of Niasar has been made by a three parallel streets, that their morphology is different from pattern of organic pathways within super-blocks. Mentioned passageways divided city to main super-block that characteristic of each of them has been given in following table separately.

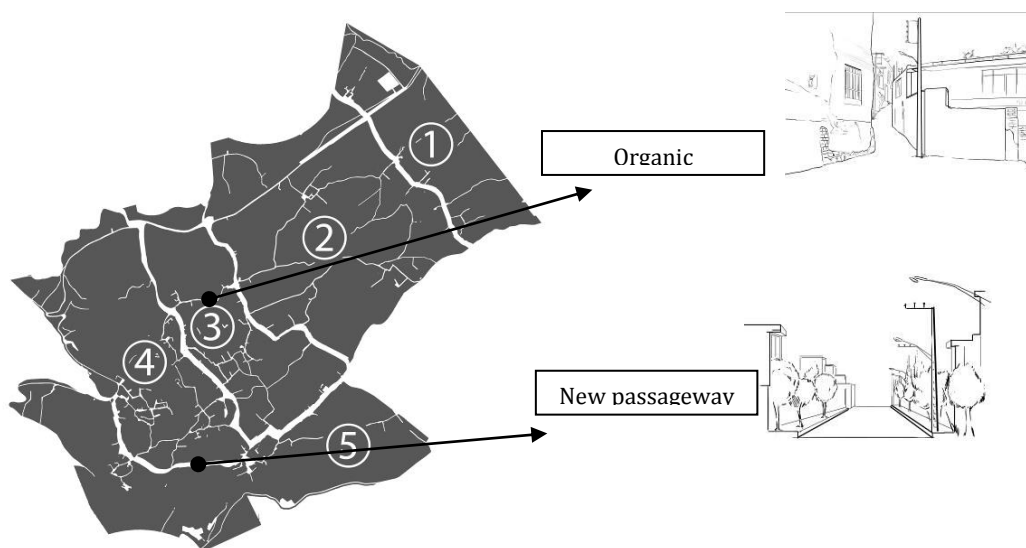









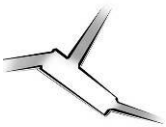
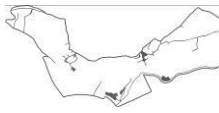


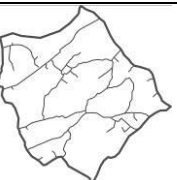

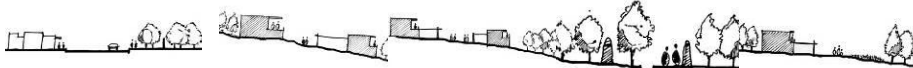


Figure 9. Formation of super-blocks and Morphology of their pathways (source: the authors).

Table 4. Investigating the morphological of super-block and their qualities (source: the authors)

		Block number				
		5	4	3	2	1
Super block form		Geometric regular	Geometric Irregular	Geometric regular	Geometric regular	Geometric regular
Blocks form		Irregular	Irregular	Irregular	Irregular	Regular
Number of Block		6	10	12	11	5
Super block dimension (meter)		450*2400	800*1700	500*1000	1270*1460	460*1460
Dominant uses		Agriculture residential	Commercial – residential	Agriculture	Agriculture	Agriculture
Figure and ground diagram for each Super-block						
Morphology of most of the squares						
Pathways' Morphology		Curvilinear	Organic	Organic	Curvilinear	Axial
						
Level of responses the environmental qualities						
	legibility	average	Good	Good	Weak	Weak
	Permeability	Weak	Good	Good	Weak	Weak
	Functional Variety	average	Good	Good	Weak	Weak
	Intuitive richness	Weak	Good	Good	average	average
	Compatibility with nature	Weak	average	average	average	average
	Safety	Weak	Good	Good	Weak	average

Conclusions & providing urban design guidelines

According to what has been mentioned above, with change in the form of super blocks during development of Niasar city, and consequently with change in the quantity and form of blocks and their internal routs, their environmental qualities have been changed. Therefore, to analyze the form of the city based on the provided model, it is proposed that future developments to promote environmental qualities should be implemented based on the compatible forms and ground. So, morphologic oriented urban design guidelines should be done with respect to the following table.

At the end, in order to get sustainable place through increase in the environmental qualities, all of the urban dimensions should be analyzed; and Morphology as the main aspect in sustainable analysis is the beginning of this process.

Table 5. Providing morphological Urban Design Guidelines for Niasar (source: the authors)

Scale	Purpose	Objectives	Guidelines	Morphological Factors	Qualities
Macro Scale	Sustainability based on the preservation of urban historical and natural character	- Preservation of natural features and strengthening their impact on the physical structure of the city - To regulate the spatial structure	Using natural slope of the ground for surface water's disposal.	Slope direction & Topography	Natural harmony
			Shaping blocks according to micro-climate, wind, and Penetration level of sun and ground's feature.	Ground	Natural harmony
			Use of local and ecological materials resistant to rainfall and radiation	Environmental friendly	Natural harmony
			Avoiding checkered segmentation, attention to ground's pattern and existing natural complications	Main Structure	City character and Identity
			New construction should be guided in ways that prevents the creation of formless spaces, incomprehensible, without specific form and edges in remaining space,	Figure and ground diagram	Sense of Place
			Maintaining and strengthening memorable agents such as paths, buildings, squares	Main Structure	Identity
			Avoid excessive physical development of urban green zones	Ground	City character Natural harmony

Middle Scale	Continuing of vitality and social life		Creating cultural – athletic center in functional section of the city and neighbors	Functional dominance and distribution	Variety and Safety and legibility
			In new developments must be avoided to creating the deadlock that makes the Communication systems introverted	Figure ground diagram and	Safety and permeability
		- Increase the participating and encouraging the pedestrian-oriented texture.	Create various blocks into the internal development in order to create different types of buildings and their uses	Classification of block in term of shape the major of manufacture	Variety and legibility
			Prediction of pause spaces ,and gathering for promoting social interactions	Morphology of main square, nodes and pathways	Safety and Variety
		- Conversion of the main backbone of the neighborhoods to the space of services appropriate with local needs.	Considering the form of spaces to create enclosure, with clear and defined edges that are imaginable.	Figure ground diagram and	Legibility
			Predicting active uses at night	Functional dominance and distribution	Safety and Variety
			Strengthening the relationship between the center's activities.	Functional dominance and distribution	Safety and legibility
			Predicting spaces with mixed uses.	Functional dominance and distribution	Variety and legibility
		- Enhance the safety, security and	Removing the far nooks and corners	Figure ground diagram and	Safety
		Life quality improvement			

discipline in public field.	Considering hierarchy of the public to personal arena because of their importance in creating safety and security and increasing individuals participation in community	Morphology of main square, nodes and pathways	Safety
- promote Legibility of the environment to improve the sense of place and vitality in	Applying indirect and organic forms in semi-privates paths accordance with the characteristics of the ground causing limited entering the strangers into the places	Morphology of main square, nodes and pathways	Intuitive richness
	That better mass using in edge of entries be in a manner that contributes to caret the gateway patterns and makes privacy for semi-private arenas with special identity	Figure and ground diagram	Safety and legibility
	establishment of physical Signs and strengthening existing signs	Functional dominance and distribution	legibility
	Maintaining and improving the strategic vision of public aspects to existing signs in texture.	Morphology pathways and Figure and ground diagram	Legibility and permeability
	establishment of physical indicators in twisting place of texture's organic passes and introducing the movement's direction and vision expansion in them	Morphology of main square, nodes and pathways	Legibility
	The combination of occupied and empty spaces done in a way that can create the spatial sequence and enclosure	Figure and ground diagram	Variety and Legibility

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Urban morphology of historic fabrics and contemporary architectural design

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Abstract. *The problem of the revitalization of small historical centers in the Lazio region is highly topical and requires urgent interventions. These new centers are undergoing a rapid transformation due to the change of functions in buildings and to a new social composition of the population. We should read carefully their urban fabric and built structures to actively protect their historical heritage and to design the indispensable architectural transformation. We need a method to read and design historical fabric transformation, ensuring across time transformations "congruent" with their formative process, also accepting the incontrovertible fact that an urban organism, like any living organism, is subject to continuous modifications. In Lazio these changes have, within certain limits, common characters in different centers that allow an intervention method for some aspects generalizable. Action is needed to update the existing built landscape in order to continue it in a historically coherent form. The proposed paper deals with the study and application of a method of reading and designing the historical built landscape based on the notions of urban organism and on the typological process applied to the historical centers of small towns in Lazio.*

Key Words: urban-morphology, architecture, urban-design, historical fabric

My intention is to propose some considerations about a method of reading and designing architecture developed by Roman School of Architecture and the way we are trying to update this method in designing interventions for the revitalization of small historical centers in the Lazio region, a highly topical problem which requires urgent interventions based on scientific methods of analysis and design.

First of all I will propose a synthesis of the theoretical principles, then I will present some examples of application of the method to architectural design in the Lazio region, conducted with Alessandro Camiz and Paolo Carlotti, considering, in particular, some exemplary case studies as Pisoniano, Bellegra, San Vito Romano.

The method of design used in the research is based on the principles developed by Gianfranco Caniggia, but belong, in general, to the architectural tradition of studies on the architectural organism began in the School of Architecture of Rome, between the two wars and continued after the war by Saverio Muratori.

The work of Gianfranco Caniggia, as a scholar and architect, must in fact be studied inside the general background of continuity with his own cultural area, whose heritage was driven by Saverio Muratori, who has had a fundamental role in the formation of Caniggia's thinking.

I will try to develop some reflections about Roman School heritage starting from didactic experiments conducted between the two wars, based on history's new centrality in built environment interpretation and on the architectural "redesign" as a tool to transmit the notion of organism intended as an "integrated, self-sufficient correlation of complementary elements expressing a unitary aim".²⁸⁸

This didactic system was boosted by *Monumental Restoration* teaching, imparted by Sebastiano Locati during the first year of the *Regia Scuola di Architettura* in via Ripetta in 1920-21, before it became a university faculty.

²⁸⁸ G.Caniggia, G.L.Maffei, *Composizione architettonica e tipologia edilizia 1. Lettura dell'edilizia di base*, Venice 1979, page 47.

This teacher played a significant role in linking up roman didactic with Lombard research of Camillo Boito. Trained at the Brera Academy and then at the Milan Polytechnic School and an authority on Roman monuments, Locati proposed restoration based on rules analogically derived from a stylistic comparison between synchronic works.

Restoration was considered as the synthesis of all architectural disciplines.

For that reason, restoration was not just intended as study and preservation of the document's historic and artistic aspects but also as simply a design operation which, like all design, is a critical modification of the built environment.

This teaching was then taken over, in the new Roman School of Architecture, by the dean Gustavo Giovannoni for twenty years, testifying the discipline's founding role in the Roman school's more general didactic design context.

For Giovannoni, teaching restoration of the work's original organicity by reading typical transformations, was actually a tool towards comprehending the forming processes of architectural organisms and architectural design.

In fact, this teaching was imparted not only through institutional courses on *History of Architecture* but also through a real "didactic organism" inevitably joint with courses such as *Stylistic and Structural characters of Monuments*, imparted for many years by Guglielmo De Angelis D'Ossat as from 1937, in the conviction that restoration possesses a critical and, all round, design matter.

Much has been written during the post-war period about the conservative positions of this School, generally considered "academic" in its meaning of pedantic submission to traditional design rules.

In fact professors as Gustavo Giovannoni, Vincenzo Fasolo, Arnaldo Foschini and Giovan Battista Milani (professor at the Engineer School of Rome University) were perfectly conscious of the recent conditions induced by modernity. Yet, as all classic thinker, they interpreted modernity as a loss of rules and fragmentation of the basic unity of knowledge.

They were fully aware of the true conditions of the modern crisis and, also, how it was impossible to repeat the archaic unity of things that had enabled building cycles, decadence and regeneration of forms.

They also knew that the world required new answers to new, complex problems.

Yet they did not agree, and this is where they differ from the Modern Movement's pioneers and their followers, on the faithful adaptation to new myths and on the irreversibility in the loss of every shared and authentic language.

They do not interpreted the built environment as it appears but, according to their own design ethics, making interpretation converge with a transformation hypothesis.

Giovannoni's intuitions, Muratori's major territorial visions and Caniggia's reading of the organic transformation of urban fabric are *interpretation that not only imply design but are, themselves, design*.

Totally perceiving how contemporary architecture cannot be condensed in a single corpus of design theories, Giovannoni (as far back as the Thirties) sustained the existence of numerous, contradictory forms of modernity.

He posed the question of the arising conflict between analytical-technical and intuitive-artistic components in architectural design and in its consequences: the contradictory relationship between structural systems, construction and architectural form.

Giovannoni blamed the split between architectural "imagination" and "construction" as the very origin of the dissolution of the "principle of truth" that has always been, during the course of history, one of the ethical rules that architects were called to obey.

Giovannoni did not reduce the "principle of truth" to a simple cause-effect relationship between structural solutions and spatial pattern.

In fact, he individuated the dividing of the original design unity into various, specialized aspects of modern architectural thought.

A "positivist" line of thinking, a second set of theories actually linked more to physiology than to reason, a third group of theories based on the modern expressionist interpretation of

architecture, derived from studies on the use of psychology in interpreting artistic work, as in Wölfflin, a fourth group of theories of those who derived directly architectural forms from the environment, simplified in the internationalism-localism combination.

Giovannoni condemned all those trends as the lack of a general shared order that could freed design from the volatility of fashions and from extemporary invention.

Anyway, at the same time, Giovannoni admitted how the Modern Movement theoretical innovations, although with unexpected results, were at least an attempt to overcome the late 19th century eclectic drift.

Contrary to a superficial historiography that separated academics from innovators, Giovannoni's critics to modernity was perfectly updated and fruitful, consciously integrated in the contemporary debate.

Starting from his initial studies during the forties, Saverio Muratori's thinking seems to extensively resume and develop certain issues raised by Giovannoni, by basically including modernism among eclecticismisms that had lost the order governing the unitary formation of architectural organisms.

In his *Storia e critica dell'architettura contemporanea* (1944) Muratori also reconsider, more generally, the linguistic fragmentation that preceded the first world war as the origin of the crisis in modern language.

This phase was an ambiguous passage in the history of architecture; disbelieving linguistic unity, it ended up by being an "anti-stylistic" period".

Gianfranco Caniggia, disciple of Muratori, also accepted the basic historic need for the Modern Movement. The Modern Movement was however mainly accused of not having considered the real *forming processes* and, therefore, of professing aestheticism and being individualistic.

Caniggia developed, innovated and systematized Muratori's heritage by introducing the issue of not only comprehending monument's language but also basic building (the "dialect" of simple houses) to such an extent that he almost founded a new discipline.

The method of redesigning architectural process proposed at Caniggia's courses (in Genoa, Florence and Rome) inherited, updated and upgraded the built landscape.

It was a way: i) to read buildings and fabrics; ii) to understand their forming processes; iii) to continue them through the project.

Therefore *the architectural design is the continuation of a never ending process*.

Developed through fundamental experiments conducted at courses held by Muratori in Rome as from the 1961-62 academic year on redesign of historic fabrics such as Tor di Nona but also on contemporary fabrics like Centocelle, the experiments proposed by Caniggia tended to approach, through successive approximations, the real built environment process through interpretation.

This interpretation that gave rise to a design method which, directly derived from the built environment, avoided the shortcomings and risks of the ideology that largely contributed to the disaster of so many modern architectural experiences.

Affinities with Aldo Rossi and Carlo Aymonimo methods aside, also in the light of subsequent studies, Caniggia's research on the formation of fabrics and their transformations must be acknowledged as being surprisingly original in Italian schools of architecture.

These brief considerations will perhaps help to explain how according to Caniggia the multiple built-environment forms could not simply be classified and scientifically processed as in the series of typological studies generated by Giulio Carlo Argan's analysis.

According to pre-modern principles, Caniggia sensed how it was necessary to extract hidden, deeper meanings from urban fabric: the architecture of the cities, houses as monuments, thus became not just simple constructions but *textes* and architects had to be capable of interpreting the message transmitted by them, in this way understanding not only what the built environment *appeared* but, above all, how it *should* be in the future.

For many years I have been involved in the continuation of this method of study, which I have tried to update through researches carried out in the Polytechnic University of Bari and the

University "Sapienza" of Rome. In particular, research on minor historical centers in the area west of Rome, conducted with funding from the Ministry of Scientific Research and now in course of publication, gave, in my opinion, good results.

This research adheres to a broader national research, sharing its assumptions and considering specific connotations of Italian landscapes as suggestion for tools, different from current ones, for architectural design in Italy, and outlines a possibility for its original connotation. In particular, the research, conducted in our Lpa (Reading and Design of Architecture) laboratory in "Sapienza" University, focuses on specific characters of territory of the Lazio region, given by the diffusion of the small towns, of high historical value, which are rapidly losing their landscape and settlement qualities. These minor centres are furthermore structurally weakened by the proximity of the Roman metropolitan area.

The research concerns the following issues: i) local historical paths and courses and their recent transformations, given as elements structuring the form of the territory; ii) small and largely built "nuclei", commonly known as "minor centers"; iii) the urban sprawl formed in the last two decades.

The research aims to develop a method to understand the historical "small towns" of Lazio, updating the typological and processual method, based on the application of scientific criteria for specific reading of urban tissues, analyzing at different scales the links between the characters of anthropized territory. These links are particularly evident in a highly plastic-masonry (and therefore organic) region such as Lazio and constitutes, on one side the specific cultural heritage conservation work to be done to protect settlements and built landscape and, on the other side, possible tools to be deployed for the design of "mending" and also in new interventions. In this sense, the meaning of the word "landscape" that will be used, as mentioned, differs from that, however settled in literature, and derived from the picturesque tradition of landscape architecture, meaning by "landscape" the readable signs of the territorial anthropization process, considered in their indicative and testimonial value.

This method will be used not only for the protection of minor historical "minor centers" identifying which characters of the tissues are essential to protect the cultural heritage, but also to program transformations compatible with the morphogenetic process of historical buildings and to develop tools to cope with rapid and consistent reconstruction of tissues that may have been destroyed by a condition of long abandon or by improper use.

The studies over time have shown that common evolution of the urban fabric in this territory originates from a dequantification of the domus type (and other types of courtyard houses) which gave rise mainly to the extensive phenomenon of the formation of the "pseudoschiere", singlefamily and single-faced housing units, also found however as a formative unit in the tissues of a large number of Italian towns (see the surveys carried out in the areas around Genova, Venice, Rome, and in Puglia, some of which are reported in literature).

Next to the formative unit, differentiation, articulation and diversity of results, identify (make individual, unique and unrepeatable the character of the town) the concept of courthouse, constitutes one of the greatest treasures of the fertile countryside of Lazio and the premise for its typological and constructive renewal.

For this reason the investigation, taking also into account its proposed operational purposes, started by considering the housing organism as a result of a sequence of construction acts that ends with the formation of an urban organism in the territory and begins with built elements (minimal component critically selected for subsequent aggregation), passing through successive scalar degrees: the structures of elements, in turn, systems of structures (set of structures that contribute to the same aim and are not independent), the whole constructive organism (with relatively autonomous systems that compete for the same purpose), aggregated organism.

The research makes some proposals for different structures and systems and their organic relationships within the building, and becomes a problematic node specific of different cultural areas, suggesting to organize the research on themes aggregated not only around the more general meanings of the specific term organism, but also investigating those structures and systems that are particularly significant for individual cultural areas.

It also appears clear that the results of this research, in the way shown above, is willing to overcome the current method, in the end still late romantic, based on data reading of the design problem (the territory at different scales) according to an individual and literary manner (e.g. the endless publications on the topic of "fragmentation" of the territory).

Under the current total loss of the concept of process, the interpretation of the neo picturesque built town usually suggests the idea of randomness, of unique structures that have assumed the present form "worthy of being painted", in fact (e.g. the tradition of painted landscapes of Latium, from Tivoli to Anticoli Corrado) but that could take on countless other forms. This fact certainly contains some truth but completely useless, however, for the project. Ignoring that part of truth essential to understand and design the newly found rule for the formation and transformation of the built environment, a rule that can let us appreciate, through its endless exceptions, also the richness of the life of urban tissues and buildings.

Believing that the characters of the Lazio region (only partially affected) should be destroyed only for whom that doesn't want to acknowledge them, the research has produced some tools related to the concreteness of the transformations of the built landscape, by a progressive reading the formative process as a basis to understand which are the congruent and possible developments, to finally define which are the possible tools for redesign.

The representation of the structure of the territory, identified through the stages of its anthropic use, can only start by reading the routes which, as any given built reality, have their typical characters, i.e. are recognizable in their form and evolve with common characters that can identify historically their phase, and locally their relevance to the natural characteristics of the soil to which they are associated.

A first guidance distinction between typical paths can be implemented through the hierarchy of tasks performed: spatial paths originally generated by migration and, subsequently, the links between cultural areas of great polarization (examples are contemporary highway routes); local paths, internal to each region or between the border areas, polarized by the settlements and urban areas; land routes, links to the scale of production areas; urban routes, routes within urban areas.

These pathways are structured, in turn, hierarchies that establish organic relationships in the territory that can be read by mapping them.

Scale of urban organism in relation to the territory

Study of the formation process of the settlement, from the existing routes to the buildings related to the area.

Documentation

Cadastral maps of existing land and buildings prepared by Technical Revenue scales in 1 / 1000 and 1 / 2000;

Cadastral maps or historical antecedents found in the 'UTE, State Archives, or other municipal archives;

Cadastral monastic property or family;

Survey from 1:5,000 aerial views to 1 / 1000.

Development

Chart of the mosaic of the urban cadastral land and areas immediately adjacent to the 1:5,000 scale obtained by plotting on the same scale and composing maps. This paper will include the relationship between territorial and urban roads and relations between inhabited and relevant productive settlement;

Map produced on glossy paper redesigning supplemented by previous contours. This map will place the urban organism in the geomorphological situation that has conditioned its transformations;

Map made with the same maps where you get the signs of construction and agricultural boundaries, paths, outdoor and indoor urban body and their relationship with the topography and hydrography . This map will study the hierarchical relationships between pathways and their significance in relation to the territory;

Charter of the mutations of the structure of the urban organism obtained by comparing the maps with the oldest of the historic cadasters.

Reading

Relationship between paths. Comparison between the different maps, from which it is obtained;

The formation and transformation pathways and tissues;

Formation of city walls, the continuity between internal and external routes, the routes and timing of tissues;

Relationship to productive areas;

Identification of land links and courses, adduction to funds;

Identification of territorial planned systems (centuriations. convent subdivisions etc.);

Check recent urban expansion (suburbs) in relation to tissue existing land obtained by comparing the different maps;

Reading of the change of role in the system of scattered buildings: i) outbuildings used for agricultural uses(farms, cottages, farms, etc.); ii) specialized antinodal facilities urban or suburban (convents, hospices for pilgrims, post stations, shrines, churches and rural); iii) specialized structures for production (factories, tinali, mills, plants etc.).

Scale of the urban organism (formative phases)

Hierarchy of routes and the formation of tissues as a result of the training process of the urban organism. Nodality and antinodality for pathways and tissues.

Documentation

Current cadastral maps of the urban scale in 1/1000 and the urban core and the relevant territory in the scale 1/2000 (same maps);

Cadastral maps and historical background (same maps);

Photogrammetric aerial survey maps and aerial zenithal photos in scales 1/2000, 1/1000, 1/500;

Archaeological maps;

Geological maps;

Publications of local history, guides, archival records etc.

Development

Base Map: Urban cadastral Mosaic scale 1 / 1000 and 1 / 2000;

Comparison, based on maps, including cadastre and land registers current history;

Charter purified from recent structures, at the stage before the nineteenth century expansion (i.e. expansion during Murat rule) and traumatic changes made in the historical fabric from the end of the last century;

Map overlay to natural manmade structures, useful to understand the differences across profiles, gradients, hopping height, terraces that have affected the formative stages of the urban organism;

Chronotaxis: Historical, chronological order, relating (directly or indirectly) the formative stages of the urban organism. Should be reported in order: Year, News, Source, grade reliability.

Reading

Finding ways of warping the urban fabric (indicate graphically different lines of different orientation);

Identifying the relevant sections for each course;

Identification of central and peripheral urban polarity (bridges, ports, intersection of routes etc.).

Identifying specialized nodal and antinodal buildings (churches, convents, palaces, cemeteries, markets etc.).

Identification of routes touching the polarity, often of greater length and continuity (Routes matrix);

Identification of new polarity and its paths of restructuring;

Identifying the paths between hierarchies (axes accentranti, dividends, axes controradiali)

Reading formative process .Each stage of the phases shall be identified by a map. Each map must reconstruct graphically: i) the urban core, as achieved in that particular stage; ii) adduction of the route; iii) Land outside the fabric; iv) polarity.

The research results are currently in course of publication with Italian and English tex: G.Strappa, A. Camiz, P. Carlotti, *Morfologia urbana e tessuti storici. Il progetto contemporaneo dei centri minori del Lazio. Urban morphology and historical fabrics. Contemporary design of the small towns in Lazio region*, Gangemi editore, Roma.

Typomorphological methods in planning practice; a case study of the *Plan d'Occupation des Sols* for St Gervais Les Bains (Haute Savoie, France)

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Abstract. *The study draws from previous research and publications related to the use of typological and morphological methodologies to prepare and produce local land use plans (Plan d'Occupation des Sols, POS) for local authorities in France (Samuels, 1993; Samuels and Pattacini, 1997; Samuels, 1999; Pattacini, 2001). The focus is on the evaluation of the practical application of the plan for Saint Gervais Les Bains in the past ten years and the resulting built environment. Saint Gervais Les Bains is a market town and tourist resort in the Val Montjoie, below the Mont Blanc massif in the French Alps. Following the adoption of the 'Loi de Montagne' in 1985, two land use plans (POS), which had zoned much of the land in Saint Gervais as constructable, were declared nul and void. A new plan was then commissioned from Qualipos, a multidisciplinary team of consultants in 1997. The main aim of the new local plan, ratified in 2001 was to identify specific characteristics and qualities of the local environment in order to devise rules and design guidance to generate new developments better integrated in the existing landscape and the traditional built environment. Similarly to the evaluation work undertaken for another French local plan in Asnières-sur-Oise using the same typomorphological approach (Samuels and Pattacini, 1997), the study analyses some of the major projects implemented since the adoption of the POS and evaluate the extent to which the planning policies have influenced the form of these developments. Interviews with the relevant stakeholders and principle actors provide evidence to evaluate the effectiveness and limitations of the local plan since its adoption more than ten years ago. The aim is to identify how the morphological content of the local plan has influenced the planning and design process and how it has contributed to develop the specific local character of this alpine town. Fieldwork is scheduled to take place during February 2014 and it is intended to have the research completed in time to be presented at the ISUF conference in Porto in July 2014.*

Key Words: typology, morphology, planning practice, local character, evaluation.

Introduction

This study of the *Plan d'Occupation des Sols*(POS)for St Gervais Les Bains is one of four supported by the International Seminar on Urban Form (ISUF)which evaluate the application of urban morphologically derived methods in practice. It follows one of the recommendations of the ISUF Task Force (Samuels, 2013) and draws from previous research and publications related to the use of these methods in this type of local plan which was legally established in France in 1967 and replaced in 2001 by the *Plan Locale d'Urbanisme* (PLU). In particular, work undertaken by one of the authors (Pattacini, 1996) evaluated several cases including the earlier POS for Asnières sur Oise prepared by members of the same team and which used a similar approach to this plan. A number of publications have explored aspects of the experience of St Gervais and other cases using a similar approach (Samuels 1993, Samuels and Pattacini 1997, Samuels 1999, Pattacini 2001). Both the authors contributed to the typomorphological analysis which formed the basis of the survey (*rapport de présentation*) of the St Gervais POS, while the regulations (*règlement*) were mainly prepared by a legal team of the Paris based consultant, Qualipos.

Following a short discussion of the physical, social, political and economic contexts of the commune as they impact on the built form of development, an analysis is undertaken of some of the projects implemented since the adoption of the POS. A limited number of major actors were interviewed and an attempt has been made to evaluate the extent to which the typomorphological character of the adopted planning policies has influenced the form of these developments. Finally, some lessons are drawn from this experience which may be of relevance to other contexts.

St Gervais les Bains; a special place

The market town and tourist resort of St Gervais lies in the Val Montjoie, in the French Alps. The communal boundary includes the peak of Mont Blanc which it shares with the French commune of Chamonix and the Italian commune of Courmayeur (figure 1). With an area of 8768 hectares it climbs from the Faucigny Valley at 500m to the peak of Mont Blanc at 4807m. No other commune in France includes such dramatic changes of level. This produces an exceptional range of landscapes; from the permanent snow and glaciers, woods and forests at the higher levels to the agricultural land- pastures, orchards and small vegetable gardens, at the lower levels (figure 2). Traditionally the population lived in buildings constructed from local materials and adapted to the climate and topography. However, the agriculture could only support a limited population and there was a tradition of migration to neighbouring countries. The most significant architectural monuments of the region, the Baroque Chapels, were funded by these expatriates.



Figure 1. Location of St Gervais les Bains.

The advent of the railway and tourism disrupted this pattern of life and although some agriculture still exists it is economically insignificant (Olivier 1993). A new type of architecture was introduced at the end of the nineteenth century as large hotels were introduced to accommodate the visitors in search of cures in the Thermal Spa. They were in a style known locally as "*thermal*". The last half of the twentieth century witnessed the growth of mountain sports, again with the introduction of a new style of architecture - modernism. The small permanent population of 5,800 now rises to more than 20,000 during the four month winter and two month summer seasons.



Figure 2. The commune of St Gervais les Bains includes a wide range of landscapes.

Since Roman times the Val Montjoie has played an important role as a commercial route through the Alps. The historic core of St Gervais, the administrative, commercial and religious centre of the valley is located on the middle slopes at 800meters at a strategically important crossing point of the ravine of the Bonnant Torrent. Two fortified farms (*chateaux de la Comtesse* and *de Hautetour*) testify to a historically important defensive function. A third of the commune population is concentrated in this centre, which has expanded since the construction of a cable car lift to the skiing slopes at Le Bettex and above. All the main public facilities, library, Town Hall, schools are also located there together with some recent social housing. (figure 3).



Figure 3. The Bourg of St Gervais - the main settlement.

The other urban centre is the settlement of Le Fayet. It developed in the Faucigny Valley during the early twentieth century around the Railway Station and the Thermal Spa (*les Bains*). Small industries and most of the social housing of the commune are located there. It also accommodates the terminus of the Mont Blanc Tramway (figure 4).



Figure 4. Le Fayet. Main street, railway station , Thermal Spa.

Smaller settlements locally known as *hameaux* such as Bionassay, St Nicolas de Verece and Cupelin are located at strategic points on the ancient routes over the Col du Bonhomme. Originally small but dense groups of farms around a chapel these *hameaux* have been expanded more recently with private chalets (figure 5).

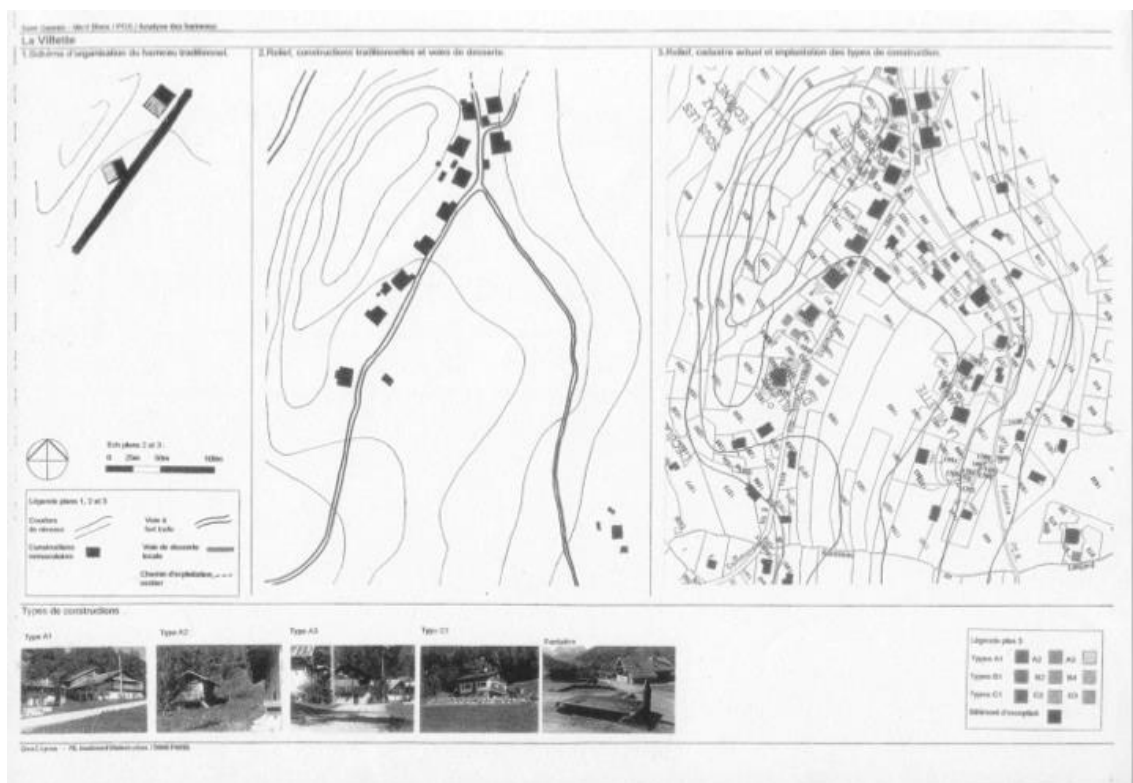


Figure 5. Typomorphological analysis of one of the farm groupings (hameaux) in the commune.

The territory covered by the commune of St Gervais les Bains has never formed a homogeneous entity and has always consisted of settlements of various sizes dispersed in the landscape. This dispersal has always made the mapping of ownership complex and resulted in the intricate mosaic of land uses found today. (Buston, Duprest and Duhamel, 1994, p.24).The

differences between the various types of inhabitants, dwellings and social Status: permanent or seasonal, urban or rural, old and new also create some tensions in relation to urban development and planning control.

From thermal spa to ski resort

Following the democratisation and development of winter sports in the last half of the twentieth century, the region around Mont Blanc has become one of the most sought after areas for tourism in the North Alps (Oliver, 1993). The mountains have become the playground of urban dwellers seeking sun and fresh air and the lost rural life (Gumuchan, 1989). In St Gervais 79% of the dwellings were built after 1948.

The approach to the planning of ski resorts in the 1970s and 1980s did not take into account the existing character of the sites. Such iconic resorts as Flaine designed by Marcel Breuer deliberately rejected local types and forms in favour of a modern architectural style (Pagand, 1996). St Gervais suffered from this period of euphoric development with a number of buildings ignoring the traditional relationships of built form and topography and the characteristics of landscape. (figure 6). These impacts on the landscape were exacerbated by the need to accommodate motorcars with access roads to the facilities and extensive car parking spaces which were used, at best, for only half a year.



Figure 6. Modern buildings at Flaine and St Gervais.

St Gervais with its established tradition of thermal and medical activities did not benefit as much economically from winter tourism as its higher altitude neighbours, Chamonix and Megève. One of the objectives of the commune over the last twenty years has been to restore its reputation and capture a greater number of the tourists descending on the region. One of the strategies for this is to reassert the attractiveness of the place by reference to the characteristics of the vernacular buildings, its reputation as a thermal spa and the quality and diversity of its landscapes. With ‘the implicit understanding of appropriateness’ (Habracken, 1998, p.229) having been ignored in the new developments linked to the tourism industry, it became necessary to apply explicit rules to maintain a balance between economic growth and the qualities of place.

The planning context

French planning operates within a legal framework based on written law and thus has much less

discretion to operate than the English case based legal system (Kropf, 2011). Thus any written document such as the POS which was introduced in 1967 and replaced by the PLU in 2000 (which included issues related to the sustainability agenda) is potentially a very powerful instrument for determining the form of places. The decentralisation law adopted in 1982 was a turning point in the French planning system with all 36,000 communes having the right to prepare their own POS (Prevost, Molines et al, 2012). Given that many communes are very small, with populations of one or two hundred, some of these plans inevitably are standardised since the cost of developing a plan tailored to local circumstances could not be afforded. For the same reason the administration of plans for smaller communes is undertaken by staff of the *Direction Départementale d'Équipement* (DDE) based at the main town of the Department who sometimes have a limited knowledge of the local context.

The standard plans specify broad land use zones on which are imposed quantitative controls in the form of maximum floor space indices. Local character is not necessarily considered as a justification for the rules and the specificities of the local area are often ignored. This was the case for the first two POS for St Gervais where the important relationship between buildings and landform specific to the vernacular Alpine architecture were not considered. As result the commune of St Gervais is well known in French jurisprudence since its first POS was annulled by the highest administrative tribunal, the *Conseil d'Etat* in 1984, and the following POS, adopted in 1986, was subjected to numerous revisions and finally declared void by the *Préfet* of Haute Savoie in 1996. This followed protests from local environmental associations that too much land had been zoned as constructible in contradiction to the 1985 *Loi de Montagne*. This was intended to reconcile environmental protection and community development in the French mountain territories by only allowing new building in continuity with existing settlements.

Given the difficulty of controlling development in a period of rapid tourism expansion and the need to protect sensitive environments, the political decision was made to shift the development control from the DDE to the local municipal offices and St Gervais created its own town planning department '*service d'Urbanisme*' with a dedicated planner. A new POS was commissioned in 1997 by the mayor from Qualipos, a Parisian consultancy founded by the mayor of Asnieres sur Oise, a lawyer, and which included some members of the team responsible for that plan. Environmental and wild life specialists were included and it was considered that outside consultants would be able to provide a fresh look at urban development without being influenced by local interests and pressures.

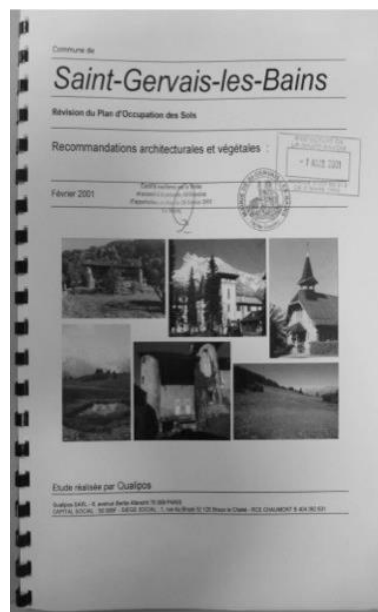


Figure 7. The 2001 POS.

The main aim of the new POS, which was only ratified after four years in 2001 (Figure 7), henceforth referred to as the 2001 POS, was to identify specific characteristics and qualities of the local environment in order to devise rules and design guidance in order to generate new developments which would better integrate in the existing landscape and the traditional built environment. However, a new mayor was elected in 2001 and he did not support the new POS, which belonged to the previous administration and had proved a sensitive political issue with his electorate. It was cancelled and temporarily replaced by the POS of 1986 until the commune developed their PLU which was ratified in 2006 with revisions in 2011, 2012 and 2013 (St Gervais, 2006).

The Last POS

The main aim of the 2001 POS was, through a detailed analysis published in the survey report (figure 5), to identify the specific characteristics and qualities of the local environment in order to devise regulations which would ensure that new developments would integrate with the landscape and the traditional built environment. In order to achieve this Qualipos used a typomorphological approach which has some similarities with recent United State Form Based Codes methodology. This enabled the identification and description of suitable types characteristic of the area, which were then developed into prescriptions for new developments. The process and resulting planning rules are explained in some detail in previous publications (Samuels 1999, Pattacini, 2001). Because of the complexity and diversity of the building types over the dispersed territory of St Gervais the final document took a long time to be approved and included 250 pages of regulation.

At Asnières the POS, which used the same approach, failed because it was too complex to be implemented by staff of the DDE who were essentially administrators with little technical expertise (Pattacini, 1997). St Gervais with its planner was better equipped than most small communes in France to administer a plan and it also access to the services of the *Conseil d'Architecture et d'Urbanisme et de l'Environnement du Haute Savoie* (CAUE), an advisory agency serving each region of France. Even with these advantages the 2001 POS proved difficult to enforce because of the large number of rules related to specific types so that, despite the local expertise, the document became a major political issue with numerous legal disputes resulting from the refusal of planning applications. It was labelled as a '*POS spoliateur*', a confiscatory plan, since it reduced building rights and it encountered strong opposition from the elected communal council. However, although it was only applied for two years the principles of the POS proved more long lasting and have influenced subsequent planning documents as discussed below.

Evaluation

This evaluation is based on a limited number of interviews with key actors in the process of adoption, implementation and application of the POS and an examination of some major projects implemented since its preparation and adoption. For comparative purposes, the choice of the interviewees was informed by the previous research related to the Asnières sur Oise POS (Samuels and Pattacini 1997). The equivalent of the planner in the UK situation is a more complex group of controllers in the French context. In the case of St Gervais the system is less complex and, unusually, the chief of the planning office at the time of the preparation of the 2001 POS is still in post and was able to offer a unique view of its evolution and impact. As has been noted above, the mayor remains a key figure in the French planning system.

The architect charged with safeguarding the architectural heritage of the Department (*Architecte des Bâtiments de France*, ABF) has been involved in the recent development of the

town centre but was not as instrumental as in the Asnières' case where all projects needed his approval because the main settlement lay within 500m of the listed church. An architect in private practice in the commune was also interviewed and it was possible to use the unique "before and after" illustrated panels which the Mayor has erected in key locations to illustrate the positive changes made to the town as part of his long term legacy.

The Mayor

As a key actor in the decision making process of a small commune the present mayor did not support the qualitative 2001 POS commissioned by his predecessor when he was deputy mayor. The rigid constraints imposed by the new plan were extremely unpopular with the local population and landowners, while its power to make or break fortunes made it a powerful political tool in local elections. The mayor considered the detailed prescriptions of the POS inappropriate and he did not defend it when it was annulled in 2003. He took the opportunity of changes in the planning system to replace it by the PLU approved in 2006.

The 2001 POS tended to favour new developments which were a pastiche of the historic spa architecture and this reflects the inclination of the elected members of the council to emulate the traditional architecture rather than encourage a more contemporary style. The mayor is conscious that the promotion of emulating the old will encourage pastiche but for him that is preferable to risking uncontrolled innovative design. In the mayor's opinion this is a safe option, which suits the majority of the electorate and is only criticised by few "purists and aesthetes".

However a vision for St Gervais can not only look backwards but must also build the necessary infrastructure for the future. The exceptions to the conservative rules of the *POS* plan are the new bridge, described by the mayor as a work of art (*'oeuvre d'art'*) with particular attention being paid to its limited vertical impact on the landscape with the lighting integrated in the balustrade to emphasise the horizontal line. This has diverted through traffic to the ski lifts and permitted an ambitious traffic calming scheme to be implemented in the town (fig. 8.). A new swimming pool, designed by a high profile architect, Dietmar Feichtinger, will also be a 21st century landmark.



Figure 8. The new bridge and traffic management in the centre of St Gervais.

The planner

The planner in charge of the commune planning department (*'Chef de d'Urbanisme'*) has ensured the continuity and a long-term vision for the development of St Gervais. Having been in place since 1990 he has a comprehensive understanding of the radical changes in the approach to development control. He refers to the POS prior to the Qualipos work as a *'POS photocopieur'* a generic document fixing some arbitrary rules with no reference to local specificity. The lack of information and underpinning principles to adequately assess and control the quality of new developments was only partly addressed through work undertaken by the advisory architect (*architecte conseil*) of the CAUE, who had undertaken a detailed analysis of the main settlement.

From a professional point of view he considered that the 2001 POS "was a remarkable piece of work", meticulous and thorough, providing a good database of the key characteristics of the existing built environment and that the work undertaken by Qualipos marked a radical shift from generic to specific. The careful analysis of the built environment was comprehensive and enabled a better understanding of the various types of building found in the different settlements of the commune. This work was an important and necessary to enable a shift from crude zoning to specific urban characteristics and building typologies.

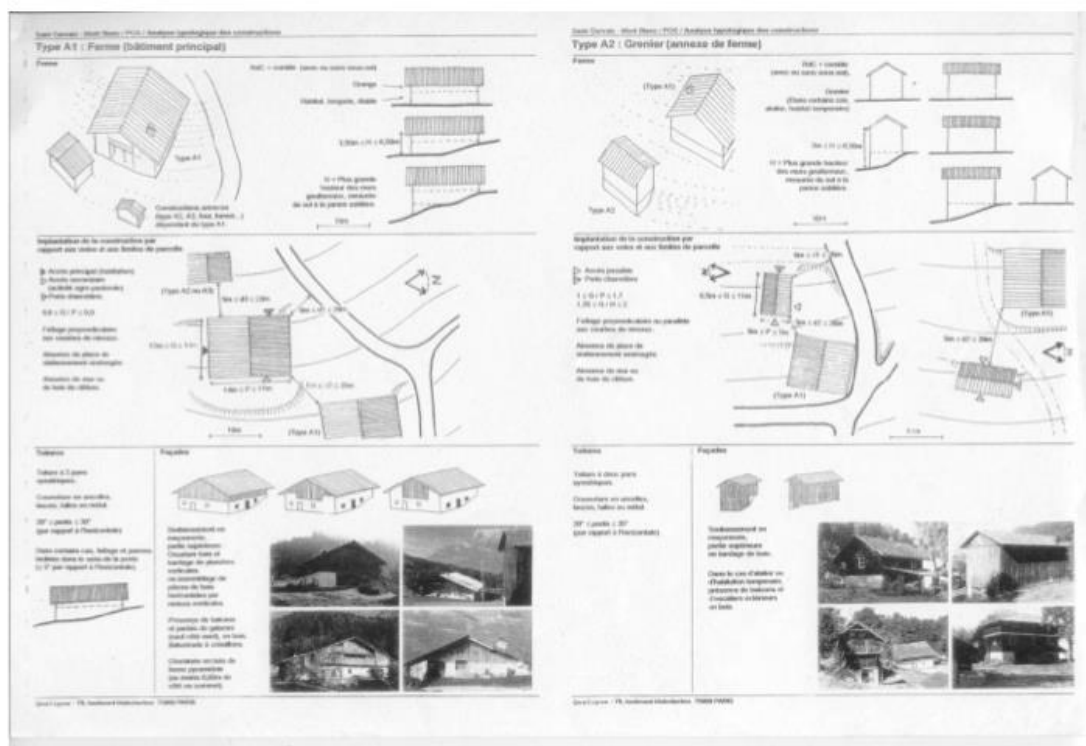


Figure 9. Characteristics of farm buildings (from the survey report).

While the resulting document was noteworthy it was also unrealistic in its ambition of controlling new developments. The value of the morphological approach is not questioned but, in his opinion, it went too far in prescribing details through regulations which were extremely difficult to enforce, especially those related to three dimensions. As the person in charge of assessing planning applications he considered that it was too complicated to use and apply. It was too ponderous to administer and resulted in numerous counterproductive conflicts between the political power and the inhabitants, which proved detrimental to the development of the commune. Rules need to be clear, justified and well explained but also manageable and

understandable. From his point of view an attempt to control everything is never a possibility. (figures 10,11,12).

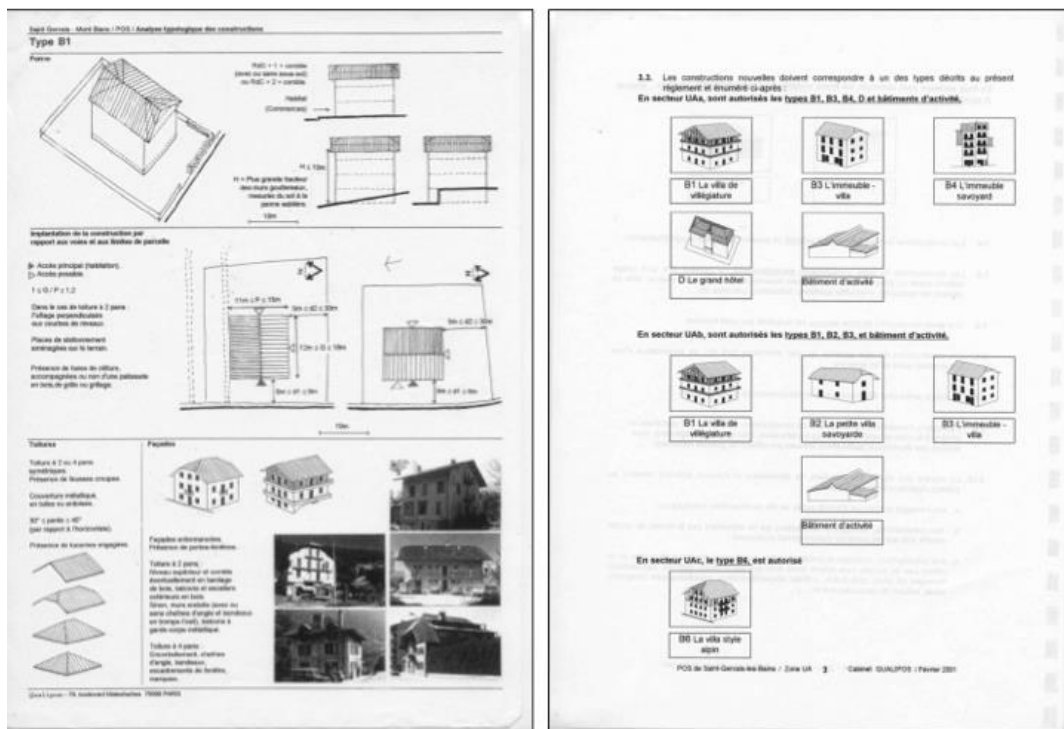


Figure 10. Analysis of Type B1 (from survey report). Zones where B1 type, in addition to other types, is permitted (from regulations).

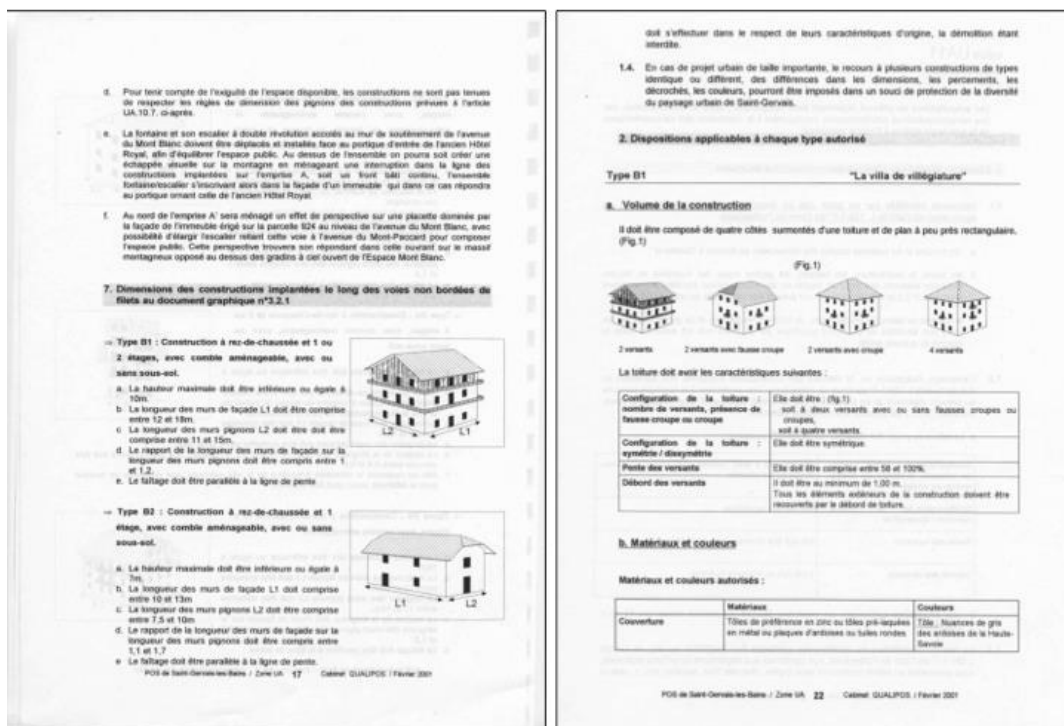


Figure 11. Regulation for type B1 : dimensions, roof characteristics and materials.

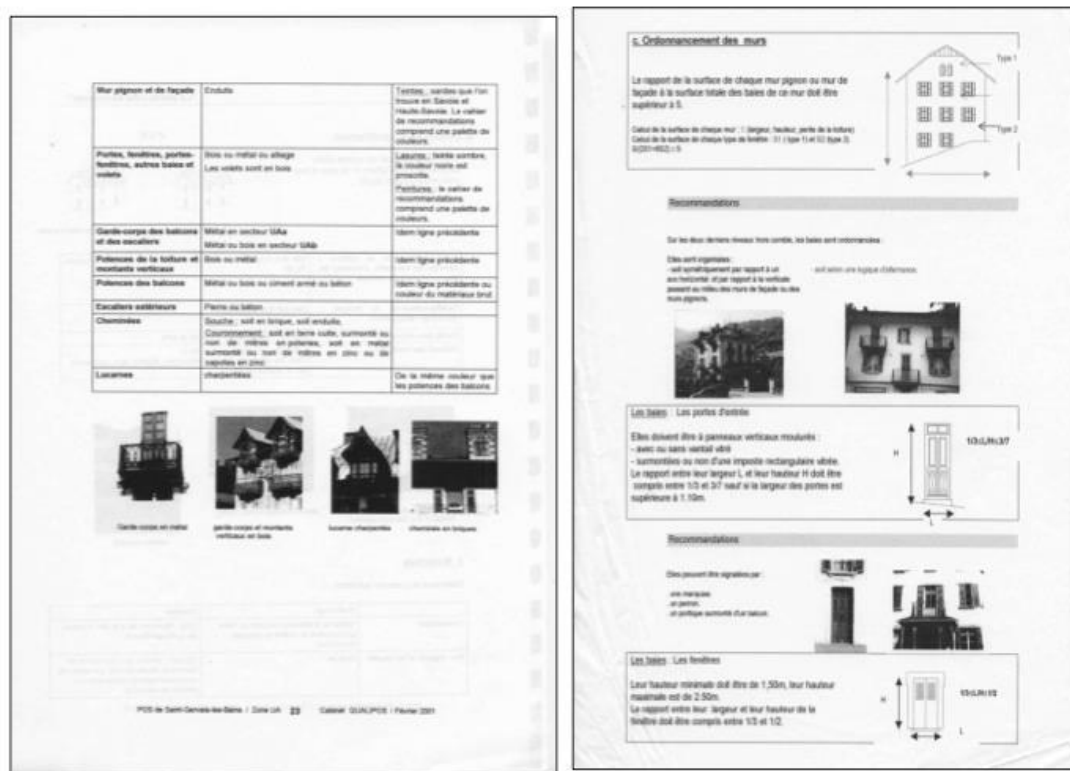


Figure 12. Regulation for type B1: materials and details.

Although the annulment of the 2001 POS seemed to be a backward step, the presence of the same planner ensured the continuity of the key principles underpinning the qualitative approach to urban planning. The vision of a more coherent urban development respectful of the surrounding mountain landscape was also strongly defended by the new mayor. This combination of political will and technical expertise enabled the pursuit of achieving a high quality built environment in harmony with existing vernacular architecture and the natural environment to be continued.

The architects

The ABF has been involved in the commune after the annulment 2001 POS. He was commissioned to produce a typological study of farms prior to the award of conservation grants by the CAUE. He considered that the specific morphological characteristics of these vernacular farms, as described in the 2001POS (fig. 12) are so intimately related to the agricultural function that the type cannot be adapted to modern use for vacation homes without major architectural changes. For example, the living quarters were at the bottom of the buildings while tourists demand the best views so what was a barn at first floor is now the main living room. The balconies for drying purposes were originally unrelated to the internal floor arrangements so that to accommodate present needs, the balcony position on the façade has been shifted to the same level as the living space and enlarged to accommodate outdoor living.

For the local architect, who had been engaged in designing private chalets, the 2001 POS was an important step in changing the attitudes of the 1970s and 1980s i.e. of building without any consideration for the local context. The rigorous approach to the types and forms of vernacular and thermal buildings forced private developers to be more careful and sensitive. He

considered that the main improvement has been the change to the roofscape since flat roofs are no longer permitted. However, he did believe that the strict rules were punishing contemporary architects for the mistakes of previous generations and he was convinced that architects nowadays would not make the same mistakes and are in general fully aware of the importance of respecting the context. He was therefore not in favour of overly prescriptive rules which can be unrealistic because they focus on vernacular types and forms without taking into consideration their appropriateness for modern uses. For example as described in the 2001 POS the volume of the traditional farm building with a large footprint (minimum 12 by 14 metres) was determined by the building having to accommodate several functions which needed to be grouped together as protection against a hostile environment. For his clients, who want a small dwelling for their holidays, these volumes are neither appropriate nor economically feasible. He also referred to the matter of the location and size of balconies mentioned above. As with the ABF the architect's main concern is the overall coherence of the built environment so that his work now includes the renovation of 1970s houses and their cladding according to the chalet typology.

The legacy of the 2001 POS

Although the 2001 POS was annulled only two years after its introduction for reasons discussed above, it has had a considerable impact on development since then. It set some strict rules underpinned by a thorough analysis of the urban morphology and existing building typologies and this proved a turning point in the approach to new development in St Gervais. The morphological approach is a well-established methodology to study the physical form of settlements (Allain, 2004) and the analysis underpinning the regulations highlighted the specific local characteristics, their importance and the need for more sensitive new developments. None of the interviewees questioned the value of this outcome and the planner stressed the importance of the document as a reference source particularly with regard to the detailed classification of the different urban zones (figure 13).



Figure 13. The crude zoning of the 1986 POS, the more detailed identification of specific zones in the 2001 POS leading to the zoning plan of the 2006 PLU.

The key principles underpinning the POS were also adopted in the development of the PLU. The main difference lies in the formulation of the regulations. . The PLU includes far fewer illustrations and focuses mainly on key principles leaving space for interpretation. The planner refers to these as safeguarding rules (*'règles garde fou'*) which will ensure that the most disturbing intrusions into a sensitive context are avoided. What he deems important is an

approach informed by the existing typologies as identified in the qualitative 2001 POS. (figure 14)

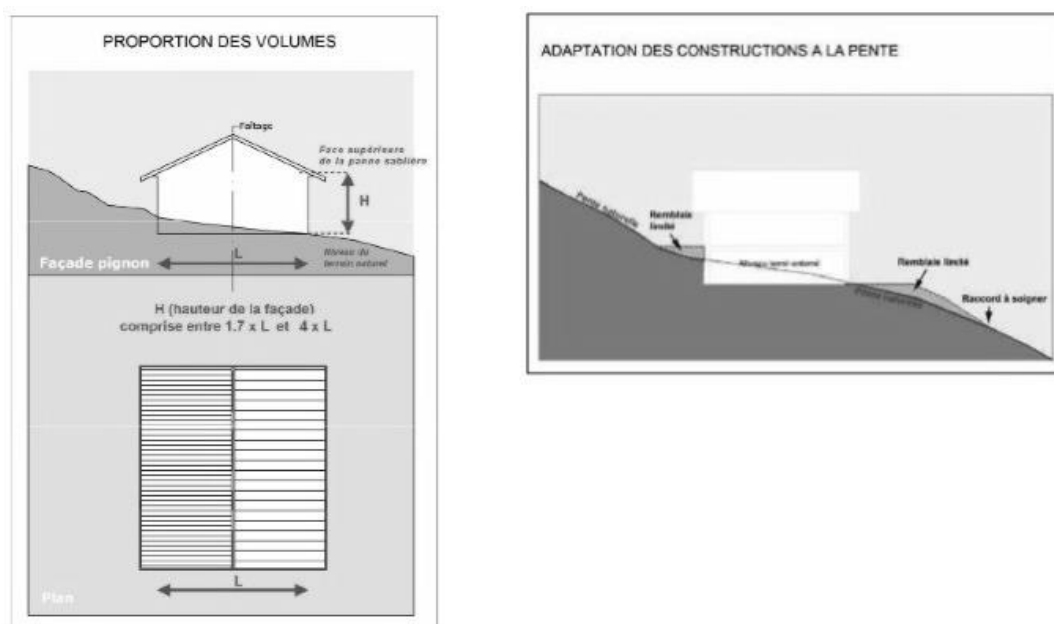


Figure 14. The PLU controls volumes which respect the natural topography rather than excessive detail (St Gervais 2006).

For example, traditional farms are orientated so that roof ridges are perpendicular to the contours and this characteristic is now part of the PLU regulations. Hitherto this characteristic was ignored so that an alien geometrical order was imposed on the landscape. (figure 15) Another characteristic incorporated into the PLU is the use of building entrances at different levels according to the topography (St Gervais 2006).



Figure 15. New chalets which respect the slopes compared with extensive cut and fill (top right) to create a flat platform.

For buildings in the *hameaux* the PLU regulations control the relationship with the topography, an insistence on the built area being accommodated within the roof cover (i.e. no

extensions), a width: height (to the string course) ratio of between of 1:1.7 and 1:4 with a maximum total height of 6.5 metres (Ground floor + 1+attic); and a maximum build area of 30% of the plot area. For buildings in more urban contexts the model is the architecture of the spa and for this the PLU specifies maximum height of 9.5 m for hotels in town centres (ground floor + 2 +attic), a maximum built area of 55% of the plot area and the maintenance of a minimum area of open space per dwelling (from 100 to 250m²per dwellings). Specific examples are illustrated below.

Another principle carried over from the 2001 *POS* is the reduction in the size and impact of new vehicle routes by more sensitive alignments and narrower carriageway widths and attempts to group car parking on the edge of settlements. While these measures go some way to reduce the intrusion on the streets and landscape, in the high season cars still dominate the scene.

The projects

In the *hameaux* the emphasis is on the grouping of buildings and their integration into the fabric of the place including considerations given to the natural slope of the mountain landscape. Figure 15 illustrates the contrast between a chalet built on a platform and new constructions better integrated in the existing landscape.

The *Domaine de Crespin* on the outskirts of the urban centre of St Gervais illustrates the reference to the character of Spa Architecture to inform new apartment buildings. (fig. 16, 17) It also demonstrates the effectiveness of rules related to topographical considerations and the amount of open space in relation to the number of dwellings – although this is mainly occupied by car parking spaces. Particular attention has been paid to details including balconies and roof modelling. This new development contrasts with developments before the work undertaken to develop the 2001 *POS* (fig. 6).

The radical transformation to the historic core of the commune made possible by the construction of the new bridge removing heavy through traffic has already been noted. This allowed an emphasis on the visual quality of the building facades even to the extent of using trompe l'oeil windows and trees (fig.18). The replacement or radical modification of the flat roof buildings of the 1970s may not have a strict morphological justification but it demonstrates how a townscape perspective can contribute to the coherence of the street scene (Fig.19). Similarly the *Maison Forte* project is not a strict restoration of the original fortified farm but an imaginative reconstruction which is justified because it meets the need for an iconic new landmark tourist attraction, a requirement which a more authentic restoration could not meet (Figure 20).

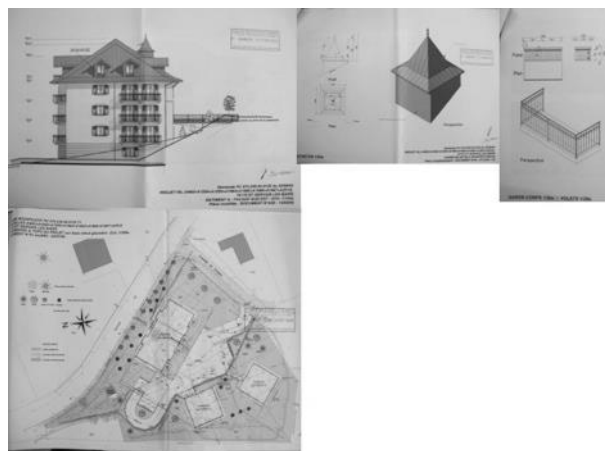


Figure 16. *Domaine De Crespin*, Planning application drawings.



Figure 17. *Domaine de Crespín.* New buildings better integrated with the topography which, in contrast with buildings from the 1970s and 1980s, refer to the buildings in the background buildings.



Figure 18. Trompe l'oeil paintings of windows and trees used to improve the street scene.



Figure 19. Building extensions used to improve the street scene (before and after street panels).



Figure 20. Ferme de Hautetour or La Maison Forte: from a disused fortified farm to a new landmark tourist attraction.

Lessons from St Gervais and Asnières

Degree of prescription

In both places those drawings and rules related to an analysis of urban forms, spatial structure and plots were well received. The classification of general building types in their context indicating volume and heights were more problematic to enforce but nevertheless used effectively and emulated at St Gervais in the more recent PLU. The most problematic level of definition appears to be the prescription of construction details, including materials. This was poorly accepted by the users and replaced by the old more familiar generic document. In both cases the urbanist and administrators experienced difficulties to enforce and police the detailed requirements. According to them both plans have gone beyond the manageable threshold with regard to a level of prescription and have been criticised by locals as over regulating. Finding the right balance between a too simplistic, generic and a too detailed prescription must be the key to the success of this approach.

Technical competence

The technical capacity of those who will be left to administer a plan once its authors have departed is clearly a matter, which has to be taken into consideration. St Gervais is fortunate having a full time planner in the commune and, although he admits to having found the regulations onerous to administer, he was quite capable of the work and the POS failed for other reasons. However at Asnières a principle reason for the abandonment of the POS was the inability of the staff of the DDE, essentially administrators with limited technical capability, to administer a complex set of regulations.

Political considerations

In both St Gervais and Asnières the mayors turned to a typomorphological approach in an attempt, in the former, to avoid a repeat of the 1970s-80s modern building boom and, in the latter to prevent the commune becoming another anonymous Parisian suburb. In both places the main aim was to preserve and enhance the 'genius loci' of the place and the morphological approach provided robust principles to support the political choices. It enabled well informed and evidence based judgments to be made in the granting of planning permissions (Allain,

2004). In both cases the main concern was not the architectural merit of the individual buildings but the achievement of a homogeneous and harmonious environment. Tugnutt and Robertson (1987) refer to the need for buildings to be tutored and in the case of Asnières and St Gervais, this tutoring is achieved through a better understanding of types and forms.

Although they were initially supported by the local electorates, it is notable that in both places the mayors who commissioned the plans were voted out of office soon after each POS was adopted. The extent to which the type of plan implemented contributed to their defeat would require a much more detailed investigation. However there is a suspicion that the high degree of specification and the increased cost involved in meeting these requirements contributed to their unpopularity. Of course, in democratic societies all plans need political support in order to be adopted and implemented, whether they incorporate urban morphological methods or not, but it may be that this type of regulation with a high degree of detailed control presents an easy target for criticism.

Economic considerations

The way the St Gervais plan affected the development value of sites has been noted above. Another economic aspect relates to the considerable resources needed to undertake detailed work of the type described, particularly in dispersed commune. The fate of Qualipos is instructive in this respect. The firm was established following the preparation of the Asnières POS by the mayor of that commune, a lawyer. His professional partners were notaries (a profession which had been involved in town planning from the middle ages) and the Asnières POS received a *Prix National d' Innovation* of the *Conseil Superior du Notariat* in 1995. The work had been undertaken by a team of UK University staff and postgraduate students and Qualipos proceeded to prepare plans for a number of small communes (Aumont, Molitg-les-Bains, Thauvenay, Chateau Rouge etc) in different parts of France with members of the same team working on a *pro bono* basis supported by French recent graduate interns on the minimum wage (*SMIC*). Even with such a low cost base the fees from the small communes were not capable of supporting the work and soon after St Gervais Qualipos stopped trading. Unless less labour intensive methods can be devised, perhaps the use of new technologies, any projects of this type must be aware that there is a demand for resources which goes beyond that needed for more generic plans, although it must also be taken into account that once the labour intensive analysis has been made a resource is available to inform future work as has happened with the St Gervais PLU.

Conclusion

Beyond the mundane, but critical, considerations of cost and competence both St Gervais and Asnières confirm that an urban morphological approach offers a rigorous method of acquiring the sound understanding of local identity essential to achieve high quality, unique environments. However, the shift from description to prescription requires a great deal of consideration as to the appropriate level of definition to ensure a consensus between the professionals and the users as well as the presence of the technical ability to implement the instrument.

In both Asnières and St Gervais the detailed level of the regulations was detrimental to the success and long term application of the plan. In St Gervais the less prescriptive and more flexible PLU has so far proved more resilient in application because it enables some room for interpretation and allows a degree of discretion in decisions. The local plan has a political impact and is a mediator between the different interested parties and interests. It is a tool to reach a consensus between the State concerned with global environmental issues, the inhabitants dependant on the economic health of the local area and, at St Gervais, the tourist looking for a mountain experience. The difficulty is to get to the right level of control in order to reach this consensus, which allows economic development without compromising local identity

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Spatial patterns of urban growth in Xi'an, China: a fringe-belt approach

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Abstract. *The fringe-belt concept, though widely investigated in Western cities, has hitherto attracted little attention within Asia. Building on a recent investigation of the fringe belt associated with the wall constructed around the small, compact Chinese city of Pingyao in the Ming dynasty, this paper explores fringe-belt development in one of China's major urban areas – the former capital city of Xi'an. Like Pingyao, Xi'an has a fringe belt associated with its Ming wall but, unlike in Pingyao, this fringe belt is deeply embedded within a metropolitan area and has been subjected to major pressures for change, especially since 1980. The development of its inner fringe belt, especially in the course of the first half twentieth century, is examined. Its significance is considered both as a heritage feature and, in very broad terms, in relation to the city's growth farther out. Brief comparisons are made with the conclusions of fringe-belt studies of Western cities.*

Key Words: *Xi'an, city for, city wall, fringe-belt, Period of Republic of China.*

Introduction

The significance of cross-cultural research has been underlined recently in the field of urban morphology (Whitehand, 2012), including in relation to the fringe-belt approach (M.R.G. Conzen 1969, Whitehand, 1967, 1988, 2004). A comparative study of a Chinese and a European fringe belt has recently been undertaken (Conzen et al., 2012) and, from a different standpoint, Berlin and London have been compared (Fehl, 2011). Frequently two or more cultures are embedded in a single city (Whitehand, 2012): Istanbul in the cultural convergence zone of the occidental and oriental is a striking example (Kubat, 1999). A number of traditional Chinese cities have been examined using approaches honed in the West. Guangzhou, Beijing and Nanjing are examples (Whitehand et al., 2011, Conzen, 2012). In several cases the mixing of Chinese and colonial aspects of urban form have been examined (Whitehand et al., 2011).

In this discussion of my work I propose to give particular attention to the fringe-belt concept within a Chinese cultural context. In Xi'an, fringe belts that developed in relation to traditional urban cores are now deeply embedded within a major metropolitan area. The extreme conditions that Xi'an has experienced in the course of its long history from flourishing national capital through a long period of greatly reduced size as a provincial capital to two short periods of war devastation and, most recently, major regional growth centre make it substantially different from any cities that have hitherto been the subject of fringe-belt analysis.

Conzen describes a fringe belt as "a belt-like zone originating from the temporary stationary or very slowly advancing fringe of a town and composed of a characteristic mixture of land-use units initially seeking peripheral location. ... In towns with a long history this geographical result emerging gradually from these dynamics is often a system of successive, broadly concentric fringe belts more or less separated by other, usually residential integuments" (Conzen, 1969). In pre-industrial cities many city fringe belts are associated with city walls.

Xi'an, located in north-west China, recommends itself for study in part because it is a major traditional city with one of the most complete ancient defensive works in existence. These city walls and the fringe belts associated with them have become embedded in the modern city. The evolution of the fringe belts of Xi'an, particularly the one associated with the city's late-fourteenth-century Ming-wall, will be investigated from 1911 to 1949. This period includes a number of major changes: the substitution of the new regime of the Republic China for the Qing dynasty since 1911, the Sino-Japanese War between 1937 and 1945, and the Communist Revolution in 1949. These twentieth-century changes occurred within an urban morphological framework characterized by a number of significant cultural changes, each of which has left a significant legacy on the ground. The fringe belts of the cities were investigated within the multiple city walls since the fourteenth century, which formed four layers fixation lines from the interior to the exterior including the Drill Ground with wall and moat, the Man city wall, the Ming wall and the Gate city wall, each associated with fringe belt features. (Figure 2-1).

The earliest of their fringe belt to be considered here marked the period of the governance by the minority Man people in the original area of the Han nation, the Man city occupied the north-east quarter of the Ming city wall between 1645 and 1911, and the new wall in its west and south along with the main street, far beyond the dominant city form of symbolism by the Fengshui, which served as a sort of cultural believe in the harmonious of the cosmos since then as well as the Muslim community layout in the northwest embedded in the Han communities till to now (Fig 2-1). It was essentially apartheid between the Man and the other nationality, so that the core of the city was composed of division quarter layout within the Rectangular City (Fig.2-2). Besides, it exhibited a particular process of the city form with the feature of function of land use, street fabric and the street block, which the modern industrial function of land use emerged since 1911 as well as adapted to the needs of the social-economic development at the moment which was seldom affected by the culture from abroad directly. This is different from the previous general cognition of Chinese traditional city, such as Guangdong which the city construction were impacted by the colonization from the West with the trades and industries more or less.

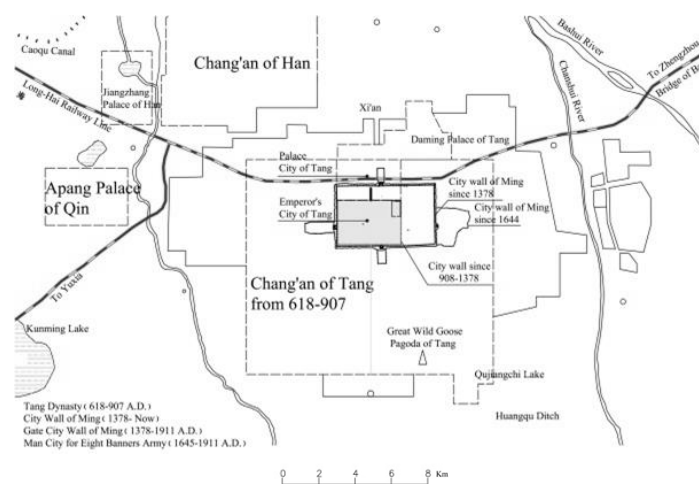


Figure 1. The historical site of Xi'an. (source: Historical Geography of Chinese City, Edited by Ma Z. L., Shandong Education Press, Otc 1998).

The historic-geography background of the city form of Xi'an

Xi'an experienced the development of its fringe belt within the city wall re-development since 1378, which was, inter alia, the Emperor city, once an important part of the capital of Tang dynasty since 618 A.D. (Fig 1, Fig 2-1, Fig2-2). The city of Ming dynasty had been enlarged to the north side and east side of the previous city since 1378, which had been built about four

hundred years in the original site of the Emperor city since the end of the Tang dynasty in 907 A.D.

According to the measured data, the perimeter of Xi'an city wall of Ming is 13.9 km, of which the length of east wall is 2.89 km, west is 2.71 km, south wall is 4.26 km, north wall is 4.26 km. The area includes the wall thickness is more than 11.5 square kilometres (H. Wu, 2000). The four gate cities had been built in addition in 1644 in order to strengthen the military fortification of the city. But it could not prevent the city pledge loyalty to the Emperor of Qing since 1645. The Man city was the production of the changing Dynasties since then, which was the place for the army of Emperor's tribe and their kinsfolk living. It was built in terms of the tenet of the prior of the military needs with the closed city wall within Ming wall till to the year of demise of the Qing Dynasty in 1911.

The city of Qing dynasty was divided into 4 parts within the Rectangular City basis on the site of Ming city, by the 2 perpendicular arterial streets linked the 4 city gates and cross at the centre point, namely the bell tower, which is the landmark for surveillance in the city. From the bell tower to the four main gates, the road was named by the director of the gates, namely East, West South, and West Broadly St.. The Man city in the northeast part, which the measured perimeter of its city wall is 8.77 km, the area is 4.8 square km, accounting for about 42% of the area to Xi'an city (H. Wu, 2000) (Fig 2-2).

The other part of the city, including the northwest (NW), southwest (SW) and southeast (SE) accommodated the residential area with the civil administrative department of the provincial and the regional located among them and around the Man city embedded in the corresponding residential area. Besides, the Muslim communities involved about 50 000 people, assembled in the most area of northwest part, while some new institute emerged in the late Qing dynasty since 1903 such as the hospital with the western medicine, primary school and mid-school with the modern education idea, which were belonging to the church, always near to the city wall or in the Gate city.

But it dramatically changed after 1911, when the government of the Qing Dynasty was replaced by the Republic of China. The Man City was destroyed completely, when the Eight Banners Army loyal to the emperor was defeated by the army loyal to the Sun Zhongshan who is the first president of republic of China and advocates democracy in China. And the Man National people were escaped far from the city for the fear of implicated as the enemy to the new government. Since then, the people of Man nation were almost disappeared in the regional of Xi'an. Obviously, the Xi'an City built-up area is reduced to a minimum level in 1911, and it became the turn-point of the evolution of the city form of Xi'an till to 1949.

The year of 1949 should be the watershed with the development of Xi'an city since modern times before the national industrialization period effected by the previous Soviet with the rapid development of the planned economic system. In the view of the comparison, the development of the city is very different from its spontaneous evolution in the previously period before 1949.

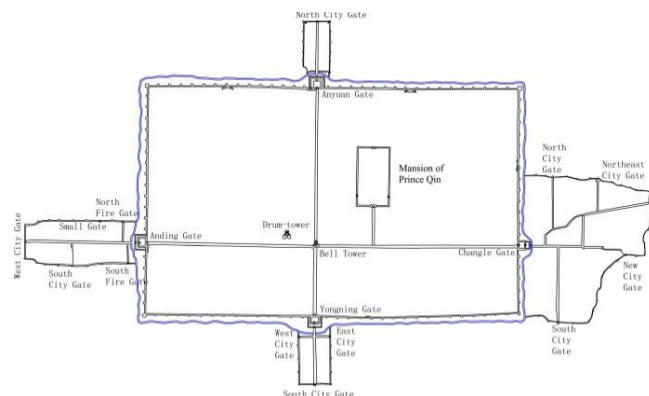


Figure 2-1. Map of Ming dynasty 1624-1644.

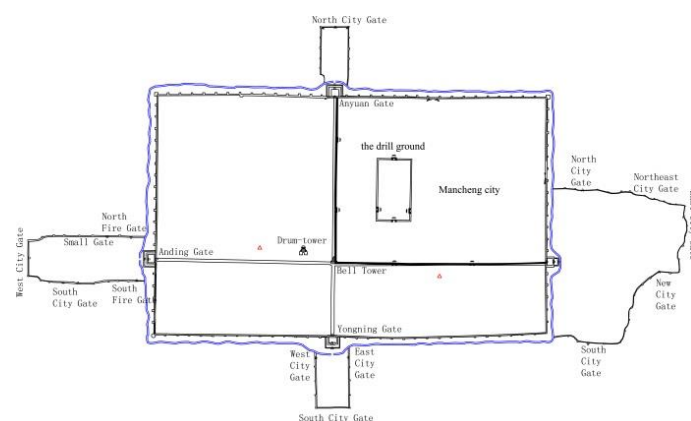


Figure 2-2. Map of Qing dynasty 1645-1911.

Background of the delimiting about the period

In terms of the terminology of fringe-belt studies, it is characterized by the relocation of individual functions from the centre to the periphery (M.R.G. Conzen, 1960). Obviously, although the processing typically in accordance with the methods, Xi'an experienced a different way in the city form for it proximately division quarter area developed within the individual quarter part of the city rather than a comprehensive commercial centre within a kernel area, because the provincial guild accumulated in the southwest quarter part with the commercial market and shop distributed in the northwest and southeast part as well as the Muslim residential area. . Indeed, before 1911 the paramount important military centre is the Man city for the Eight Banners Army, which is the domicile of army served to the Emperor located within the quarter area in the northeast of the main city. (Fig 3)

There exists a wealth of information of historical of Xi'an, which essentially make it could be understood about the fortification, streets fabric, some of the significant organization. But it lacks true cadastral maps showing individual plots and buildings for the entire urban area and city fringe as well as in Europe. However, quite a true ground plan of the research area of Xi'an has become available since 1893, especially the Ordnance Survey maps in 1934 and blueprint map in 1939, as well as a plan showing the situation of the area before 1949, even the plotting scale is not good enough to show some details information of the fringe belt. They have created the research opportunity for morphological as well as the contribution significantly in the present study.

Fortunately, the Ordnance Survey maps in 1934 by the Land Surveying Bureau subordinate to the General Headquarters, contain detailed information: for example, the legend of the new district is different from the built-up area which marked clearly in the map with the distinct boundaries of the land use and building. So the new area built after 1911 is possible to be laid out on the map (Fig 3) as well as the methods with the map of 1939, 1949, which is helpful to the city plan analysis in the view of the approach of fringe belt.

For the purpose of the explanation of the town plan as we find it today, as well as the contributing of the cartography exhibited the exclusive character in the process in accordance with the changes of the fringe belt with the information of the Map of 1934, 1939 and 1949.

In terms of the major influencing factors such as the Second World War and the post-war reconstruction, yet the milestone events within the period during 1935 to 1949 such as the railway coming into use, as well as the incidence of modern cartographic sources, make it expedient for the purpose of the analysis to adopt certain contractions and subdivisions as shown in the following table:

(1) Pre-railway period (1911-1934)

- (2) Railway period (1935-1949)
 - (i) Pre-Prior War period (1935 -1939)
 - (ii) Anti-Japanese War period (1939 - 1945)
 - (iii) The post-war Reconstruction period (1945 – 1949)

The inner fringe belt within the Ming wall from 1911 to 1934

With the demise of the Qing Dynasty, the city was completely destroyed during the last fierce fighting war in 1911, the west wall and the south wall was pushed to the ruins. Man city became the potential activity area for the redevelopment within the Ming city with the rectangular fixation line by its wall and moat of the Drill Ground of Eight Banners Army. Comparatively, the fringe belt area in the other three areas kept the spontaneity process of themselves in the corresponding corner within the city wall (Fig 3).

There existed important information could be understood with the comparison of the map of 1893 and 1934. The map shows the distinct difference of the street fabric within the Ming wall, which could be discerned the organic area with the residential building excluding the Man city in terms of map 1893, which the area could be judged forming spontaneity since 907 AD when the new city was built on the site of the Emperor City of Tang dynasty for people to live in, till to 1374 when the city began to expand to the north and east out of the prior one in the beginning of Ming dynasty. (Fig 2-1) and finished in 1378.

The condition of the fringe belt of Xi'an in 1911 was unusual. Almost the entire Man city (perhaps the nearest equivalent in the West would be a massive medieval castle), occupying the north-east corner of the Ming city, was in ruins. The fringe belt of Xi'an between 1911 and 1934 could be judged by the map. The Man City wall became a fixation line especially the west and the south wall of it except the other two sides of the original Ming Wall, additionally, the wall and the moat of Drill Ground which was the original Prince Mansion of Ming became the other fixation line either. The characteristic development in the Man City area shows typical features of fringe-belt formation, with the land use of institutions, commercial and public facilities (Fig 3).

Meanwhile, the un-built up area mainly located in the other three corners outside the Man City but within the Ming city wall, especially the northwest corner which was adjacent to the inner wall and was hard to be used because where there was the land of low-lying as well as the water pollution and unfitted for living at the moment.. A new area assembled of public services (administrative, military, public entertainment facilities and the Western Church) developed between the west and south Man city wall along the North Broadly and East Broadly St. and the previous Drill ground after 1911. Besides, in terms of the official statistics, in 1929 industrial development was at a low level, mainly consisting of the handicraft industries (Statistical report about the construction of Shaanxi, 1929) , which were fusion in the residential area by using of existing residential buildings with the first floor for shops ground or the front room of the house for the store, without the contribution to the outwards of the land use.

Some new land use with the new building types became the dominant appearances of the fringe belt development. For example, the land use of commercial with the corridor along the north side of the main road along with the south wall of Man city (Compilation Committee of Local chronicle, 1996), namely East Broadly St., spread from the point of the Bell Tower to the East Gate of the Ming wall since 1912 under the support of the government. Besides, the institutions near to the built-up area were exhibited forming the arterial ribbon along the East and North Broadly St., such as hospitals including the Red Cross Hospital in 1912, Land Army hospital in 1913, Shaanxi Christian Guangren hospital in 1916, the vehicle repair factory as well as the new churches with primary school or the hospital dispersed along the south and west of Man city wall, such as Young Men's Christian Association (1914) and the Baptist Church (1914) distributed along with the East Broadly St., and Protestant Episcopal Church(1916) with the primary school distributed along with the North Broadly St.

Furthermore, the garrisons with the affiliated facility places near to the new government which based on the site of the drill ground of Man city, yet which had been the mansion of the Prince of the Ming as well as the institutes such as the Protestant Episcopal church, primary school and the government department along the North Broadly St. from the Bell Tower to the north city gate directly formed the arterial ribbon. Meanwhile, there emerged the public garden or the park for the memories of the people dead in the war, and a several mulberry fields etc., which most of them scattered in the Man city around the Drill Ground and also sparsely in the north-west and south-east corners of the Ming city as well as some cemeteries.

The initial phase of fringe belt formation in the extramural area is also evidenced. Some new land uses developed outside to the Ming wall, dispersed within agricultural land, which included cemeteries, nursery gardens, a school and a Seventh-day Adventist Church. The four stretches of wall are similar in character with the villages scatter around it in accordance with the distance of the agriculture work, partly of the peasants lived in the four Gate city. Industry was beginning to develop adjacent to the railway along the northern wall by the end of 1934 (Figure 4), though there was still little evidence of industries other than those traditional handicraft of Xi'an. The plots using by the government department, some institute or the warehouses among the Muslim residential area were replaced simultaneously while the initial of the fringe belt development within Man wall.

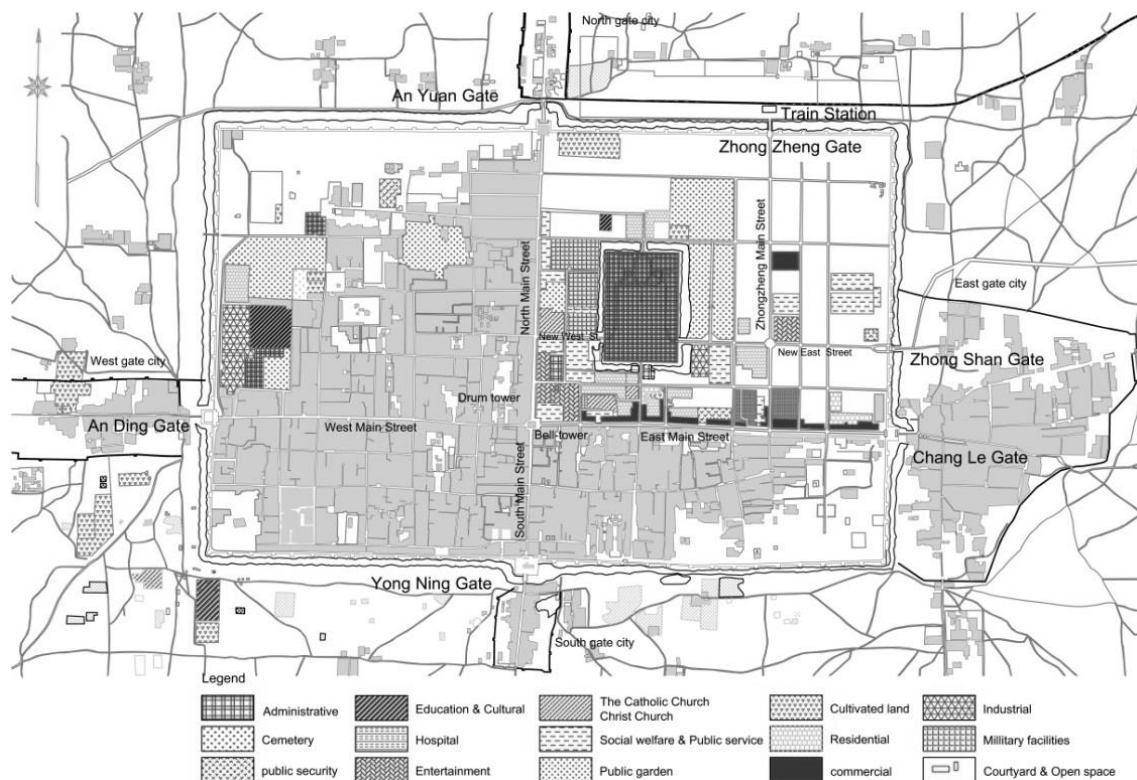


Figure 3. Urban fringe belt of Xi'an : Site developed 1911-1934.

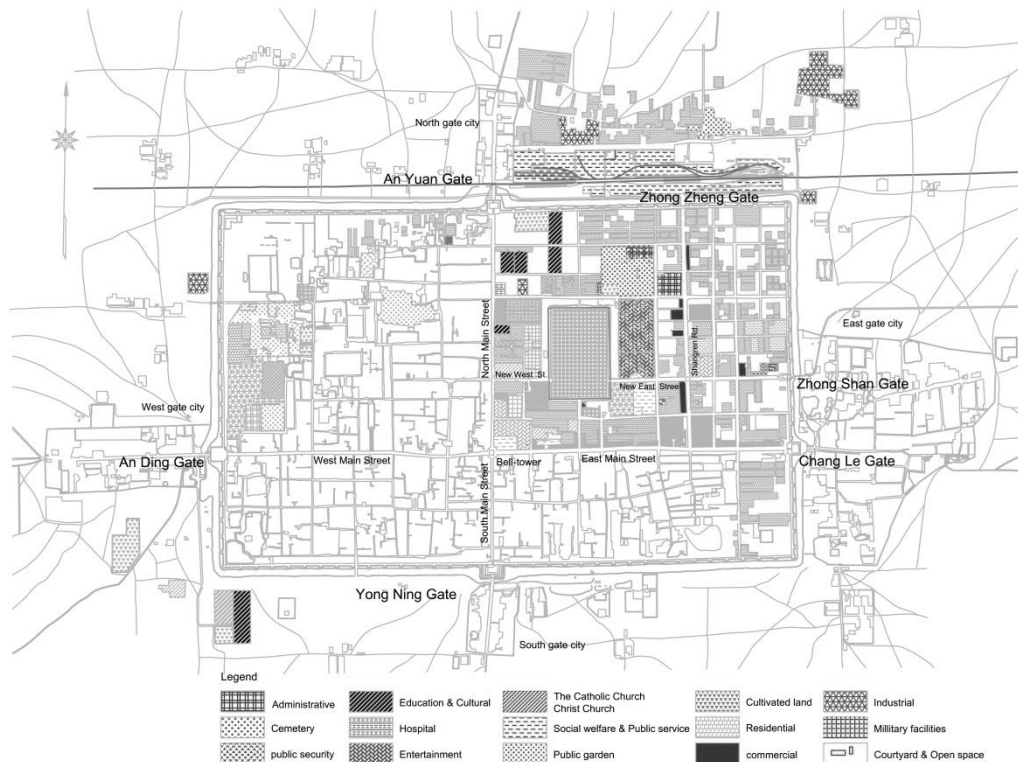


Figure 4. Urban fringe belt of Xi'an : Site developed 1935-1939. (source: Xi' an Map of the year 1939, Xián City Archives “The existing road traffic map Xijing City”).

The inner fringe belt of the Ming Wall 1935 to 1949

1935-1939

The railway link to Xi'an from the Lianyungang of east China in 1934, later developed to Baoji to the west of Xi'an in 1937, started to become the lifeline of transportation during the war years. The railway station was built just north of what had been the Man City, which connected to the city from a new gate in front of the station namely Zhongzheng Gate. Fringe-belt development began near the station as institutions began to take up sites along Zhongzheng Road. Again the residential area accumulated immediately, mainly between the north of the Drill ground and North wall as well as the northeast part of the Ming wall and near to the train station. The fringe belt within the Man city wall had formed 2 areas including the area near to the built-up area and the opposite far beyond the area and near to the wall. The area near the station and along the road developed quickly, linking the railway station directly to the area south of it. It essentially formed another arterial ribbon of fringe belt along (Fig 4).

The railway line linking Xi'an from Lianyungang of Jiangsu province in the east coast of China in 1935 made it possible for mass transport of raw materials and products, promoting the progress of the industrial development base. The railway became a new fixation line, along which new factories developed. A few factories were built near to the north side of the railway line, including the flour mills, textile factories and electric power plant (Fig 5). It essentially formed the extramural inner fringe belt which developed with the benefit of the railway. However, still in 1949 there were a large number of the villages, schools, agriculture test areas and cemeteries as well as the Seventh Day Adventist Church sparsely distributed along the outside of the Ming wall.

Inside the Ming wall, the grid fabric of the street adapted to the requirements of the motor car. The street pattern of the Man City, with its straight and regular streets fabric, acted as a morphological frame. However, although the main street pattern was regular it contained within it an irregular, organic pattern, reflecting the adaptation of the interiors of street blocks. Thus within these street blocks it is possible to recognize adaptations from the layouts feature of traditional Shaanxi dwellings: arguably a process with antecedents at least as far back as 907 A.D..

In contrast, the street block met the needs of the land-use pattern of the platoon courtyard model in the area of Man City, with new functions, such as a stadium, institute of railway administration, and new types of residential buildings. This was a relatively rapidly period of development period. This was especially influence by the extension of the railway line to Baoji, which is a major city in the west of Shaanxi and a traffic node linked with the south-west and north-west of China as well as the east of Shaanxi Province. So, it shows that the construction of the city and its industry have achieved remarkable development over the 1935-1939 period.

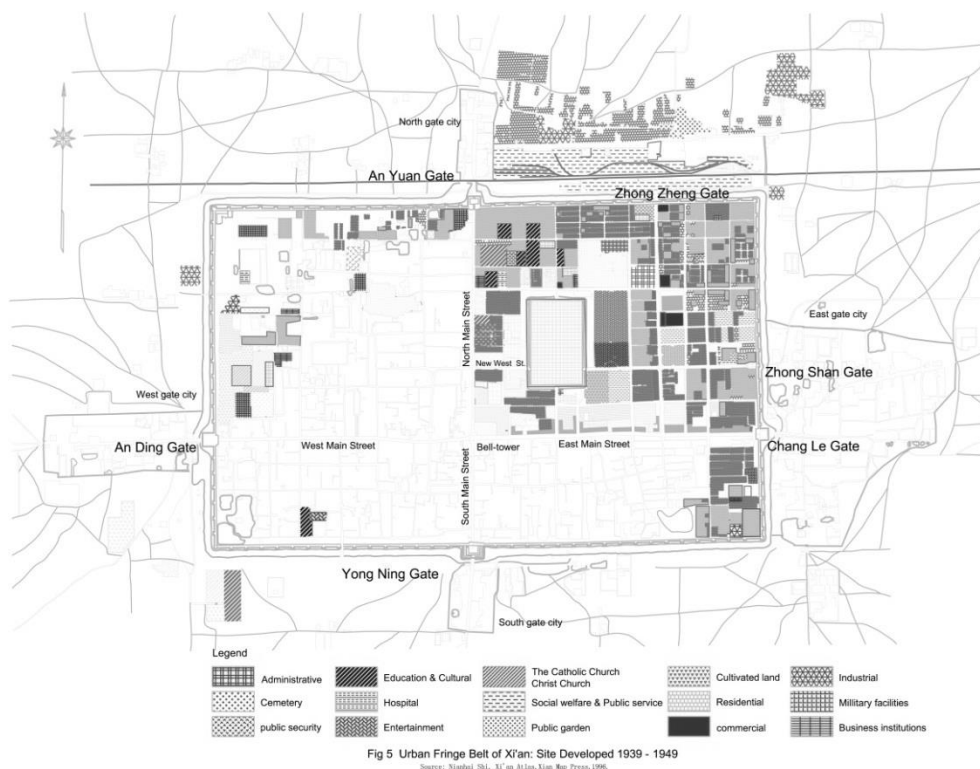


Figure 5. Urban fringe belt of Xi'an : Site developed 1939-1949.

1939-1945

However, there was also another important aspect of development at the end of 1935-39 and following that period. The Japanese invasion of China led to the migration of industry for reasons of national security. Japanese bombing caused great destruction between 1937 and 1944, especially to industry, although a good deal of the handicraft industry was absorbed into residential areas.

During this exceptional period the fringe belt was filled with new types of residential buildings, as well as an orphanage, a hospice, parks and some factories and barracks. With the occupation of eastern China by the Japanese, Xi'an became an important hub of transportation supply, munitions and civilian production. Along with the large number of funds and population flowing into Xi'an, various enterprises set up and stimulated a short period of city growth. There

was a mixture with the damage by Japanese bombing and the initiation of city projects, such as road widening.

According to incomplete statistics from the Republican archives in 1942, at least 79 industrial enterprises came into existence in this period. However, this had a minor physical impact on the city, for most industrial premises were workshops that were absorbed into residential areas.

The railway line was a significant contributor to the development of the extramural fringe belt at this time. This part of the fringe belt comprised the station and associated other railway buildings and track, a few factories as well as the original villages and cemeteries, and some new institutions including a school and a church.

1945 to 1949

After 1945, the Kuomintang troops and their families withdrew from Xi'an. In addition, a number of factories of national importance returned to their pre-war locations with a decline in population in Xi'an. City development activities mainly concentrated within the Ming wall during the period 1945-1949. At the same time a plan was produced for the post-war city.

The commercial centre formed in the vicinity of the main street that linked the east gate to the bell tower. The new administrative and military institutions sited in the fringe belt which was mainly close to the main street, although some departments occupied plots in the built-up area inside the Ming wall.

The residential units in the Man city area were very different from those in the other three areas. The block of residential units was more uniform in the Man city area and more adaptive to the needs of vehicle echo and leading a quickly development and an obviously evidence in the development of the fringe belt with the modern features, such as the new type residential building make the block with the shapes of narrow rectangle instead of the traditional residential block with the irregularity and organic texture. Such as the Qixianzhuang, which the high quality residential area at the moment, leading a new type of the platoon courtyard and became the model of the construction, and the similar street block could be found in the area near the train station.

Conclusion

In this paper, findings on fringe belts in Western cities are beginning to be added to in the very different cultural conditions that exist in China. The features of the fringe belts of Xi'an, mainly within its Man city wall, have been examined. The development processes associated with the fringe belts in the period 1911-1949 have been the focus of attention. There are more than twenty cities in China with the Man city walls. The subject of city walls developed inside existing walled Chinese cities deserves greater attention.

The processes of fringe-belt formation and modification have been identified (Whitehand, 1967). Modification has included plot repletion and slum clearance. In the phase of fringe-belt formation after 1911, some new land uses developed between the Grill Ground and the Man city wall. Subsequently some land use, including agricultural plots, a park, a military site and an asylum, were replaced by new functions.

The locating of the railway station outside the northern Ming city wall in 1935 gave major impetus to the growth of the Ming fringe belt on that side of the city. This accords with findings in Western cities, such as Newcastle upon Tyne. An arterial ribbon formed south of the station along the new main road linking the station to the interior of the Ming city. Here there developed residential buildings, factories, banks, markets, entertainments, and institutions.

There is potential in Xi'an for further exploring the effect on the urban landscape of internal cultural differences within the city. The case of the Man city within the Ming city has been considered in my talk. In Xi'an the Muslim residential community has kept its traditional

character over a very lengthy period. In addition land uses related to Western culture have become evident, such as schools, churches, hospitals and charitable organizations. The inter-relationship between such developments and the fringe-belt concept are a significant topic for further investigation.

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Xi'an City Archives: The map of existing road of city Xijing in 1939 , (Drawing ratio 1: 8000) Draw by Engineering Department of Xijing Municipal Construction Committee, Shaanxi Province Land Survey Bureau printing.

Xi'an built-up area map, 1949 (from: The Historical Atlas of Xi'an, Nianhai Shi, Aug-96, Xi'an Map Press,pp:138-139).

The Middle Eastern Cities and Isfahan School of Urban Morphology

Isfahan School of urban design: a morphological perspective

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Abstract. *Urban morphology of cities in the Middle East and Central Asia has been of great interests to academics from various disciplines. Through centuries of development Iranian (Persian) art and architecture contributed to what is called now Islamic cities. Isfahan school of urban design has particularly played a significant role in creating to be highly influential in development of Islamic cities in the region. We discuss how establishment of this new school of thought on Islamic cities in 16th century (concurrent with Renaissance) influenced the way we think about cities in the Middle East and Central Asia today. Using content analysis and direct observation as our research methodology we investigate urban fabric of Isfahan- the capital of the Isfahan region in Iran and once its most largest and glorious city in order to extract the conceptual and practical lessons about traditional urban morphology and advocate their importance and relevance for the contemporary urban development practices in Islamic cities.*

Key Words: *Urban Morphology, Isfahan, Urban Design, Islamic Cities, Morphological Integration, Iranian Art and Architecture, Samarkand.*

Overview to Isfahan Urban Transformation from a Medieval City towards an Avant-garde Metropolis

It can be argued that Isfahan's central position in Iran preconditioned it to become the capital of two major dynasties, the Seljuk (1037–1157) and the Safavid (1502–1736) dynasties. Its dual function as an emporium and as a capital manifested in Bazaars and in the courtly buildings that gave Isfahan the reputation of an oriental Versailles (Jayyusi et al., 2008). Given the geographical position of Isfahan at the center of the Iranian plateau, it has been known as one of the most important trade centres of Iran. This position occasionally makes it the bridge between the East, West, South, and North. According to Golombek (1974) Isfahan's urban development shows three phases from the early history of Isfahan to the contemporary era:

Late Sasanid to early Islamic (7th–8th centuries): the satellite villages. During the first Islamic century Isfahan consisted of two small settlements (Jayy and Yahudiyyah) and a large number of villages around the Zayandeh-Rud. The pattern of Isfahan city, like other Iranian desert cities, was based on the transformation of farming lots into urban residential spaces. The irrigation network kept its form as a network of public spaces running through the streets and alleys. Although the primary function of the irrigation systems was to supply water for agriculture, it has also defined the city layout and its urban evolution.. Privately owned farms were divided

into smaller lots of land for residential buildings (Estaji and Raith, 2012). Mehryar (2007) believes that the city of Isfahan was originally the result of the amalgamation of fifteen villages.

From 8th to 15th centuries (early Abbasid to Safavid) the villages eventually amalgamated and Isfahan became a walled town: The next major physical development happened during the Buyids when Isfahan was walled. The exact date of the construction of the defensive wall and its citadel is unknown. However, Muqaddasi, writing in 985, describes Isfahan as a walled city with twelve gates". As soon as the city was limited to its surrounding walls, it was socially and physically divided to several neighbourhoods called Mahalleh (Golombek, 1974, Sarraf, 2010). Mosque (religious space) and Bazaar (economic space) were the two main urban elements for the formation and direction the growth of the city, similar to other Islamic cities. The first mosque, in the mid-seventh century, served a symbol of victory and Islam, within the Jayy's walls (old Isfahan). The mosque was the central urban space, as the city formed and expanded around it; it sparked the development of Isfahan into an early Islamic metropolis. In the early Islamic cities the mosque was not only a place for religious purposes, it served functions of a court, a school, a place for discussing and debating, and a place for announcing the Islamic governmental orders. In other words, it was a political, social and religious centre and consequently the centre of the city.

The main mosque of Islamic city was usually located near a large plaza (Meydan), main routes were connected the main meydan to the city gates. Commercial spaces were usually located on the sides of those routes near the city centre and around the main Meydan (Kheirabadi, 2000). Figure 1 presents a schematic model of Islamic cities.

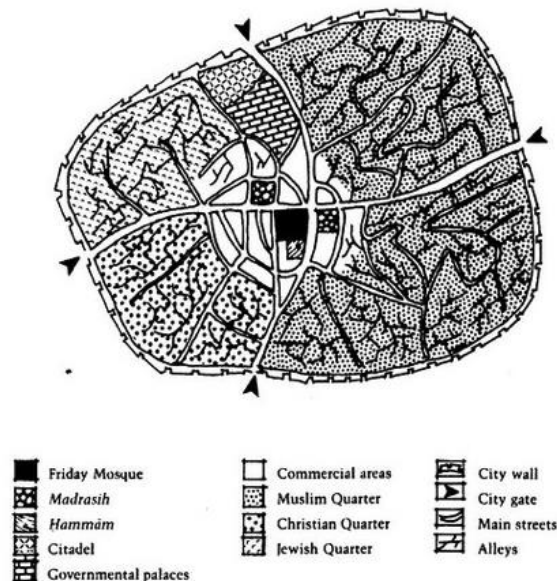


Figure 1. A schematic model of Islamic city (Kheirabadi, 2000).

In Isfahan, the complex of mosque and surrounding spaces and bazaar formed the main structure of Isfahan city during the centuries. The Isfahan bazaar had three major developmental steps after the advent of Islam in Iran: First is the formation the old Meydan and surrounding bazaar that connected the Jayy and Yahudiyyah (Two initial nucleuses of old Isfahan) together. The bazaar organically grew around the old meydan and the Friday mosque (Pourjafar et al., 2014). From 11th century Isfahan evolves towards becoming a prominent Islamic city. Saljuqid was a brilliant period for Art and Architecture in Isfahan, when Isfahan became the capital of Persia (Iran) for the first time. Many of the most important monuments in Isfahan such as the great dome of the Grand Mosque and some important Minarets were erected during this era. The main streets of old Isfahan usually connected the city centre (old meydan) to the gates. These

covered routes had another function; they were bazaar as a structure of Isfahan urban in Saljuqid era. The form of City wall and bazaars followed the organic form of topography and water routes. In the Timurid period the city organically developed further; the city wall expanded southwards, the Isfahan bazaars grew and some new neighbourhoods were formed (Pakzad, 2011). This period sees Isfahan as well developed and quite prominent on the map of the medieval cities of Asia (Babaei, 2008) reflecting blossoming Iranian art and architecture of the time.

From the 15th century, from Safavid era, Isfahan emerged as an avant-garde metropolis became the capital for the second time during Safavid. Shah Abbas the Great (1587-1629) moved his capital from Qazvin to Isfahan and developed Isfahan for its new role. In general Safavid's strong central governments had plans for their capitals, for example, Qazvin shows some examples of new urban interventions. But Shah Abbas's ambitious plans for developing Isfahan were realised in form of large-scale urban public places, new boulevards and architectural monuments. Naqsh-e Jahan meydan and its surrounding buildings were erected for the governmental function and the straight Chahar-Bagh Street connected the old city to the royal palaces (Hezar Jarib) on the other side of the Zayande-Rud. Isfahan's development before Safavid was organic and slow during centuries of organic growth but it changed during Safavids rule as the city developed according to a planned urban design based on the new Cartesian geometry. Development of art and architecture in the city of Isfahan reached its peak and set examples for other cities in the region. Complementary to large-scale urban plans, at this time a new period in Persian architecture emerges bringing rich, sensationallly coloured and imaginative details developed by the predecessors into meaningful ensembles of immense scale and grandeur (Pope, 1965) that was later referred to as the Isfahan School of thought by researchers such as Habibi and Ahari. Figure 2 presents the morphological development of Isfahan.

Perspectives on Isfahan School of Urban Design

Architecture was always a physical symbol of philosophical thought of men. The Art and architecture of Iran was being developed from centuries ago had its mark on the Middle Eastern cities. For example, Samarkand city, the former capital of Uzbekistan repeats a particular city-form and conceptual underpinning of Isfahan, and is ultimately called "the Isfahan of Central Asia (Shea, 1995). This school is important in the field of urbanism because related achievements formed earlier than Renaissance and Baroque in Europe. The famous practice of Iranian art and architecture only reaches its climax in Safavid era, during which their capital, Isfahan, became a city-scale scene for statesmen and artists to exercise their ideas, religious, philosophical and mystic beliefs in architecture and urbanism, supported by a strong central government that also was a religious leader. Architecture/urban planning was more than a mere aesthetic experience and indeed was symbolic of greater truth of the relation between human and God (Shakiba, 2013; Ardalan, 1973). In fact, the Isfahan School started before Isfahan became the capital and in other Iranian cities such as Qazvin and Tabriz. Shah Hassan in Tabriz and in Qazvin by Shah Tahmaseb (two processors of Shah Abbas in Safavid ear) built Friday Mosque, meydan, bazaar and new boulevard in order to boast their governments' power, economic, social and culture of in their capitals, which were Tabriz and Qazvin respectively.

Iran's traditional architecture and art originated from monotheism and accepting divine unity. God created the world based on discipline, order and beauty. Iranian architecture was inspired by order. Architecture tries to restore order in environment; the traditional architecture aims to place human being in God presence by creating order in space. These Islam Gnostic aspects establish Islamic art foundation. Clearly, harmony, proportionate and continuity in spaces are pleasurable and chaos, disorder and visual disorganization are inconvenient (Tavassoli, 1992& Ardalan, 1973). The city form represented a composite of world views and cultural idioms and nevertheless expressed an idea about the city as 'the face of the earth', 'the

mirror of the world', 'the garden of souls' etc. Statements as such are compared to the poems of the Sufy mystics that reveal conceptual essence of the Islamic art and architecture that addresses the search for order and harmony in the natural world, the intangible world, the human soul and the city. Such principles are repeated in cities that either are part of Iran or influenced by the Iranian culture, art and architecture. For example Samarkand that represents the same principles (Shea, 1995). Concepts of unity-pluralism and order-chaos are of the common fundamental characteristics in art and architecture that can be seen as of the architectural tools for forming cities, buildings and gardens that are the mirror of god on the earth. Both are manifested by geometric patterns. Figure 3 presents examples of geometric patterns for creating totality and unity in Islamic art and architecture.

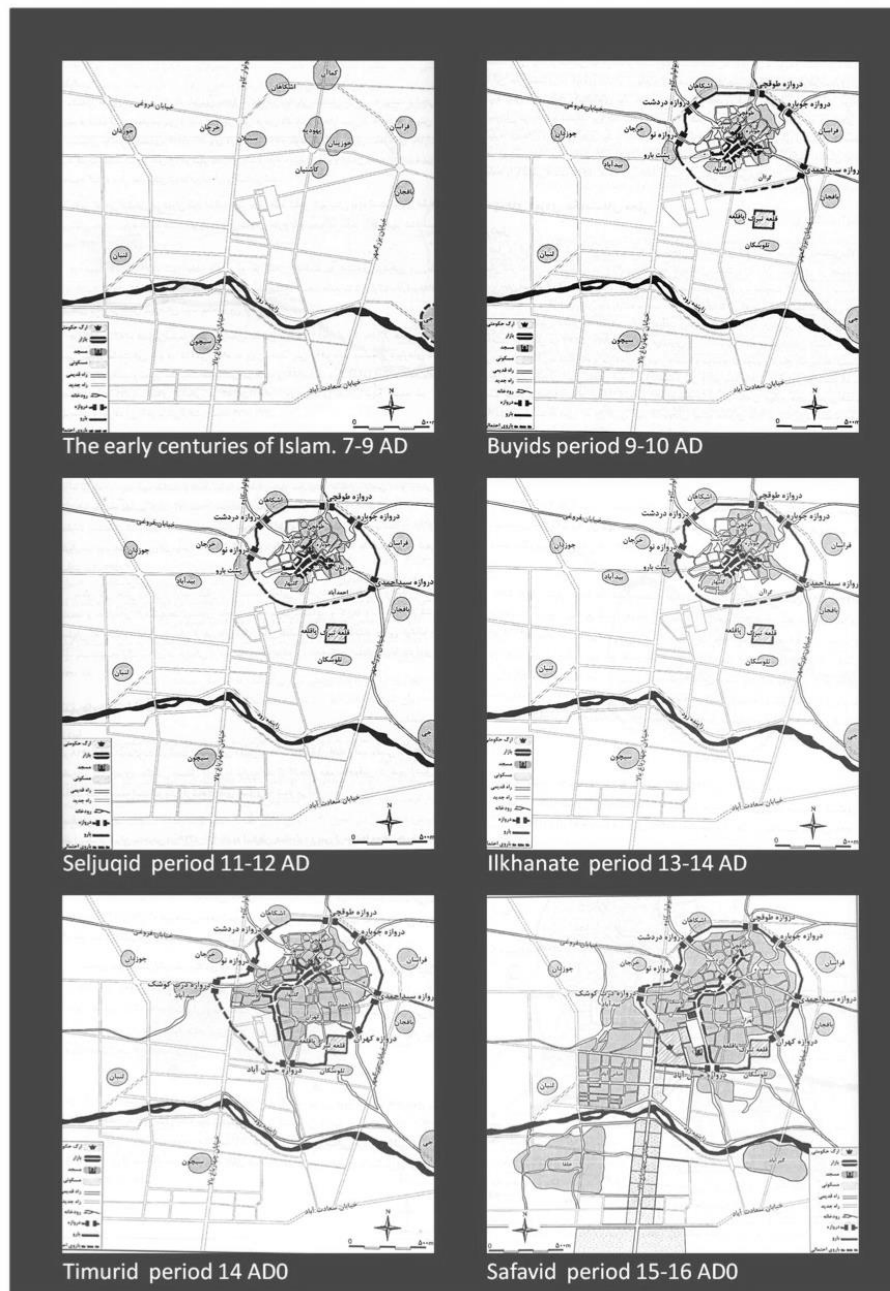


Figure 2. Development of urban form in Isfahan during centuries (matched on the contemporary streets map) (source: Pakzad (2011)).

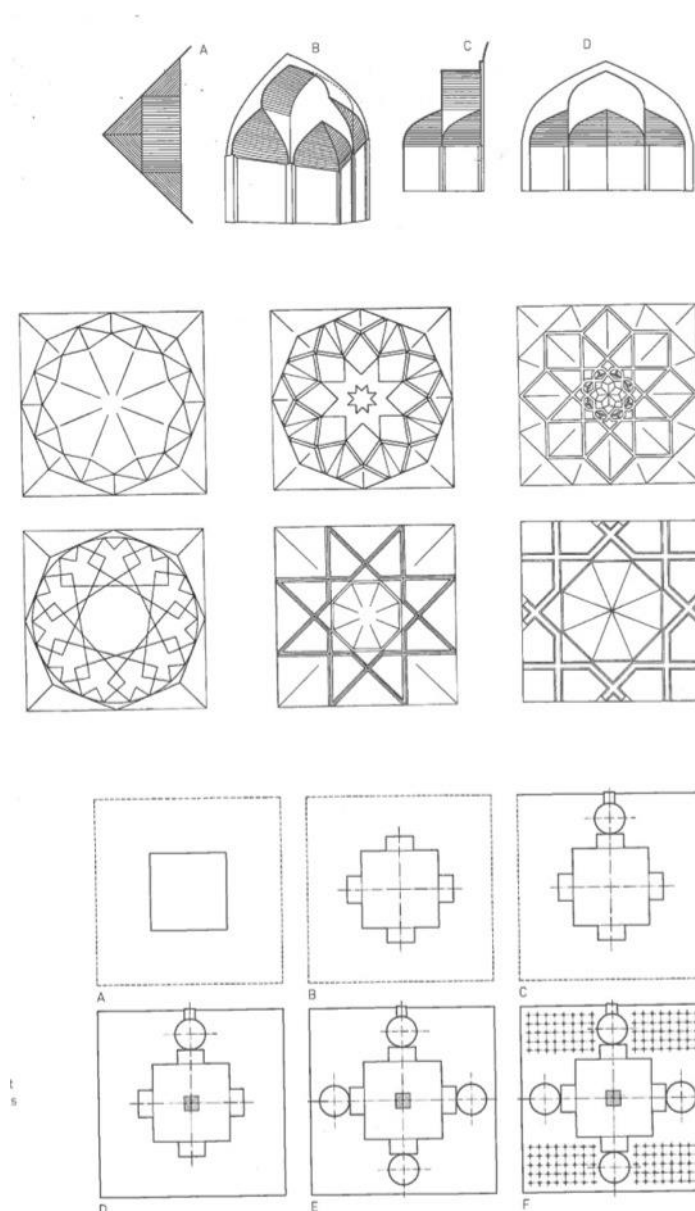


Figure 3. Examples of using geometry in art and architecture (source: Stierlin, 2011).

The concept of unity in art and architecture has resulted from Sufism spiritual thinking, where the unity of one (God) and his beloved is celebrated and plural details all mirror the one. The relationship between detail and totality is considered as an Iranian urbanism branch related to unity and pluralism issue; every element and form is comprehensive, individually and combined. While market stalls are independent and complete structured in a combination they create the totality of bazaar (Shakiba, 2013; Tavassoli, 1992; Ardalan, 1973). Order is synonym of geometry in Iranian architecture. Mathematics and geometry played a deterministic role in visual arts and architecture besides organic and natural structures geometrical patterns. Symmetry is a powerful tendency in Iranian architecture at the time. There is a difference between organic expansion and Euclidean geometry but it is similar to fractal geometry, while in static buildings an independent, individual and geometrical order is seen. Even in bazaar, although the pathway creates an organic spiral form without classic geometry in total arcades, architectural modules and nodal junctions offer the sense of geometry and continuity.

Moreover, caravanserais, schools, inns and bathrooms are the extensions of bazaar and all follow strong order and geometries. They present static and independent well-defined geometrical order like leaves on stems (Shakiba, 2013; Tavassoli, 1992; Ardalan, 1973). Figure 4 shows this.

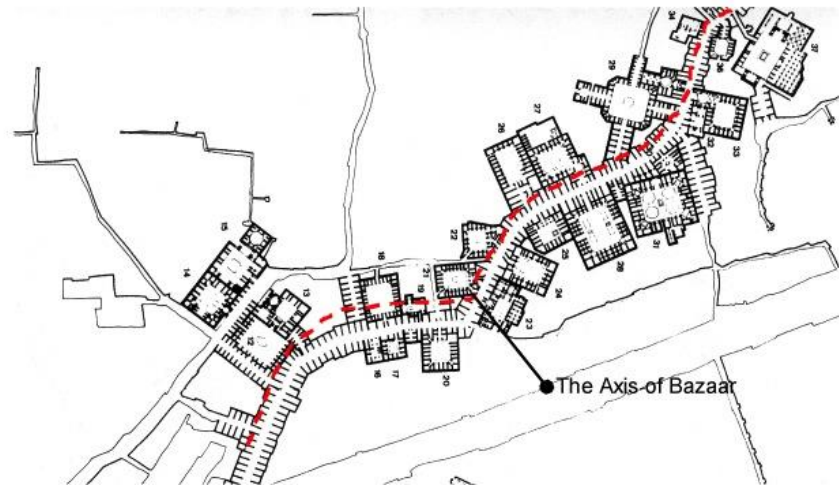


Figure 4. Details of Isfahan Bazaar (source: Ardalan & Bakhtiar (1973)).

Importantly also, the mystical epistemology of Iranian art and architecture was mirrored in Safavid era by Shah Abbas the Great (16 AD) ambitions, exceptional capacity and artistic sense, and was aided by the wealth, security and strong central government that his able government had fostered. Therefore, not surprisingly, the Shah is treated as the world ruler and the rules' palace is at the centre of the world. The palace precincts represent the spiritual head, while the mosque is the symbolic heart of the city's body. At this time a new period in Persian architecture emerges where in rich, sensationally coloured and imaginative details developed by his predecessors become unified into meaningful ensembles of immense scale and grandeur (Pope, 1965) and was later referred to as Isfahan School of thought. Divine school of Isfahan flourished in philosophy and theosophy which eventually influenced architecture, urban design and other arts. It resulted in formation of patterns which determined not only architectural and urban forms in Isfahan city but also served as a model for urban development throughout Iran and the neighbouring countries and cities as it was in Samarkand. The period is known as the period of unity in formal language of urban design. This language is known as Isfahan school of urban design.

Innovative but Integrating Urban Structure in Isfahan

When Isfahan had become the capital of Safavid dynasty it was already well developed and quite prominent on the map of the medieval cities of Asia. The morphology of Isfahan developed organically over centuries. However, the early Safavid (400 years ago) refashioning of the city as their capital was not shaped by the same gradual integration of the new urban elements into the old fabric of the city as were, for example, Istanbul, Madrid, Paris, and London. Isfahan fundamentally transformed at this time through large scale pre-designed urban expansions which granted the principal patterns for its later developments up to this time (Babaie, 2008). It was, indeed, under the Safavids that Isfahan was transformed into one of the greatest capitals in the world of that time.

The new transformations happened in the south of the old city, extending the city towards the Zayande-Rud River. The structure of the city in this period was based on bazaar and a large organic square, called Meydan-e-Kohne (the Old Meydan) and the grand mosque nearby. This

organically shaped meydan was located where the major roads converged in the centre of the city (Browne 1976b). The main routes leading from outside to inside of the city transform into to the major branches of the bazaar, a pattern which has preserved its major characteristics until now. This urban expansion (took place two centuries before the famous Housman's works in the 19th century's Paris) included a large geometric urban space at the south-end of the bazaar, a counterpoint for the Old Meydan. The new urban space or Naqsh-e Jahan Meydan was a joint for connecting the older parts of the city to the new extensions of Isfahan. Its surrounding buildings were erected for the Royal functions, e.g. new palace and royal mosque. Naqsh-e-Jahan was also connected to a wide park-way style boulevard, Chahar-Bagh Street that means Four-Gardens in Persian. Stretching from north to south Chahar-Bagh was established as one of the main axes for the city extension program and connected other royal palaces (Hezar Jarib) on the other side of the Zayande-Rud to the old city. This pre-designed geometric urban expansion resembles contemporary urban development projects. As Ardalan and Bakhtiar (1979) highlight, Shah Abbas the Great achieved his ambitious plans for Isfahan by appropriating an innovative relationship between the new and old parts of the city. This relationship was manifested particularly in the Linear bazaar system (Sarraf, 2010). Figure 5 shows the Isfahan expansion and its connectivity to the older organic parts of the city.

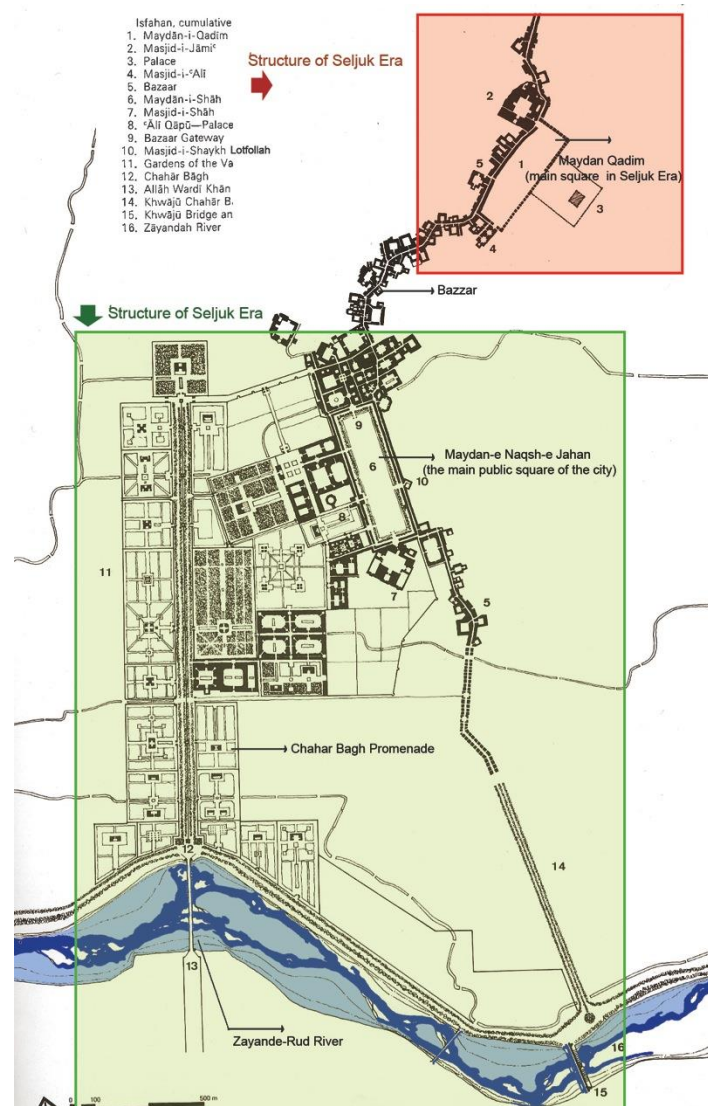


Figure 5. Pre-planned urban expansions in Isfahan (source: Habibi, 2008).

Isfahan urban structure and main elements

According to Piaget (1971) urban structure is a complex of places and streets interconnected. It joins the whole of city and unites all of the city's main components. Traditionally, bazaar was in the basis of the spiral structure of Iranian cities and of what is called Islamic cities. However, the great urban transformation of Isfahan gave rise to and emphasised other significant elements in the urban structure and morphology of Isfahan. Figure 6 presents the Isfahan city after the great urban expansion.



Figure 6. Isfahan after urban expansion (source: Sarraf, 2010).

While the urban form consistent of different elements comprises a unified totality, it is still possible to discuss its components separately. The following four elements of the urban structure that together can be identified as the “central design structure” of a city and present the

city's identity. These include: bazaar, Naqsh-e Jahan (the main public Meydan-plaza- of the city), Chahar-Bagh Boulevard, and Zayande-Rud River.

They hold the city structure together over centuries and preserve areas that are now recognized as the World Heritage Sites:

Naghsh-Jahan: According to Hillenbrand (1999, p. 230) a prominent art historian, the expansion of Isfahan masterplan for its expansion almost 400 years ago is one of the most ambitious and novel schemes of town planning in Islamic history. One of the greatest monuments that came out of it is the great central meydan, Naghsh-e Jahan, which, with its measurements of 512 * 159 m (1680 * 523 ft), is perhaps the largest plaza in the world. The great central meydan was designed as the heart of the new city and served as a stage for military manoeuvres, public processions and games, especially polo. . It is surrounded by two story arcades which focus on the recessed portal of Masjid-e-Shah (Royal Mosque). Opposite at the north end of the meydan, is the royal caravanserai and the bazaar. At the middle of the west side is Alighapu- the government seat and the private oratory of Shah Abbas, the mosque of Sheikh Lutfollaah. Each side of the Naghsh-e Jahan is defined by a certain function and architectural dominance of the building. The northern side shapes the entrance of the bazaar, linking it with the older parts. The royal palace overlooking the Meydan sits at another side and is connected with the Chahar-Bagh Boulevard through its gardens. The fourth side is identified by another mosque-the Shah Mosque (Masjed-e Shah) which is the new grand Mosque of the city (Pope, 1965).

Moving the Friday mosque from the older part of Isfahan to the site of its urban expansion is an evidence of the Shah Abbas's decision to move the city life to the new planned areas. In fact, a Friday mosque is celebrated as the most important building in the Islamic cities. Any decision or proposed suggestion about the design and structure of this building should be made by the caliph, king or the delegated powers (Sarraf, 2010).

Interestingly, the Naghsh-e-Jahan meydan itself is also known as a positive space. The large size facades of the meydan are divided by the two story arcades, which size is proportionate to the commercial architectural modules in the Isfahan bazaar. The meydan is conveying the sense of place through the surrounding architectural monuments with each one being an architectural masterpiece of Iranian art and architecture. For example, as Pope (1965) describes the Masjid Sheikh Lutf Allaah as a culmination of a thousand of years of mosque building in Persia and refers to the whole mosque as of majestic proportions. The Naghsh-e-Jahan meydan becomes an urban courtyard that connects prominent functions and city life together. It is a designed place of integration between the old and new, the organic and geometric, and finally, between delicate smaller scale and large scale architectural elements in an urban scene. It is a designed public place and a meeting point of religion, power and commerce. Figure 7 shows a facade of the Naghsh-Jahan meydan with an overview to the Masjid Sheikh Lutf Allaah.



Figure 7. Naghsh-e-Jahan meydan, source: Silk Cities archive.

Bazaar: Despite the sudden expansion of the city, the Isfahan bazaar was kept as the main urban structures for the new visionary city. Isfahan bazaar remains one of the best examples of the Eastern bazaars, in terms of character, size and architecture. The high levels of spatial integration extend from the Old meydan through different branches of the bazaar and reach the gates. The main thoroughfares shape, at the same time, residential quarters around them are joined by some secondary routes (Karimi, 2003). Isfahan bazaar also underpins the material and spiritual aspects of the city; it does not make distinctions between the urban quarters, and forms an integrated and unified complex with links to the different areas of the city. When Isfahan reached the peak of its prosperity in the Safavid era, the bazaar connected the old and new cities and ensured the survival and well-being of the city. Bazaars are never static because cities continue to live and grow around their significant axes and they offer unique scientific values so that anyone can find the city's identity through it (Pourjafar, 2014).

Ardalan and Bakhtiar (1979, p. 97) describe the bazaar of Isfahan as a strong movement under the shade that stretches from the Khawju Bridge on the southeast to the northern gateway, encompassing, in its course, the primary commercial, religious, and governmental activities of the city." All the different senses of hierarchy, unity, concentration, privacy and publicity, solitude and togetherness, mobility and immobility, connection and proportion, simplicity and complexity, and dimension and domain are implied in the complex of the bazaar and its public spaces. According to them, the bazaar is the primary movement system in the fabric of the city, while the residential pathways are the secondary and the Madi are the tertiary one. Pedestrian crossings are like ribs feeding into the backbone of the city and the vital organs are placed in close proximity to each other; the schools, the baths houses, the granaries, the bakeries; tea houses and stores of craftsmen and of merchants (Shea, 1995).

Chahar-Bagh: Chahar-Bagh Boulevard or as its Persian name means "Four-Gardens", refers to a popular garden typology consisting of four plots divided by waterways or paths forming a cruciform plan. The original public boulevard is 1,650 meters long and consists of four quadripartite gardens arranged along a north-south axis that slopes towards the south. Each quadripartite unit is composed of two square and two rectangular plots separated by pathways and is located slightly lower than the preceding unit. Together, they are experienced as a single boulevard with a central promenade flanked by axial garden plots. The gardens have since been converted into roadways, with plane trees lining either side. Running along the centre of the promenade was a water channel with cascades; the promenade now only features circular flower beds and light posts (Blake, 1999; Blunt, 1966; Ope, 1977; Katouzian, 1986; Alemi, 1986). Water channel also contributes to creating a natural axis that directed further urban development towards the south of the city.

Zayandeh Rud: The Zayandeh Rud River was considered as a natural southern border of Isfahan; a natural element that directed the urban expansion during Safavid (Pourmoghaddas, 2006). Access to the south point of this river was provided with several bridges over it that were constructed at different times. Although the river has always served as a sustainable water source, being located outside the city it never influenced the socio-spatial relationship of Isfahan to a large extent. However, during the Safavids era the Zayandeh Rud River and its bridges played an important role for channelling commercial activities all over the city. Celebrations were also conducted on the Zayandeh Rud River bank (Agha Ebrahimi Samani, 2012). The river is on the main elements for creating natural axis in the city. This "combined natural axis" is the main element that has led the urban growth of Isfahan during its past four centuries. This axis consists of Naqsh-e- Jahan, Chahar-Bagh Promenade, Si-o-se-pol Bridge, and Chahar-Bagh Bala - which is the contemporary extension of the historic Chahar-Bagh towards the south of Isfahan. This axis connects the Zayande-Rud River to the city life with the nature and nature and it ends in the agricultural fields beautifully (Habibi, 2008).

Encountering Modernisation

Since the 20th century, the new universal ideals shaped by the unfolding free market economy, advanced technology and a nuclear family model at the micro-level have prompted the

relationship between architecture and modernisation (Ricouer cited in Foster, 1982:16). Like anywhere in the world, desires for having modern cities have negatively affected historic cities across the Middle East and Central Asia region. For example, following fashionable mindset of becoming modern at the time (1925 onward) Pahlavi dynasty did not pay attention to the existing urban structure and form. While Safavid ambitious plans for Isfahan included urban expansion in the continuity with existing urban structure and morphology, the period of modernisation cut through traditional urban fabric and changed the existing physical patterns and relevant socio-spatial relationship. As Sarraf (2010) points out, although the Safavid urban transformation is considered as a successful large-scale urban development initiative in the history of Isfahan, there are strong criticisms about the urban renewal programs implemented in 20th century, in Pahlavi's era in attempt to modernise Isfahan. The urban growth of Isfahan, akin to many historic cities, was the outcome of a centuries long process. The modernisation programmes of Reza Shah (1925-1941) gave the city a modern-looking face . Radical modernism entailed more than urban expansion but also imposition of automobile as the principal mean of transportation throughout the city and, hence, the cure for all the ills of the compact, integrated urban fabric. Straight streets cut the compact, integrated fabric of the Isfahan bazaar next to the Friday Mosque, as it was the case in many other cities in Iran in the 1930s-70s. Easy access by car to the city centre as its commercial/cultural heart became prominent with automobiles being prioritised over pedestrians. Figure 8 shows how the urban fabric and Isfahan bazaar was cut in order to provide transport solution for automobile accessibility.

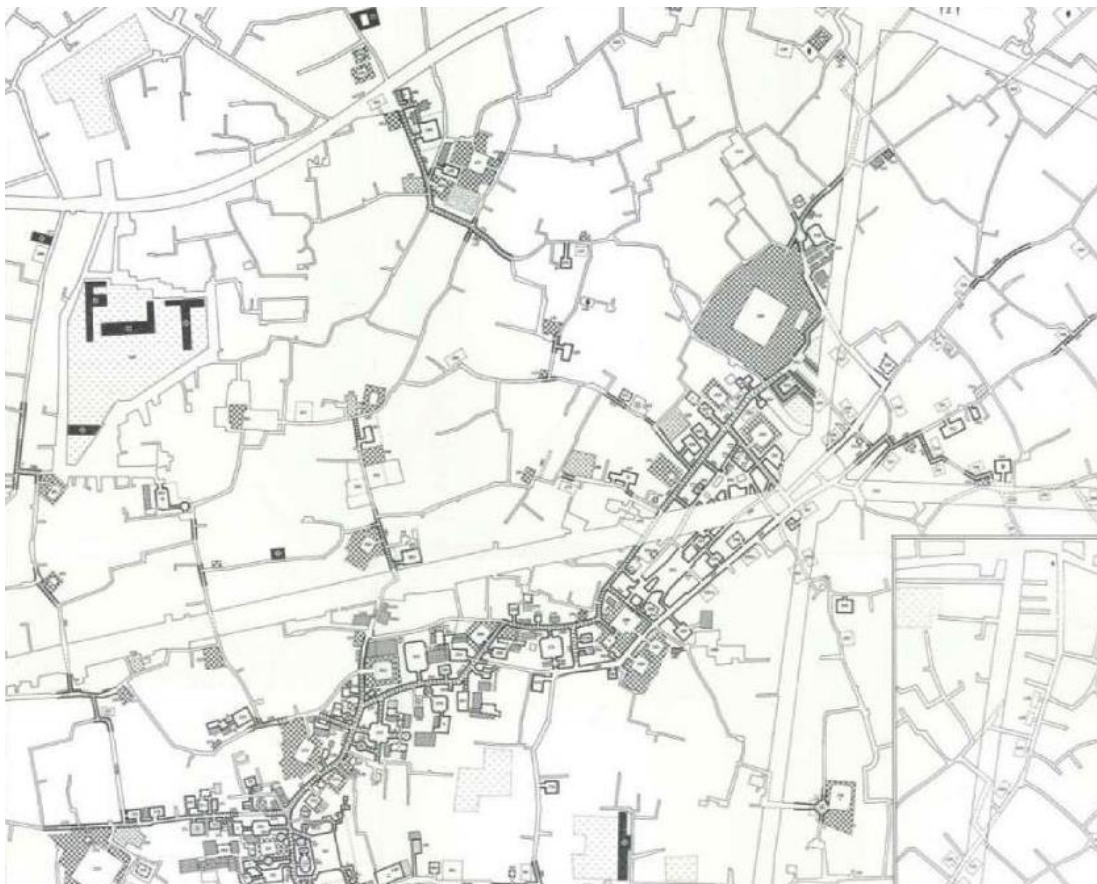


Figure 8. Cutting established urban structures to allow cars enter the commercial heart of the city (source: Sarraf, 2010).

Another example is Samarkand; during Russian and Soviet presence in Samarkand most of the significant urban forms were destroyed or/and transformed for different uses. The rest of city was re-planned by the soviet architects using the same model as in other Eastern European towns and given none consideration to the concepts that shaped the city's archetypal forms.

Wide roads were built with long vistas cut through the fabric of the traditional courtyard housing, and raptured of a traditional concept of settlement. Traditional urban neighbourhoods (Mahalleh) were retreated from the principle avenues along which Soviet style apartment blocks and administrative buildings occupied the cleared, open space. Multi storied apartment blocks, hitherto unknown here before, supplanted the traditional courtyard houses and became Samarkand's predominant building types transforming certain parts of the city (Oosterman, 2009).

Moreover, the superimposition of a pattern of straight streets onto many of the historic cities was not only cutting the physical structure it violated the socio-spatial order which were implanted in those urban structures over centuries of incremental growth. For example the commercial connections in bazaar and the traditional residential neighbourhood patterns (Mahalleh), which used to fill the urban fabric in the continuity with the main urban structure and the holistic urban form. The first masterplan for Isfahan envisioned an imposed Cartesian grid network of roads throughout the city. Fortunately the plan was never implemented and some historic parts of Isfahan, e.g. Naghsh-e Jahan meydan were preserved as the World Heritage site. However, as Sarraf (2010) highlights, today's urban development programmes are deeply rooted in the urban renewal strategies of the 1930s that consider the physical form of cities apart from their social aspects.

Conclusion

Traditionally the built environment in the Middle East and Central Asia grew from people's dedication to Islamic thoughts and actions. Isfahan city is an exemplary case of the Isfahan school of thought Iranian Art and architecture that is rooted in the spiritual philosophy of Sufism and harmony between the physical form of the city and its socio-cultural milieu and expressed through geometric forms, squares, circles, domes and four-iwans courts. The Safavid era provided support, prosperity and security for Iranian art and architecture and serve ambitious urban expansions. Thus, Isfahan can be seen as an avant-garde case of urban development for its time that generated values and lessons relevant for the contemporary cases. The morphological integration between the pre designed Isfahan urban expansion and its existing organic urban structure makes Isfahan a masterpiece of Islamic urbanism.

The traditional bazaar in Isfahan with its socio-economic and architectural values was an integral part for urban morphology. Furthermore, the Iranian art and architecture, which influenced the Middle East and Central Asia and developed over centuries, served a significant role to create a morphological integration between the old and the new. Architectural harmony and sense of place were created through architectural modality and excellence in monumental buildings in the Naghsh-e Jahan meydan. However, such richness and inherited values in Isfahan school of thought and the city itself was ignored, while encountering modernism that prioritised automobile and cut through parts of the integrated fabric around the bazaar in order to facilitate car accessibility. While the Safavid urban development plans were to complete the existing structures, the modernistic approach tried to impose a new order regardless of what it was in the ground, cutting through socio-spatial morphological patterns of the city.

Given the lessons from Isfahan School of urban design and exemplary case of the Isfahan city itself, the question therefore, is how the future urban morphology as a determinant for socio-spatial relationships of a city can be in harmony with the traditional morphological pattern of a city. This question exists not only for the historic Islamic cities in the Middle East and Central Asia that evolved during many centuries but also for all cities that regardless of their age represent a specific morphological identity.

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Discussion about the similarity of the forms of the cities of Porto (Portugal) and Qazvin (Iran)

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Abstract. *At present, in major cities, the lack of urban structure cohesion and connectivity promoted by the expansion of street network dominated by cars has increased dramatically. Hence, social life and citizen rights considering anthropocentric and human scale have been put at risk in many cities. “Old Towns” are perceived as urban structures of the past that are revitalized and given new significance in contemporary cities. The geometrical order of the cities structures shape diverse urban tissue and promote the development in several directions. However, the main activities of the cities occur in the places with the most social interactions. In this context, this paper presents an ongoing research that aims to compare the main areas of Porto (Portugal) and Qazvin (Iran), based on growth of the cities around its historic center, i.e. “Old Town”. The urban form of the cities will be analyzed and assessed by a methodology based on street pattern identification. Also will be discussed the urban design and environmental quality. Research findings shows that the main areas of the both cities require new pattern solutions in order to promote connectivity through pedestrian network.*

Key Words: form, structure, pattern, Old Town

Introduction

Cities, like living organisms, are subject to changes and transformations. This condition has demanded the development of suitable and adaptive design solutions that require the full consideration of the spatial continuity of the city, its physical and social peculiarities, user needs, and desire for safe and healthy communities. In addition, architects and designers need to be familiar with the developmental stages of the city, including components that may have disappeared over time. It is therefore necessary to read different segments that constitute the city to reveal its historical, cultural, social, physical and symbolic features.

Yucel (1979) emphasizes that it is necessary to make some abstractions in order to handle the space conceptually and theoretically, addressing architectural theories on this subject in three categories. The first one is the functional approach which means that the realities of economic, cultural, historical, technological, ecological and social practices are sufficiently understood, in order to provide reasonable explanation of the spatial environment. The second involves placing the spatial elements within the principles of morphological elements that constitute the city image. The last refers to linguistic resources, with the idea that architecture creates a language, in order to comprehend the structural logic of the architectural space. This enables practices intended for spatial typology and urban morphology.

This study mainly focuses on the comparison between two cities in the 16th century. It is possible to describe different urban patterns and forms in many ways. Qualitative methods, as one of methods which describes different urban patterns and forms, include morphological and morphographic description (Conzen, 1988; Whitehand, ed., 2007; Gordon, 1984; Larkham and Jones, 1995). The structure of each city includes a set of paths and nodes, the overall structure of the city and its main activities. The network includes some places that the majority of people are in these places, and Sub-networks are connected by association or joint. The main purpose of this paper is to introduce the skeletal difference and provides the city's guidelines. In this context, it is essential to understand the different models in historical periods. This research studies on various forms of structure which can improve urban structure for pedestrian network.

Without any doubts, such investigations have a significant impact on structural integrity, restoration of social roles and activities in city.

Structure

Cities need the design and plan for social cohesion and cultural diversity. A complete understanding of social, economic, political and cultural characteristics of the city is needed for a successful plan. Finally they will be integrated into the daily life. Viewing economic opportunities in conjunction with other forms of political, social and cultural rights in societies is what builds capable social capital in cities. Therefore achieving the aims of inclusive cities requires an in-depth review of system, structure with the objective of changing the basis of individual engagement with others (UN-DESA, 2010: 15).

Structure as a main bond in urban tissue contributes by major public spaces linkages and has the most dynamism of public space. “Old towns” are perceived as urban structures of the past that are revitalized and given new significance in contemporary cities (Nyseth, T., Sognnaes, J., 2012). The geometrical order of structure builds urban tissue and development direction. The main activities of the cities occur in the places with the most social interactions.

A city is an organism that needs an underlying structure, such as a backbone, to secure its different elements around itself and enable their natural and logical development.

Change in the urban structure of Porto

Teixeria (2008b) focused on form of cities with Portuguese origins. He believed that morphologic of Portugal was divided into three parts. The first consists of the morphological characterization of the Portuguese of street system that include plan hierarchy, the main urban elements, the structure of urban blocks and plots, urban squares and the planning process. The second presents demonstrating how its form synthesizes Portuguese town planning of the sixteenth century. Lastly, the third part analyses the plan for the reconstruction of downtown Lisbon (Olivier, 2011). Between 15-16 century, Portugal had innovation of planning in urban network where central area of city is. It had composed of set blocks organized on a regular structure. This network had used cathedral and new tissues shall be a regular planned urban space (Bettencourt, 2007).

Important feature of previous study was the identification of the most important node of the overall city structure. The Porto Metropolitan Area is characterized by a coastal Atlantic landscape. The urban pattern is concentrated among the main nuclei (Porto and Vila Nova de Gaia) and scattered among many small rural towns and villages. Products, like Porto Wine, produced in the Douro valley, was already in the 13th century transported to Porto in Barcos Rabelos, add such identity to the city that is still known for them, even though Porto Wine is actually produced in Vila Nova de Gaia. However, what is really important it to understand the dynamics of the city and its evolution until times. The downtown of Porto can be defined by certain main landmarks – it is centred in Avenida dos Aliados (Silva, 2008: 63).

Porto is one of the oldest European cities. Archaeological research conducted in the Cathedral area reveal that the first traces of civilization in the space now occupied by the city of Porto dating from the late Bronze Age (3000/4000 BC). The city had its start on the hill of Penaventosa (Currently Morro da Sé), time was a good strategic advantage as it allowed good visibility on the estuary of the Douro, and was otherwise difficult to access and presented favorable topographical conditions the deployment of buildings. The hill encircled by a wall, known as Old Fence or Fence Romanesque (Cabeças, 2003 & Wikipedia, 2013).

Hugo awarded the first charter city residents (the Porto town) (Cabeças, 2003). The Porto of the 12th century was an episcopal town (with its unique cathedral parish), namely, the bishops were the owners of the town, with the right to apply justice, administer the lands and collect

taxes. During this 3-year period there was a tension between D. Hugo and the inhabitants of the Borough, which later lead to conflicts between the population and the bishops this century. For this reason, began the construction of the Cathedral by Bishop Hugo, it was an Old Fence important element, which affected the structure of the urban tissues of the town. Inside the building was filling the free spaces. The lack of space to build the interior led to the need to build enough away from the wall, creating needs for planning and advocacy. During the thirteenth and fourteenth centuries continued a period of expansion in the Port grew out of the old fence, around the Cathedral, and in the lower zone of the Ribeira, connected by an urban network that was High Density (Cabeças, 2003 & Wikipedia, 2013)

In the fourteenth century the port grew along the bank of the river Douro, reflecting the importance of trade and maritime activities. In that same century, during the reign of D. Pedro, began to be built a new outer wall that was completed in 1376, the New Fence or Wall Fernandina, covering an area of about 900,000 m² and being completed in the reign of King Fernando (Azevedo, 2010:41).

The picture shows process change central city of Porto. It has been shaped in different periods of the history between 12th century and 16th century. In the center of structure, there is the open space which has been created mainly for the religious activities. During time, the ministerial activity was formed. This picture illustrates the structural changes of the city during three periods (Figure1).

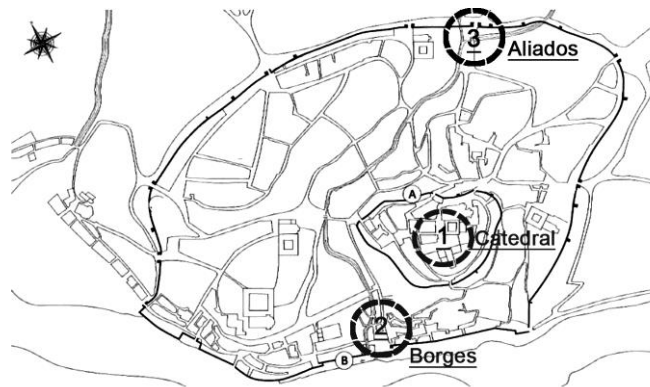


Figure 1. Analysis of Main Structure: Organization of the Territory in the Middle Ages (A - Wall of Bishop Hugo the Twelfth Century; B - Fernandina Wall the Fourteenth Century)(source: Azevedo, 2010:41).

Change in the urban structure of Qazvin

The expansion of city has depended on development the cities' spatial structure and commerce structure, while commerce tends to concentrate in agglomerations. Commerce is one of the most important functions of a city. A crucial idea states that the structure of traditional cities in Iran is based on its bazaar's economic and political factors. From early Iranian urbanization to the present time, different factors have been influenced in the formation of traditional cities. This composition has had its own form in each period, and the governors complete this combination to show their strength and understanding. Some scholars believe that bazaars are the main core of Islamic cities; others consider the "Jame mosque" as the city center; whereas some believe both are Islamic city concepts (Encyclopedia Islamica, 2012).

The structure of Iranian traditional cities reveals that a bazaar, which usually takes a linear shape, acts as the spinal column of the city and continues toward the main gates of the town (Assari et al., 2012). A bazaar is thus located in the main core of Islamic and Iranian cities. An Iranian city is frequently defined by a congregational Jame mosque and must have a chief

bazaar nearby. For economic and commercial activities in Iranian cities, the bazaar is the most important public space that has been used for development of city (Pourjafar, 2014).

The collection of the economic, social, religious, and main cultural centers of the traditional Iranian city is called a “bazaar”, which is unique to Iran. The bazaars of old Iranian cities were fully prepared to accept much flexibility in terms of space and functionality. Bazaars are generally connected to the city gates through the main urban network. Residential neighborhoods are located in the spaces between the gates of the city and the bazaars. The bazaar complex is like the backbone rooted in the organic context of the city. Thus, In Iranian cities, the bazaar are connected to living space. One guarantees the other one, promotes its mobility. Bazaars in Iranian cities are the main artery of the urban life system and represent the center of social and economic activities. Bazaars provide cohesion among the different parts of cities, such as residential areas, as well as socio-political and trade centers. Bazaars as a unifying element connect the main urban functions and guarantee the city's economic and social life (Pourjafar, 2014). The cities have had some of the richest economic and cultural resources that influenced its underlying urban tissue. Cities were built on a pedestrian scale (Figure 2).

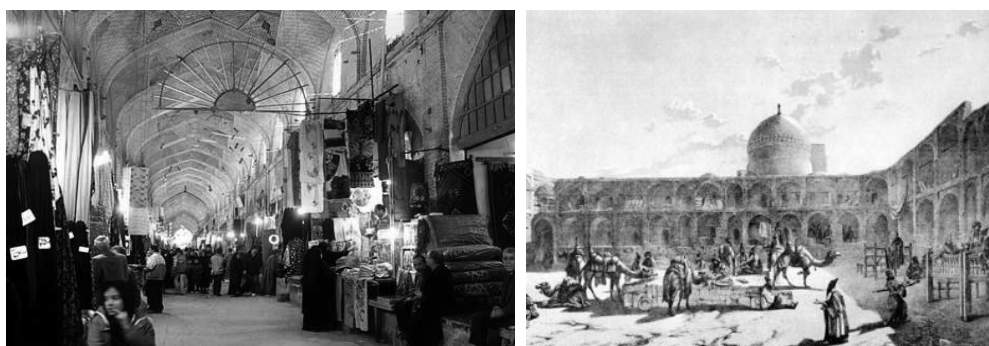


Figure 2. Bazaar in the Past and the Present.

Qazvin is one of the largest cities and capital of the Province of Qazvin in Iran (Wikipedia, 2013). Qazvin central position in Iran also preconditioned it to become the capital in the Safavid (1524–1576) period. It is a provincial capital today that has been an important cultural center throughout history. Archeological findings in the Qazvin plain reveal urban agricultural settlements for at least nine millennia. Qazvin geographically connects Tehran, Isfahan, and the Persian Gulf to the Caspian seacoast and Asia Minor. Hence it is a strategic location throughout the ages. Given the geographical position of Qazvin at the center of the Iranian plateau, it has been known as one of the most important trade centers of Iran. This position occasionally makes it the bridge between the East, West, South, and North. Its bazaar has developed in the parts of the city that are closely connected with producers and customers.

Before becoming the era capital, the main element of the city of Qazvin was a small bazaar located in the Southern part. In early Islam, the core or backbone of the city (along the East-West axis) was the Silk Road that ran through the middle of the city. The “Jame mosque” formed within this core and the bazaar, as a strictly linear element, extended from two sides of the core and along the main axis. During the Safavid period, the king decided to move his court away from the old city. He set up chogan square as the central core of his plan in the north margin of the city, and tied the old core at chogan square with Boulevard (Sepah Street) that extended the city along this axis. With the connection of the new bazaar around the chogan square and the old bazaar alongside the square, the invigorated socio-economic life of the city continued. In the next period, residential neighborhoods formed around the bazaar that became the heart and spirit of the town (Jabbari, 2007). This picture shows the structural changes of the city during three periods (Figure.3).

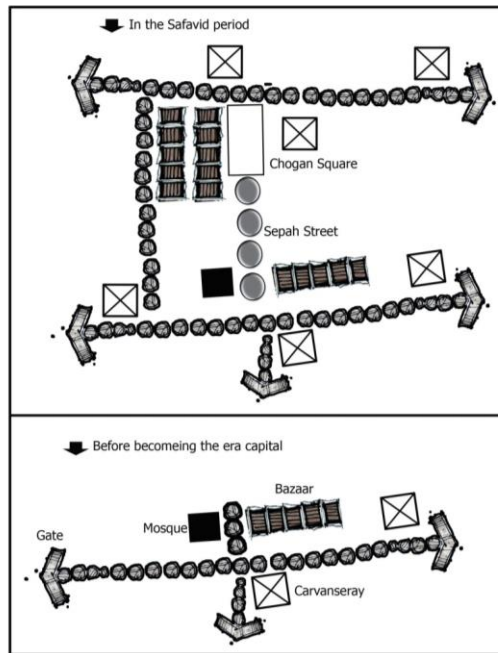


Figure 3. Analysis of Main Structure: Before Becoming the Era Capital and In the Safavid 16M.

Compare to two structure

The main structure of Porto is the nuclear. The nuclear structure is strong articulation and there is an intriguing connection between constituents of the nuclear and street. This structure provides further impetus to form other part of tissues and a pattern for future of Porto city. This pattern is based on open space that urban tissues formed around it organically. It can help pedestrian to find destination and finally it is suitable structure for social Interaction.

On the other hand the main structure of Qazvin is the linear. This is a path-dependent structure in which the initial shapes of cities have expanded. Linear structure influences on urbanized nodes to develop along the urban network. This pattern joins nodes in urban tissues. Overall, Qazvin bazaar had main pattern that use for development of urban tissues (Figure 4).



Figure 4. Analysis of Main Structure Qazvin and Porto.

Current Situation of Porto Structure

The preparation of the new municipal master plan for Porto started in 2001 and the plan was approved by the last executive in 2005. The strategic objectives of the plan are: the strengthening of the urban identity of Porto, the rehabilitation of the public space and of the built environment, the rationalization of the transportation systems, the reduction of the existing urban imbalances, and the promotion of the historic quarters and of the central area (Pinho & Oliveira, 2004). Considering to the existing potential, there is no cohesion structure in city center of Porto up to now. Active spaces do not have connectivity for pedestrian way. For example Santa Catarina Street and Cedofeita Street are separated from city center. The modernist work was the construction of radius streets beside city center. Afterwards, new plaid streets penetrated through the old organic urban tissue and divided its cohesive urban tissue into separated parts. Therefore, there was not coherence between the old and middle urban tissue of the city. In the next periods of the city formation, this coherence faded gradually. Developing city increase caused a functional-spatial disorder and gap in Porto and its historical center. Table 1 and Figure.5 shows features of structure at the present and previous.

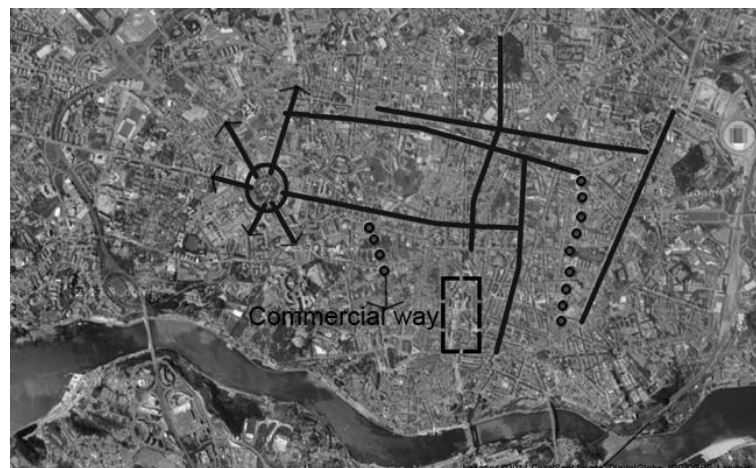


Figure 5. Porto in the Fourteenth Century

Table 1. Comparison of Adaptive Physical Properties in the City of Porto

Row	Title	Prior to The Contemporary	The Contemporary
1	Structure	Node (open space)	Decentralized
2	Function	Organized	Confusion
3	Access	Hierarchy	Without Hierarchy

Current Situation of Qazvin Structure

Qazvin in the past has a linear- nuclear structure. The structure nodes are the market, Mosque and the Safavid gardens, as articulations. They have been used in various scales of city for converting and connecting activities. With the beginning of modern urbanism, the functions and importance of the movement was through riding instead of walking in the city. Using the cars damaged human scale and visual space decreased in the city. New business in Khayyam St. formed a direction from north to south and the traditional market has faded during time. Green Plaza in the center of the main nodes of activity and socio - cultural city changed to traffic node in the city. Hence pedestrian local importance has been greatly weakened. Table 2 shows the

comparison between pre and post-modern era making changes in the anatomy of the eye focuses on different aspects of being. Figure 6 illustrations features of structure at the present and previous.

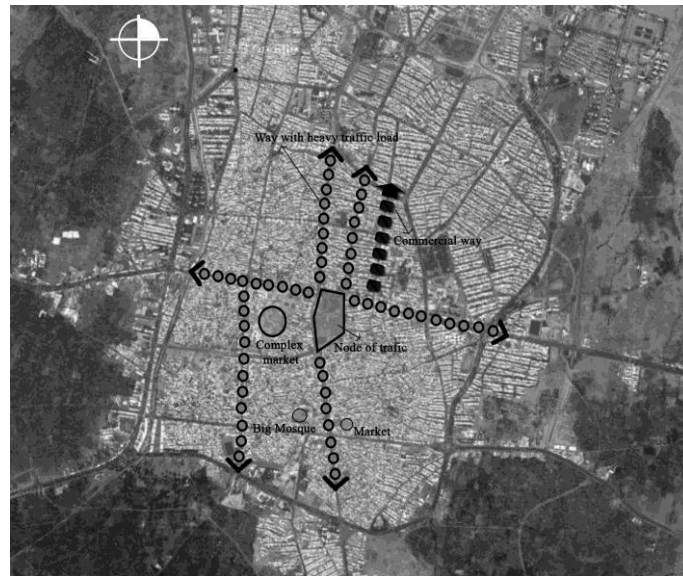


Figure 6. Structure in Qazvin.

Table 2. Comparison of Adaptive Physical Properties in the City of Qazvin

Row	Title	Prior to The Contemporary	The Contemporary
1	Structure	Node & Line (open space-way)	Decentralized
2	Function	Organized	Confusion
3	Access	Hierarchy	Without Hierarchy

The New Pattern for Network Pedestrian

Roads and nodes are one of the fundamental components of the physical structure of cities. In addition these elements effect on the perception and image of citizens. Nodes and streets appear in the minds of city residents like lines, which permit the connection in different areas of the city. They are always place the incidence of various events such as green space, trade, cultural exchanges, conduct religious ceremonies, etc. Thus they play an important role in social development, and responsible for cultural city.

Some roads and nodes act as the main structure, which major collective activities in the city are done in these areas. In modern cities with provided the roadway, the role of social and human scale of the street and the field are weakened. With enhanced pedestrian-oriented, skeletal elements can be converted, to the places which people have mental relaxation, and increase shelf space with putting options with the various activities with such an approach to urban restructuring and strengthening the articulations that link the urban citizens with civic life. Urban places and spaces can be expected that the quality and richness of improved physical, functional space and return them. Analysis carried out shows the link between old and new urban structure, physical integrity and urban tissue repair in structure town centers is essential for meaningful and strong articulations (Plut, 2008 & Peters, 2010).

This research studied stages of growing traditional city in past period that it is based on pattern of pedestrian movement and then showed current situation. In this part did not seen any unic in urban tissue. The new measures seem to work as well as the standard syntactic measures in modeling the manner in which the network affects pedestrian flows. The new pattern used in

this paper are inherently that there are important in determining how likely it is that a given space will attract greater flows of movement as compared to its surroundings. in historic center of town can be considered special in articulations, with special attention to their role, improved functional structure - Space City can be facilitated. Then other element join main way, which has a linear structure, with Development commercial activities in the main centers of activity are connected to each other. The articulation is a green plaza or open space, converter functions as a space for recreation and leisure, fill the gaps between the urban centers has been dispersed. Figure.7 shows features of structure .This pattern has specific tasks to fulfill:

1. To produce a map based on tradition pattern belong to the walking and biking routes;
2. Cooperation, motivation and networking of local businesses and other actors, such a property owners and property managers to improve the quality of the environment;
3. To enhance the interaction between the new and old urban tissues and to create new ways how the residents can participate in shaping up their own living environment;
4. To produce concrete development ideas for the two important walking and cycling routes in the area;

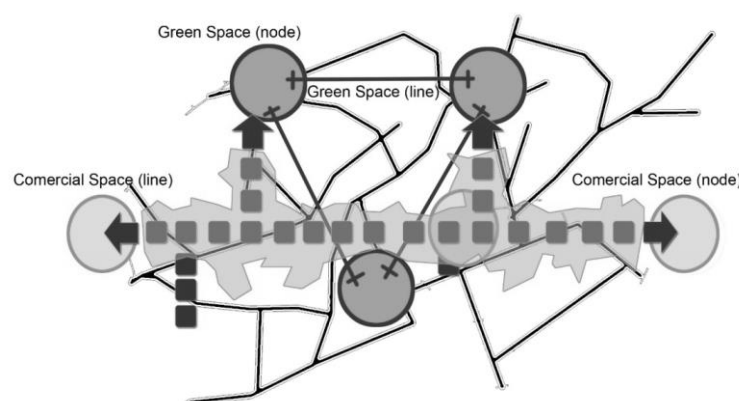


Figure 7. The New Pattern for Network Pedestrian.

Conclusion

This paper tries to provide a clear view of the development of spatial structures. This research intends to find the pattern of structures in two different cities. Traditional structure has been assessed by the distribution of internal characteristics of cities, such as Bazaar or Open space. Nowadays, Advances in transportation change the life styles of people and affect city structure. Based on the comparing results between the linear structure of Qazvin and nuclear structure of Porto, it can be possible to introduce old and mixed patterns in the future researches for improvement of nowadays cities. These new patterns can be helpful to make a connection between different urban tissues while keeping a coherent structure for the city by pedestrian network.

Finally, one of the main results was the pattern network for pedestrian showing the role of nodes and lines services available and the best of cycling and walking routes in the area. The urban and historic framework of the city center has thus been reconfigured into a pedestrian square capable of hosting cultural events and public meetings. New services have already developed within the area including art galleries, souvenir shops and cafes.

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Open spaces and the new Brazilian urban form

Open space systems and the constitution of the contemporary Brazilian urban form: first results

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Abstract. *This paper has the aim of showing the activities and first results of the research project called “Open space systems in the constitution of the contemporary urban form in Brazil: production and appropriation – QUAPÁ-SEL II” under development since 2011 in the Laboratory QUAPÁ – Brazilian Landscape Panorama of FAUUSP Project department, project of national coverage that is developed in a partnership among twenty Brazilian research centers.*

Key Words: open spaces, system, urban form, urban morphology

Introduction

The second half of the 20th century was marked by a significant urban growth, with radical changes in urbanistic-landscaping attitudes, modernization of the Brazilian city, with the consolidation of the automotive vehicle as the main locomotion and cargo transportation mean, with the urban population growth, with the popularization of gated communities – developments and condominiums, and with the cloistering of the urban plot within walls, with the creation of park networks, with the relative popularization of bike routes, with the spreading, fragmentation and dispersion of the urban area in the most different parts of the country. In regard to environmental issues, the ecological bias was introduced both in politics and in legislations, and also in urban designs, with the creation in the late 1980's of the law of the Urban APPs – Urban Permanent Protection Areas, intended to protect remaining native vegetation and to replant it along water courses.



Figure 1. Allotment closed in Palhoça, Metropolitan Region of Florianópolis – SC (Southern Region). Source: Lab-QUAPÁ, September 2011.

The early 21st century shows a consolidation of all those processes, and the appearance of a city that is very different from the one existent in the 1950's and 1960's. The Brazilian contemporary city is very constructed, much more than expected, horizontal constructions, residences, shops and small buildings, occupying nearly all its blocks, part of the squares is not installed or is poorly maintained, many of them are occupied by schools, daycare centers, health centers, slums, etc., and the streets have sidewalks which are sometimes narrow, poorly maintained, with or without trees, and which are actually not comfortable for the circulation of pedestrians.



Figure 2. Housing program of the federal government, Maceió-AL (Northeast Region). Source: Lab-QUAPÁ, May 2014.

On the other hand, the urbanistic legislation is obtaining “good” results in large urban areas, controlling verticalization, with the appearance of intra-block open spaces, with the delimitation of areas for the creation of social interest dwellings, with a more attentive view on the mobility conditions of physically challenged people, with the destination of stock areas for open areas in allotment processes, with the adoption, even though in a shy and poorly done manner, of urban permeability indexes, and with the control of visual pollution (in an experimental way in some cities).



Figure 3. Partial view of Santos-SP (Southeast Region). Source: Lab-QUAPÁ, February 2014.

A research project in progress

In view of such facts, and with the aim of attaining a deeper knowledge of the urban landscape and morphology, with focus on its open spaces, in 2012 the group of researchers of the Laboratory QUAPÁ – Brazilian Landscape Panorama – of USP School of Architecture and Urbanism, associated to a national network of Brazilian researchers, proceeding with the studies started back in 2006 about the open space systems of the contemporary Brazilian city, started a new research project called “Open space systems in the constitution of the contemporary urban form in Brazil: production and appropriation – QUAPÁ SEL II”.

In the research project, there is an attempt to understand the relations among the main stakeholders in the city formation process – conceptions, production in the strict sense, distribution and appropriations. The following is being done:

(1) construction of a methodological referential for the qualitative analysis of relations between the open space systems and the urban form, and between these and the pre-existing ecological structure;

(2) establishment of criteria to appraise such relations;

(3) formulation of systems of variables to guide propositional actions of urban form qualification, taking into consideration its relations with open spaces and its contribution to the public sphere. Thus, subsidizing the formation of inputs for the actions of Public Authorities;

(4) study of principles of dependence between open space systems and constructed structures, creating references about existing morphological models and standards;

(5) establishment of the types of implication between the open space systems and the existing urban form, and the environmental degradation processes in progress, in particular those depending on or occurring because of the inexistence of qualified open spaces;

(6) verification of the role of public and private agents leading to the configuration of the phenomena detected in 1, 4, and 5;

(7) verification of how climatic variables are distributed in the latitudes of the cities under study, and their specific behaviors in response to the dynamics of elements.

As specific objectives of the research, we have:

- to understand the main structures of the urban form and open space systems of the Brazilian city;

- to systematize the urban forms of each studied locality in order to obtain an outlook, and then establishing a criticism of the main set of urban forms of the Brazilian city, to date unknown in their totality, which is key for future actions and studies;

- to establish qualitative analysis method procedures and appraisal criteria of open space systems and urban forms in regard to:

(1) their potential performance for the establishment of the public life;

(2) the degree of obsolescence and vitality of different types of open spaces and constructed forms;

(3) the understanding of routine and symbolic meanings;

(4) their environmental contribution: drainage, microclimate, macroclimate, soil stability, ecological conservation and dynamics (mangroves, dunes, urban forests, savannas, etc.);

(5) the discussion of design alternatives for the existing open spaces and their relations with the pre-existing urban tissues;

- To create specific graphic and iconographic material, which contribute to this study, to be part of the collection of the Laboratory QUAPÁ and of the associated research centers, in order to collaborate in this study, in correlate studies, and to the demands of the public in general.

As case studies, the main Brazilian capitals and some large scale cities were selected, in a total of 36 cities in all the parts of the country. These are: Belém, Belo Horizonte, Brasília, *Campina Grande*, Campinas, Campo, Grande, *Cuiabá*, Curitiba, Florianópolis, Fortaleza, *Goiânia*, *João Pessoa*, *Jundiaí*, *Limeira*, Maceió, Manaus, Maringá, Natal, Palmas, Porto

Alegre, Recife, Ribeirão Preto, Rio Branco, Rio de Janeiro, Salvador, *São Carlos*, São Luís, São Paulo, Santos, Sorocaba, *Teresina*, Uberlândia, *Umuarama* and Vitória.

Therefore, capitals of all Brazilian regions are included, comprising a very representative sample of big Brazilian cities, and also a significant sample of medium scale cities (from one hundred thousand to less than one million residents). To many cities, it is the continuity and deepening of the reading, to others, a new study, because they were not included in the first research project (the above cities written in *Italic*).

The privilege given for capitals allows:

(1) the preferential study of metropolitan realities since the majority of Brazilian metropolises are centered by state capitals;

(2) the investigation of the main models of contemporary urbanization, because the larger scale real estate capital has in the metropolises its main activities, and therein executes the development of new models of undertakings;

(3) the study of more sophisticated (in general) urbanistic and environmental legislations, which frequently serve as model (of questionable adequacy) for smaller size cities;

(4) the analysis of more expressive state public investments in open space systems, because capitals are their preferential locus;

(5) the analysis of municipal investments in the sector;

(6) the study of main private investments in the urban tissue, both of specific programs, "*Minha Casa Minha Vida*" (My House My Life, in free translation), and in the constitution of gated developments and condominiums; in this new stage, a special attention will be paid to the private production, in its various scales, actually the main responsible agent for the constitution of the urban tissue of any given city, and thus of its open space system.

(7) the investigation of federal investments and policies for the housing sector;

(8) a convenient coverage of the national territory, because it allows to appraise different realities, while allowing to create urbanistic and landscaping references.

The selection of medium scale cities, especially the countryside ones, adds to the discussion of metropolises and capitals the issue of diffusion of the main national urban centers urbanistic culture and the specificities of local processes. It also allows the comparison among different processes in medium scale cities, given the differentiated insertion of the selected cities in their respective urban networks, where some are regional centers distant from metropolises, and others are part of expanded metropolitan complexes.

About the activities in progress

The studies were initiated with the definition of conceptual standards to be followed, with the selection of a systemic bias relating producing, regulating and managing agents, with the urban form itself and its users, who are also transforming agents.

Such concepts were confirmed in two national meetings of the network researchers, and in a series of debates of the research group based in São Paulo, which also confirmed the methodological bases of the urban form mapping to be used to represent in two dimensions the form of the Brazilian city.

As support to the knowledge of producing agents, and in order to increase the understanding of producing agents about the urbanistic legislation and legislation regarding the open space systems of each city under study, workshops were conducted in the cities under study, with the support of local partners. Workshops have the following objectives:

- to characterize the open space system in the urban form of the municipality under analysis;
- to understand the role of open spaces in the constitution of the contemporary urban form production;
- to understand the role of the environmental and urbanistic legislation in the production of open spaces and the urban form.

- to understand the concrete role of the agents responsible for the contemporary production of open spaces and constructed spaces in the municipality;
- to discuss reading and critical analysis procedures regarding the research theme;
- to discuss criteria that might subsidize public policies regarding the production and appropriation of open spaces and the urban form at local level.

Workshops were already held in the cities of Uberaba and Uberlândia, in the state of Minas Gerais, Maceió in the state of Alagoas, Santos, Sorocaba, and São Carlos in the state of São Paulo, Vitória, capital of the state of Espírito Santo, and Campina Grande, in the state of Paraíba.

The duration of workshops is three days, and they are carried out in partnership with the local group or with some public entity, which is the case of Santos and Sorocaba. They are structured as follows:

- first day – overflight and field visit by land, with the support of our local partners. This visit and this overflight are fundamental, for a general and comprehensive photographic documentation, as well as for the total understanding of the morphology, road structure and type of open spaces of each city.

- second day – *morning period* – presentation organized by the local group in which specialists related to the university, to the Public Power, and to the society present reflections and summaries of the following topics: open space system, urbanistic and environmental legislation, management and implementation of public spaces, governmental and real estate market investments, and urban form.

- *afternoon period* – division of participants in four work groups, which using the material gathered by the local group and the mapping produced by the São Paulo group analyze the city from four viewpoints/one per group: open space systems, environmental and urbanistic legislation, public and private investments (the role of agents in the production of space), and morphological standards at the urban tissue scale.

- third day – continuity of works and, at the end of the event after the presentation of each group works, a synthesis is made by the workshop participants and by the group of São Paulo about the city form and its open space system, which in general results in a graphic scheme drawn over the maps. From the results obtained, the local group is requested to produce a text deepening and synthesizing what was studied during the workshop.

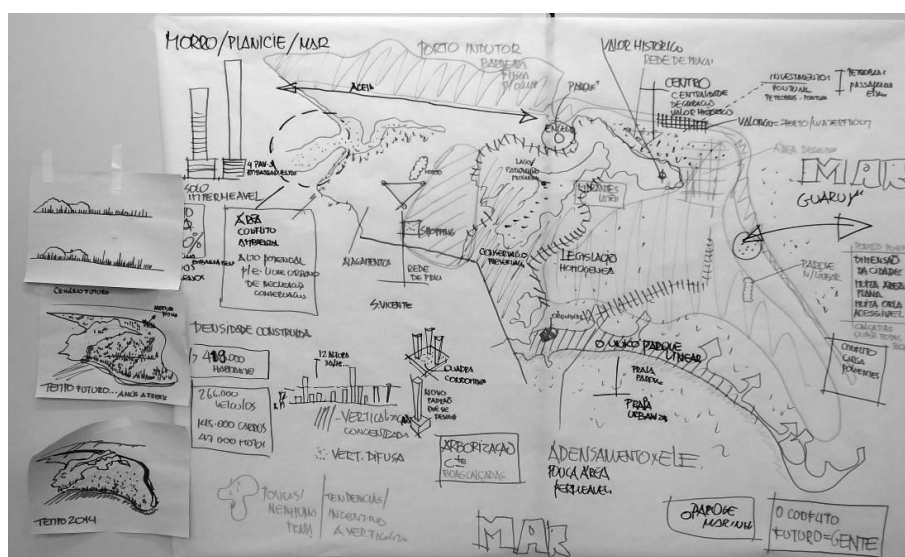


Figure 4. Synthesis map of the workshop in Santos, in which urban expansion vectors, general characteristics of the process, sidewalk schemes, etc., are highlighted. Source: Lab-QUAPÁ, February 2014.

Workshops are scheduled months in advance to ensure the participation of the local group, always related to a public entity or university/in general represented by a research group related to the area of Landscaping or Urbanism, and its components are generally graduate and undergraduate researchers, professors and technicians related to the Public Power, generally the municipal prefecture (local government). When the organization is done by some public entity, such as in Santos, there is a natural predominance of public officials related to the municipal technical staff among its components.

In parallel, we are developing a series of other activities, namely:

- elaboration of thematic maps about the main morphological standards of the Brazilian cities and the characteristics of their open spaces.

Those maps are done by using the bases for ArcGIS and aerial photos. This is an activity in progress, nearly consolidated, and is centered at the laboratory QUAPÁ in São Paulo, in the extent that we have put together a technical support body for such activity, basically constituted of undergraduate students. Mappings already done and in progress are time-consuming, because they are made through visual analysis of Google Earth aerial images and Google Street View images, now available for most of the Brazilian cities, which makes our work much easier. Maps are been elaborated by a group of 11 students/researchers.

This is an extremely time-consuming and careful work, because for each city all its blocks are analyzed, and for each of them numerical values are attributed and correspond to the variables under analysis: tree coverage, distance of the construction from the plot limits, morphological types, and open spaces.

- conduction of annual Seminars internal to the QUAPÁ-SEL National Network for sharing results, enhancements of the method, approximation of different approaches, and formulation of common concepts. In August 2013, our eighth Seminar was held, in the city of Rio de Janeiro, with the support from the Federal University of Rio de Janeiro/PRO-ARQ, and co-organized by Dr. Vera Regina Tangari with the theme “Open spaces and urban form, interpreting characteristics and conflicts”, which gathered more than fifty researchers from our network coming from the whole country, and in August 2014 we will hold our ninth seminar in the city of Vitória, Espírito Santo state.

Furthermore, we have done the following:

- participation in scientific events and conduction of conferences and lectures;
- weekly debates of the São Paulo nucleus, and biweekly debates with the Campinas nucleus;
- bibliographic studies;
- formulation of partial texts that will support the structuring of a final text that we intend to become a book about the research theme, and showing its results.

Preliminary results

In these two years of work, we have the following preliminary results:

- formulation of the theoretical-conceptual panel regarding the current reality of big Brazilian cities, and with higher adherence, evidently, to the cities and metropolises selected for this research – process in progress;

- establishment of the method of analysis of relations between open space systems and the urban form applicable to the national reality – already developed and in natural process of enhancement, through workshops and seminars, with mappings and methodology based discussions;

- constitution of a comprehensive national panel regarding the relations between the current processes of production of open space systems and the urban forms, and the formal standards established in each city resulting from vernacular and market procedures, and also from the existing urbanistic and environmental legislation – this activity starts with the first workshops,

and shall finish with the last of them, when it will be possible to put together a good general panel about all of them, and to check the common and specific points;

- proposition of a criteria system to evaluate the quality of open space systems and urban forms considering their potential for urban life and their environmental performance/formulation of general and specific critics about the subject from analysis parameters that systemically consider the involved variables, thus preventing the formulation of “urban form manuals” – and the first schemes of open space quality evaluation are ready, and shall be enhanced and developed as a text. Preliminarily, we are putting together a support notebook to the workshops, which is now in the final writing stage;

- the strengthening of the QUAPÁ-SEL National Network and of the research procedures that take into consideration the multidisciplinary and interdisciplinary contribution – routine activity, based on workshops, seminars and joint works, being the continuous activity of the research process;

Aspectos morfológicos - Sorocaba

Espaços livres intraquadra

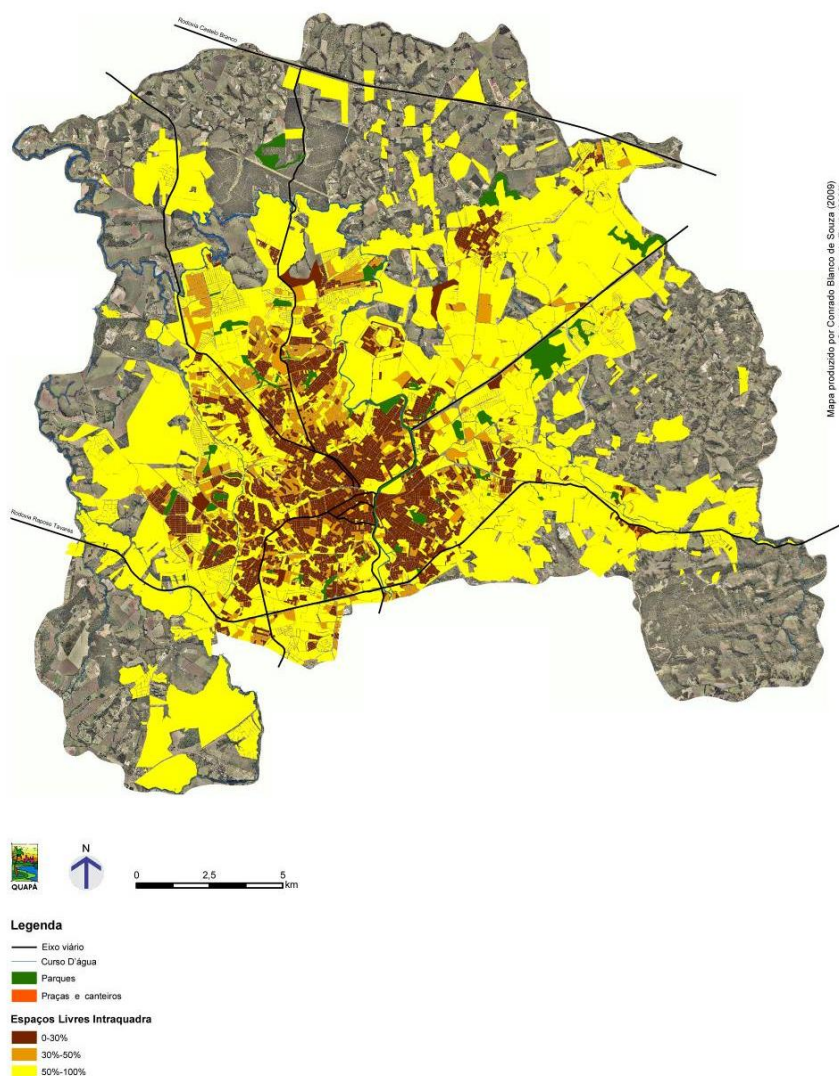


Figure 5. Map of open spaces intra-blocks. Source: Lab-QUAPÁ, April 2014.

- formation and enhancement of researchers in different levels (from scientific initiation to post-doc) – routine activity, attested by the countless students tutored by all the senior researchers of Lab QUAPÁ;
- publication of partial results in scientific magazines of the field, and in scientific events; - the final publication of the book with the disclosure of results – process in progress;
- complementation of the databank of laboratory QUAPÁ – in constant updating process with the inclusion of aerial photos and mappings.

Aspectos morfológicos - Sorocaba

Recuos Intraquadra

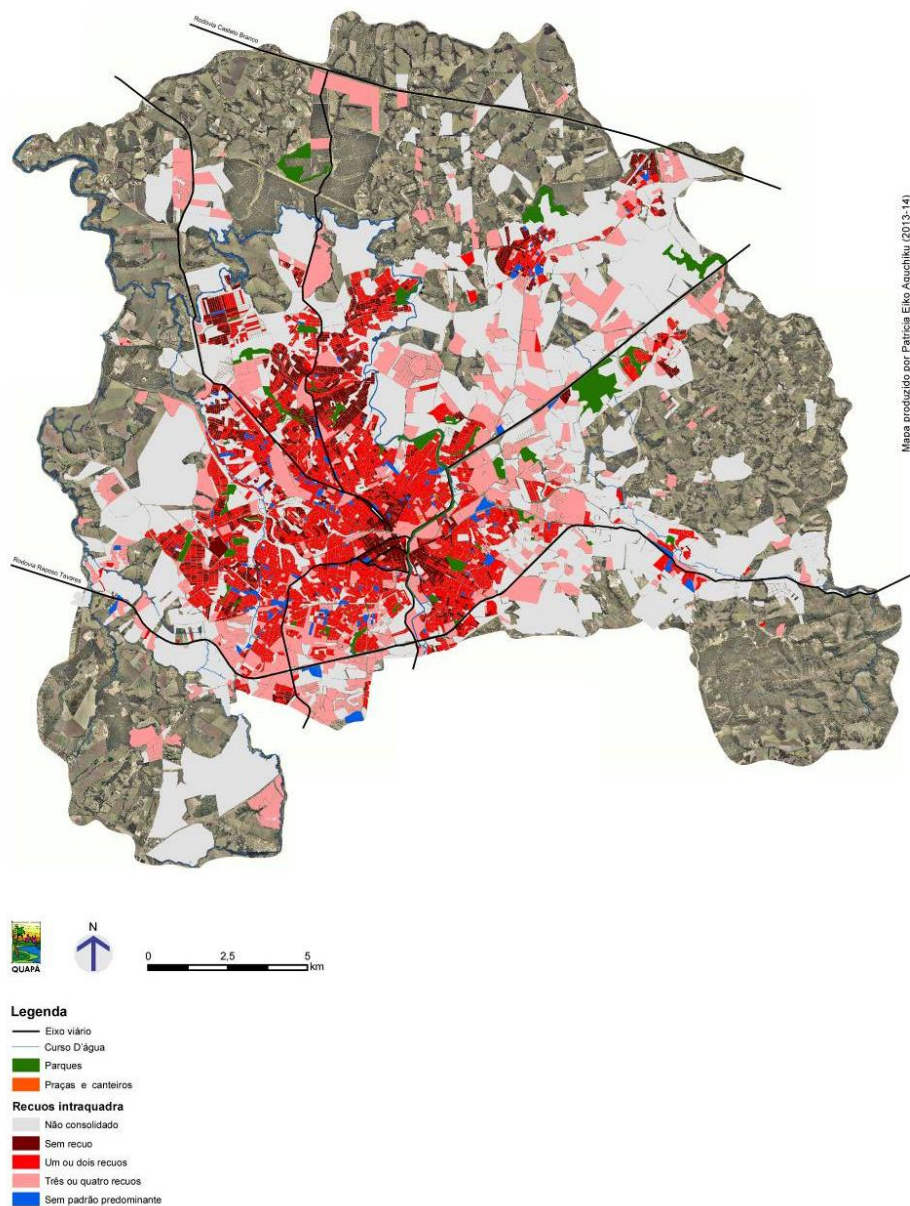


Figure 6. Map of setbacks and clearances. The darker least setbacks between buildings.
Source: Lab-QUAPÁ, April 2014.

- We have the following specific results attained:
- determination of the main morphological types and standards existing in the medium and large scales Brazilian cities;
 - establishment of representation standards of these types and standards;
 - understanding of some of the most important logics distribution of such types, such as the location of gated developments, gated communities, new popular neighborhoods, and shopping malls.
 - location and consolidation actions of Permanent Protection Areas;

Aspectos morfológicos - Sorocaba

Volumetria construída Intraquadra

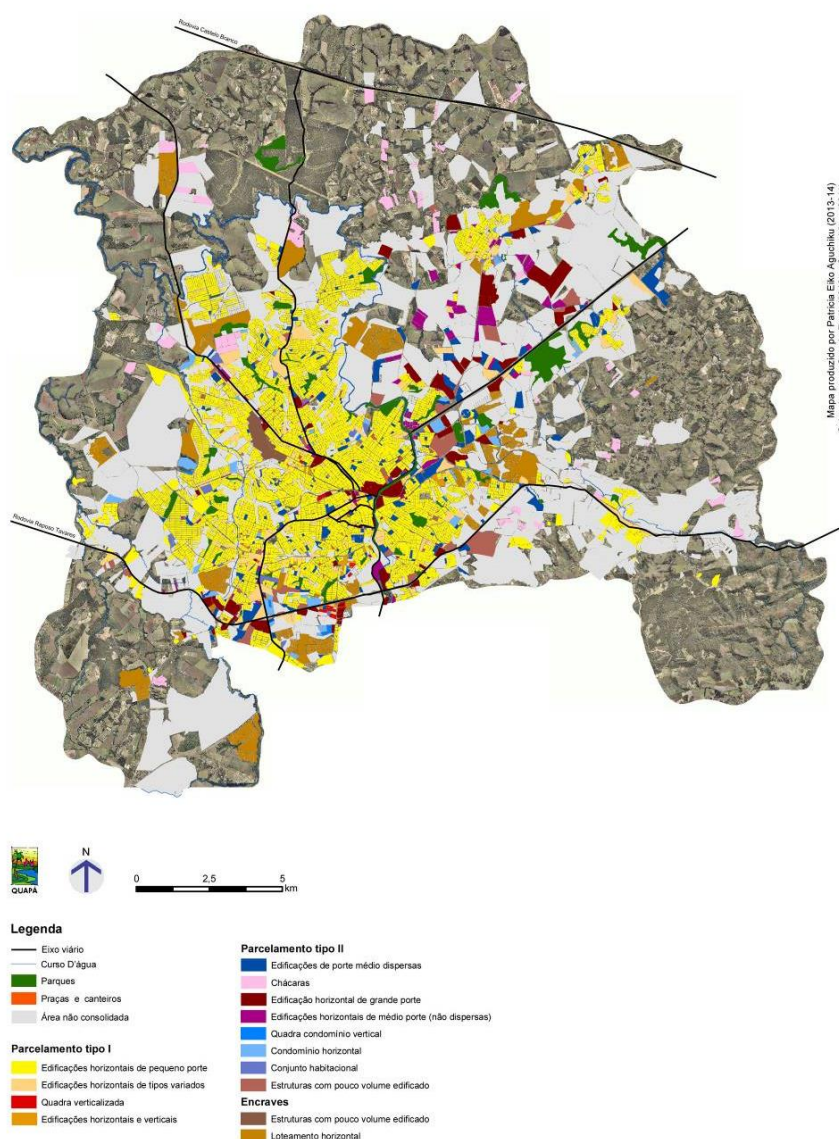


Figure 7. Map of morphological patterns. Source: Lab-QUAPÁ, April 2014.

- understanding of the distribution of verticalized areas and their morphological characteristics.

In short, this is a thorough and time-consuming work, only possible thanks to the collective effort of all the members of the QUAPÁ-SEL Network. At the end, a comprehensive panel of open spaces and urban forms characterizing the contemporariness of important Brazilian cities will be obtained, allowing to contribute with concepts, methods and systems of guidelines that might help the elaboration of public policies aiming to qualify the urban form and the urban open space systems in Brazil.

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Open spaces and urban form: a systemic relation

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Abstract. *The research project named “The open spaces systems in the Brazilian urban form constitution: production and appropriation” (2012-2016) held by Faculdade de Arquitetura e Urbanismo da Universidade de São Paulo (FAUUSP) aims to analyze thirty-five cities in order to characterize and diagnose the relationship between open spaces and urban form, by an multidisciplinary approach. Workshops realized in each city are part of the activities. Campina Grande, Uberaba and Uberlândia were the first three: medium cities, with a population varying from 315 thousand up to 645 thousand people, they present similar processes together with important differences. Distinct biophysical environment, social, economic and cultural characteristics generated unique cities in terms of urban form and open spaces distribution, mainly public ones. With good square distribution in historical city centers, recent economic development was not followed by the same accurate care with public spaces. There are parks, intensively used, but concentrated in certain urban zones. The most important real estate initiatives are closed residential areas and tall buildings, mostly for high-income population, and residential areas for low-income people. Therefore, urban legislation does not control the resultant urban form, and does not understand the relation between buildings and open spaces as a systemic one.*

Key Words: open spaces, urban form, morphological patterns, public policies, appropriation

Introduction

The research project named “The open spaces systems in the Brazilian urban form constitution: production and appropriation” since 2012 aims to characterize and diagnose the open spaces of thirty-five cities. The objective is congregate knowledge and efforts in order to understand Brazilian urban tissues patterns and therefore how they interfere in the open space system constitution, as well in the public sphere constitution that take place.

Our proposal is interdisciplinary and multi-institutional gathering together architects, urbanists, landscape architects and geographers from different institutions such as Faculdade de Arquitetura e Urbanismo da Universidade de São Paulo (FAUUSP) and Pontifícia Universidade Católica de Campinas (PUC-Campinas). Establishing and coordinating a Brazilian research network with representatives from each related city, we aim to set up a deeper understanding of Brazil.

We accomplish three-day workshops in every city. On the first day, we execute an aerial overview and a site seeing by car through the most distinguished open spaces, and on the second day, there are lectures with public government representatives, academic members and non-governmental organizations. During the last day, the workshop take place dividing the participants in four thematic discussion groups with presentations and synthesis in the end.

The first group deals with public open spaces and privately owned ones, establishing patterns, mapping, types and functions. The second group identifies the main stakeholders responsible for the urban space production: private and public initiatives, small and medium enterprises (SME). The effort is not only mapping the stakeholders but identifying their actions towards the open spaces production and management in a critical approach, describing the processes and impacts on the urban form, the environmental and ecological dynamics, and the public sphere constitution (daily and political), beyond their relations and conflicts.

The urban and environmental legislation is the third group theme. The relation between open spaces and buildings is shown through graphic simulations, as well as land subdivision, zoning

and land use (Figure 1). Like other groups, the objective is a critical view of urban form considering environmental issues and public appropriation.



Figure 1. Urban legislation and open spaces in Uberlândia. Source: Lab-QUAPÁ, October 2013.

The last group considers the open spaces in the definition of morphological patterns, identifying and analyzing existing urban tissues, as well as creating specific categories. The unity scale for analysis is the block and, as a result, the Lab-QUAPÁ developed thematic maps for each city, considering also geomorphological and hydrological aspects, vegetation, land configuration, road system and land division. The identification of gated compounds, horizontal condominiums, verticalization, informal occupancy among others typologies, reflects recent urban processes.

The analyzed “medium cities”

For this article, we considered three cities: Campina Grande in Paraíba State, in the northeast region, Uberaba and Uberlândia, both in Minas Gerais State in the southeast of Brazil. Their characterization leads to a conceptual discussion²⁸⁹: the definition of medium cities. In Brazil, the urban perimeter of a municipality determines a city, which is an administrative criterion that reveals very few about the urban Brazilian phenomenon, only that there are many cities in number. It is commonly accepted that “medium sized city” is the one that has between 100 thousand and 500 thousand inhabitants. Therefore, Uberaba (315.3 thousand inhabitants in 2013²⁹⁰) and Campina Grande (400 thousand inhabitants in 2013) would be medium sized cities, while Uberlândia exceeds this limit with 646.6 thousand inhabitants in the same year.

“Medium cities” differ from “medium sized” ones: beyond the number of inhabitants, they also have a relevant role in their urban network, performing as a centrality with diversity in circulation and offer of goods and services in an important intermediate level in the net. Campina Grande is the second city in number of inhabitants of Paraíba State (PB), and the center of a metropolitan region composed by fifteen cities. Uberaba has the fourth agricultural GDP in the country and Uberlândia is the second more populous city in Minas Gerais State (MG). Because of these aspects, they can be considered “medium cities”.

²⁸⁹ There is no consensus about what would be medium cities, even in academic terms: there is no classification that can be used indistinctly by sociologists, economists, architects, geographers, demographers, although for each specialty is possible to find some agreement about the matter. See Amorim Filho; Serra, 2001.

²⁹⁰ IBGE, 2013.

As important regional centers in a specific territorial division, the federal government implemented during 1975 and 1986 a policy to develop such cities in the country in order to transform the national urban net. The results were relative, with better results in the southeast of Brazil than other regions.

More recently, the industrial reorganization that occurs since 1990s is restructuring the Brazilian urban network, emphasizing the medium cities as the dynamic ones. In a process of territorial dispersion, they attract the metropolitan population who migrates searching for economic opportunities. This process of population dispersion redefines the medium city concept itself.

Intense intra-urban process occurs in these cities such as verticalization in central areas associated to commercial and services activities, as well the implementation of suburban-gated compounds to middle and high-income population. Certain aspects of an urban dispersion process can be noticed beside typical big cities problems like favelization, social housing deficiency, violence or even traffic jam.

According to Sposito (2004)²⁹¹, medium cities area facing complex changes in their urban structure with the implementation of centralities in the peripheries and peripheries in the central areas, social and physical fragmentation or crescent segregation that diminishes social coexistence among differences. These transformations induce recent studies about the medium cities in Brazilian urban net.

About Campina Grande (PB)

Founded in 1697, Campina Grande turned into a village in 1790 and a city in 1864. With 400 thousand inhabitants, occupies 594.18 km² resulting in a population density of 673.2 inhabitants per km². The population is mostly urban: in 2010, only 5% lived in the rural zone. Located in between the coast and the backlands of extreme dry conditions (sertão), under the biome named “Caatinga”, the city is in the junction of three different microclimates (Brejo Paraibano, Agreste and Cariri), with distinct vegetation, resulting of Borborema Sierra that surrounds it. The relief presents small undulations, 550 m of altitude and the climate is mild with medium annual temperatures of 22° C, minimum 15° C and highest 33° C.

Although rivers are not of great presence, there are more than a hundred springs around town. Water reservoirs (açude) were implemented during 19th and in the beginning of 20th centuries for diminishing water shortage. Nowadays, no longer serving the original purpose, still stand out in urban landscape. Açude Velho is one of the most important public open spaces for leisure and recreation, gathering cultural equipment. Açude Novo was drained and transformed into a public park (Parque Evaldo Cruz), also in the central area. Açude de Bodocongó, in the northwest region, is a cultural reference in Campina Grande for leisure and festivities, but has no landscape treatment what difficult appropriation by the people. Besides, there is sedimentation caused by irregular refuse placement.

In central area, there are other meaningful public open spaces, squares and parks: Praça Clementino Procópio; Praça da Bandeira, which congregates political manifestations; Parque do Povo that houses the São João party, of national importance, attracting people from different states; Parque da Criança; and other places destined for regional fairs. Excepting for Açude de Bodocongó, these structures define a central cultural and recreative axe, with no similar in the city.

With the recrudescence of environmental legislation, the Master Plan approved in 2006, defines special preservation zones (ZEP) for preservation, maintenance and recuperation of the

²⁹¹ Sposito, M. E. (2004) ‘Novos conteúdos nas periferias urbanas das cidades médias do Estado de São Paulo, Brasil’, in *Revista Investigaciones Geográficas* 54. (UNAM, Mexico). (http://www.scielo.org.mx/scielo.php?pid=S0188-46112004000200008&script=sci_arttext) accessed 15 April 2014.

historical, natural, material or immaterial heritage. The municipality also defined special environmental zones of interest (ZEIA) like São José da Mata, Bela Vista, Cachoeira, and Mata do Louzeiro reserves. Defining a green belt at West zone, they are threatened by the increasing urbanization and still do not have landscape implementation.

Since the beginning, the economy of Campina Grande has commercial basis: it was a trooper destiny and fairs concentration. In the first decades of 20th century, the city was the second world cotton producer, cropped in regions nearby. The industrial production diversified, and nowadays the city is a technological center, with technical and high education institutions like Universidade Federal de Campina Grande, therefore specialized services in the health area.

Between 2010 and 2011, the local GDP increased 23%, from U\$ 2.5 billion to U\$ 3.08 billion, while the capital João Pessoa had an increasing of only 3.08%, from U\$ 5.67 billion to U\$ 5.84 billion. The influence zone of João Pessoa goes from the coast to Campina Grande, which polarizes the interior of Paraíba and other states. Despite its influence, the city has the IDHM of 0.720 in 2010, occupying the 1301^o position among more than 5,500 cities in the country.

Its economic dynamism reflects on the morphological patterns and respective processes. The verticalization with 30-storey buildings, or taller, is significant, without proper evaluation from local authorities of the effects since there is no restrictive zones of implementation and the setbacks are reduced in scale. The entrepreneurs are mostly from João Pessoa and other northeastern cities. The single-family housing pattern predominates in the landscape, with no setbacks or small ones. The urban tissues have mainly 30% of open spaces in the lot (Figures 2 to 4).

Gated compounds to high-income population are a reality, such as Alphaville, implemented by an entrepreneur from São Paulo in a preservation area, restricting the visual access to Borborema Sierra. There are still gated horizontal condominiums of row houses or 5-storey buildings to middle-income people, built with federal resources and private ones, but with no significant open spaces to recreation and leisure, far from the central area and inadequate public infrastructure.

Industrial districts along perimetral avenues or highways and shopping centers (four in project and two more under construction) are similar to other ones around the country in terms of morphological pattern and localization, generating landscapes that no longer present local characteristics.

The existence of public open spaces in urban expansion areas are restricted and do not follow the distribution patterns in central area, of previous consolidation. Urban legislation does not come up with morphological alternatives to the high existing buildings and single-family housing units (Figures 5 and 6). The zoning was repealed and a new one has not been established yet, a conflictive situation. New developments do not follow a previous master plan, but the land offer by major landowners.

About Uberaba (MG)

According to Instituto Brasileiro de Geografia e Estatística (IBGE) estimate data, Uberaba held around 315 thousand people in 2013, constituting the second most important city in the Triângulo Mineiro Region, the second most important economic region in Minas Gerais State. On the other hand, Minas Gerais, with 20.5 million people, is the second most populated state in the country, and its third GDP.

With 4,524 km², and a population density of 69.63 inhabitants per km², Uberaba is largely urban: only 2.23% of its population lives in rural area. Although, the primary sector is highly developed, with the fourth agricultural GDP in the country around U\$ 287 million in 2011. The industrial and services sectors (GDP U\$ 1.12 billion and U\$ 1.98 billion respectively in 2011) characterize Uberaba as a very important medium city, 500 km faraway from three important

urban centers in Brazil: São Paulo, Belo Horizonte (the capital of Minas Gerais State) and Brasília (the capital of the nation).

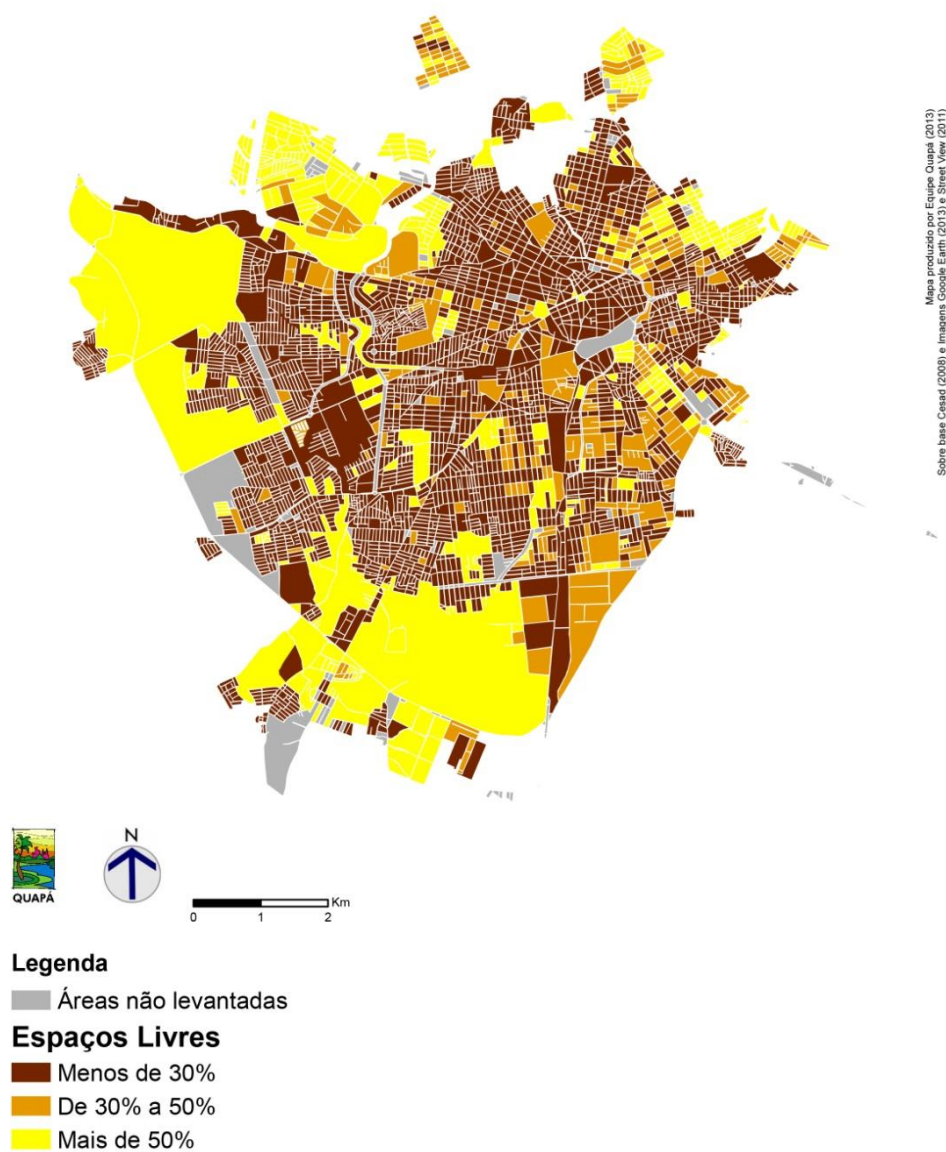


Figure 2. Intra-blocks open spaces (espaços livres intraquadra) for Campina Grande.
Source: Lab-QUAPÁ, 2013.



Figure 3. Verticalization around Açude Velho. Source: Lab-QUAPÁ.



Figure 4. Horizontal urban tissues with reduced setbacks. Source: Lab-QUAPÁ.

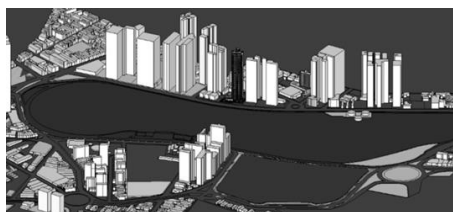


Figure 5. Simulations for the current building legislation realized during the workshop in November 2013. Around Açude Velho, the verticalization will compromise the visual access and environment. Source: Lab-QUAPÁ.

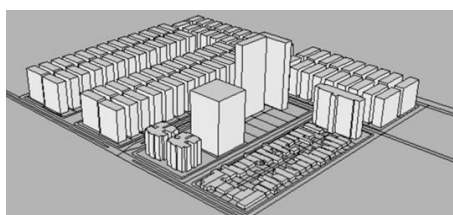


Figure 6. Simulations for the current building legislation realized during the workshop in November 2013. Around Açude Velho, the verticalization will compromise the visual access and environment. Source: Lab-QUAPÁ.

Located at 764 m of altitude, its relief varies from slightly undulated, predominant in the territory, to very undulated in certain portions of podzolic soil. The climate is tropical with a dry season; the biome is Cerrado, but because agricultural and livestock activities, there are only remains of the original biome. In urban area, the most important river is the rio Uberaba located in the north portion.

Founded in 1809, Uberaba turned into a village in 1836 and a city in 1856 when it was already an important commercial center. With the arrival of the railway in 1889, the economic growth intensified attracting immigrants and the livestock took place, still a significant economic activity.

Until the 1950s, the urban expansion occurred in a very compact way originated from the city center, based on an orthogonal road system that do not considered the undulated relief. Since the 1960s, streams were piped underground or even had their channel rectified in order to create roads in valleys, increasing urban expansion leading to soil sealing and floods, largely in central areas.

From the 1980s and 1990s, the urban expansion resulted in fragmented tissues, growing towards the east-west direction because environmental preservation zones at north and latifundiums at south, which hold back real state actions. Roads and highways are the main

inducers for new endeavors: gated compounds for middle or high-income population, social housing, industrial condominiums and *terrain-vague* waiting for appreciation.

In central area, there are narrow roads, some of them in valleys commonly flooded with summer rains. Bars and other establishments occupy squares by the implementation of gates, with security cabins, privatizing public open spaces, and reducing people's appropriation.

The road system has an orthogonal layout, not compatible to the relief, and although the slopes are not so intense, ramps could be avoided with a proper design. Some recent gated compounds for high-income population have an organic layout. The pattern in Uberaba is narrow sidewalks with few trees.

The park system has three parks classified as environmental conservation units, two of them very much used: Parque da Mata do Ipê (3.5 ha) and Parque Jacarandá (3.3 ha) where there is a small zoo. The third one, classified as a municipal natural park, is Mata do Carrinho (13.3 ha), with low frequency.

There are also two more important parks, not classified as environmental conservation units: Parque das Acácias (12 ha), very much used for walking, beyond rain water containment through retention and detention ponds; Univerdecidade Complex, designed to house leisure areas, as well a technological center, universities and government buildings; nowadays there are Parque das Sibipirunas (very much abandoned), the head office of a federal university and a gas turbine research and development center, under construction. The complex has a great potential for future use, despite of violence problems resulting from bad quality maintenance and low attendance.

The main environmental conservation unit is located at north portion named Área de Proteção Ambiental do Rio Uberaba with almost 53.5 thousand ha, including 8% of its area in urban perimeter. The main objective is to ensure the source used to provide water for Uberaba. From the total area, 25% are used as pasture, 27% as fields, 18% as agriculture, beside 9% as forests and 21% as Cerrado.

The urban tissues, already consolidated, present high occupancy in lots that have less than 30% of open spaces and one or two setbacks (Figure 7); there is a predominance of small size horizontal buildings (up to 4 floors); blocks have less than 10% of forestation with small amount per lot.

The preliminary verticalization occurred in central areas, characterized by a high level of occupation and no lateral setbacks. Presently, new buildings have four setbacks, but still with high level of construction for a city the size of Uberaba: between three and four times the lot area and less than 50% of open spaces.

The urban expansion, the most significant process, has two main patterns: Gated compounds for middle and high-income population, with serious impacts on public open spaces appropriation; Federal government housing program named Programa Minha Casa Minha Vida (PMCMV) finances different endeavors, from gated horizontal condominiums to small buildings with no lift; the open spaces have restricted access. The program is intended to low-income to low-medium income population and until August 2013, more than 5 thousand units were delivered.

The entrepreneurs responsible for these endeavors are not only local ones, but also national companies of different scales, some of them working in many states. The fragmented urban expansion that takes place is very much common in the country, deriving landowners and entrepreneurs significant profit. However, there are negative impacts on the urban density and environmental consequences, from the increasing of displacements by private cars and motorcycles (in 2012, Uberaba had 182 thousand vehicles - 100 thousand cars and 40 thousand motorcycles) to the decreasing of public open spaces usage in the neighborhood scale.

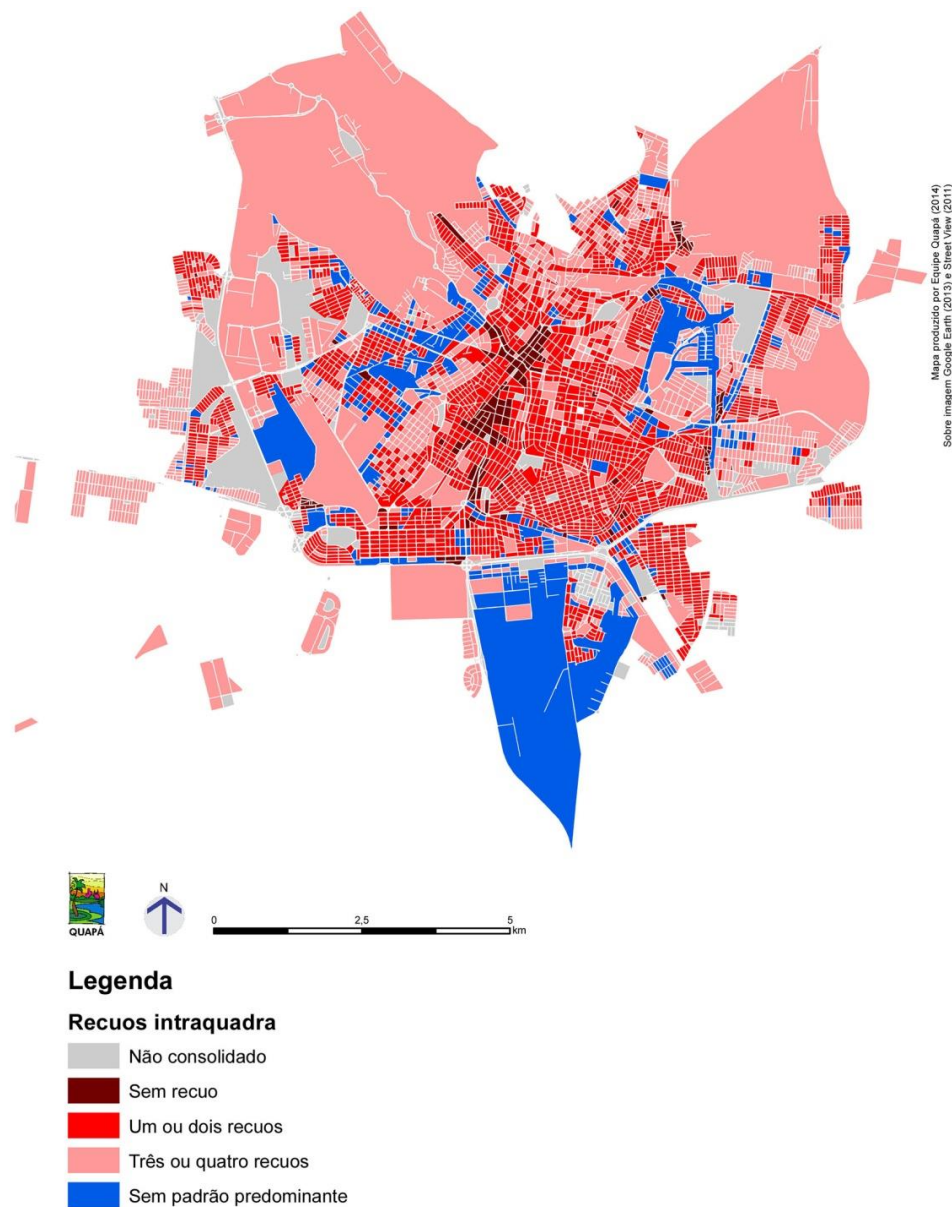


Figure 7. Intra-block setbacks (recuos intraquadra) for Uberlândia. Source: Lab-QUAPÁ, 2013.

About Uberlândia (MG)

As mentioned before, the population of Uberlândia is 646.7 thousand inhabitants (2013), 97% living in urban area. The territory has 4,115 km² and a population density of 157.15 inhabitants per km². The city integrates the region called Triângulo Mineiro together with Uberlândia and Araguari. Located 550 km from the state capital Belo Horizonte, the connection is easily realized by highways that also reach São Paulo, Rio de Janeiro, Goiânia e Brasília, as well other important Brazilian cities. It is the most populated city in the interior of the state of Minas Gerais.

Its origin remotes to 1818 and the economic growth increased after the arrival of the railway Estrada de Ferro Mogiana in 1895, together with the implementation of the orthogonal road system. The biophysical environment can be characterized by 1000 m of altitude, and a

maximum slope of 967 m; the existing biomes are Cerrado (prevailing) and Atlantic Forest (Mata Atlântica); the annual medium temperature is 22°C, plateau is the predominant relief with 70% of undulated land and the rest is flat, ideal for outside leisure activities.

The three most important basins in urban area are rio Uberabinha, rio Araguari and rio Tijuca. Rio Uberabinha, still not piped underground, cross the entire city and it is responsible for water supply. The stream São Pedro is an urban reference: nowadays is piped underground, under Marechal Rondon Avenue, in the city center, which, since the colonial time, presents a significant group of squares very well maintained and intensively used.

During the first decade of 20th century, by the influence of urban improvements in Rio de Janeiro (1902-1906), some squares were created and other streets receive urban forestation. These initiatives were lost afterwards.

The local economy was incremented by business tourism, industries, livestock activities, services and logistics warehouses of nationwide companies such as Martins. The existence of a federal university and three shopping centers indicate the city centrality.

There are innumerable social and sports clubs and eight big parks: Sabiá, Uberabinha, Siquierolii, Bons Olhos, Gávea, Santa Luzia, do Óleo e do Carvão. The two most important are Parque Sabiá – at the east region, it is composed by a zoo, lakes, aquarium, cooper trail – and Parque Municipal V. Siquierolii – at the north region, it concentrates a museum, recreational equipment for children, and significant Cerrado specimens. Both are largely used by the population. There are eleven environmental protection areas, but 50% of urban land can be classified as vacant land. There is a linear park of Rio Uberabinha (Figure 8), but only 2 km of the 7 km foreseen are already implemented. The population approved the construction and aims for its finalization. The financial resources originated from environmental sanctions named TAC (Termo de Ajustamento de Conduta), involving a private company (Sadia) and a social club (Praia Clube).



Figure 8. Linear Park along the river Rio Uberabinha. Source: Lab-QUAPÁ.

The road system reflects the urban expansion history: there is a segment corresponding to the central area implemented during the colonial period with narrow streets, not orthogonal. Then, around it, there is the orthogonal system and, more recently, fragmented segments, where roundabouts are used as squares.

Important urban process are the recent verticalization, from medium to high buildings; the implementation of closed gated compounds; and the invasion of private and public land by social movements that request housing.

As an example of the first process is Santa Mônica neighborhood with 4 or 5 storey buildings (social housing) constructed by the federal government program named Programa Minha Casa Minha Vida (PMCMV). Although, the major program operation is the construction of single-family houses, thousands of them, of small area, few meters of frontal setbacks, walled by the owners, at the city fringes. Another social housing program is the Programa Planta

Popular towards land property regularization. People can choose among 19 different projects, from 36 to 70 m², with reduced open spaces.

The gated compounds for middle and high-income population (Figure 9) are located in suburban areas, disconnected from the main urban tissues. The social movements responsible for the invasions (Figure 9) are very much organized, creating street layouts and lot division.



Figure 9. Gated compounds and social movement occupation in Uberlândia. Source: Lab-QUAPÁ.

The main stakeholders are the federal government, entrepreneurs and SME, social housing movements and the landowners. The main vacant land belong to only six families. The urbanization processes are very dynamic, reflecting in the urban form as well in the open spaces, public and privately owned ones.

Conclusions

The research about the three medium cities denoted some common aspects even as specificities, all-important to the understanding of the open space systems in the urban form constitution.

Uberaba and Uberlândia, located under altitude tropical climate with strong rains during summer time, witness floods that implicates in a revision of urban typologies along river and

streams. Campina Grande, characterized by a semi-arid climate, has lower rainfall levels, and the former reservoirs (açudes), no longer water suppliers, are open spaces systems with potential for public use and appropriation.

The building legislation, or its absence, results in different verticalization patterns throughout time. In all cities, the central areas have suitable square system distribution, which compensates the high densification from buildings with no frontal or lateral setbacks. The absence of a zoning legislation in Campina Grande facilitates the 30-storey buildings, what is not observed in Uberlândia, the most dynamic economy among the three cities. This dynamism in part resulted in large avenues, of recent construction, with sidewalks of better and proper dimension.

On the open spaces point of view, focused on leisure, all cities have important parks, intensively used, but with distinct characteristics: Campina Grande presents a park system along the reservoirs (Açude Velho and Açude Novo), properly forested, in opposition to an extensive paved area to the realization of popular parties, nationally famous; In Uberaba, one of the biggest parks and intensively used is Parque das Acácias designed to rain water control; Uberlândia, despite public parks of good dimensions, has many social and sports clubs, also intensively used, indicating specific cultural habits; The analyzed urban tissues present, in general, high levels of land occupation; lower levels of urban forestation (intra-blocks and on streets); narrow and poorly maintained sidewalks. In central areas of Campina Grande and Uberlândia, streets are suitable for pedestrians needs, revealing a former urban care lost during the last decades.

The extensive urban expansion, in the three cities, has similarities: The program PMCMV has a significant operation, even though stronger in Uberaba and Uberlândia; Gated compounds for middle and high-income population can be found in all cities, though in smaller number in Campina Grande with the lowest GDP per capita; Logistic warehouses, industrial and commercial centers are implemented along highways and perimetral roads, increasing the complexity of the peripheries.

The recent economic growth in all three cities is revealed partially in urban form, but with no qualification of the open spaces systems, or even urban form control (open spaces and built ones) objecting an urban space idea towards conviviality and urban landscape enjoyment.

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Landscape units as territorial analysis procedure: integration of geo-biophysical and urbanistic-architectural dimensions

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Abstract. *The study area is located in the city of Rio de Janeiro, capital of Brazil's second largest metropolitan area, with 6,323,037 inhabitants. The geographical position favors the dominance of wet/semi-wet tropical climate with large seasonality (wet summer, dry winter) and spatial variability. We adopted the channels watershed as our studied area. The proposed methodology of defining landscape units was applied as a tool for urban spatial analysis and for an environmental diagnosis combining geo-biophysical and urban-architectural features. As variables, we applied the characteristics of relief, hydrology, cover surface soil types, land use and occupation aspects; urban form settings. Four landscape units were defined, due to its significant heterogeneity associated with geographical location. Relief conditions were instrumental in the spatial distribution of hydrological flows and, consequently, in the territorial occupation shapes and the quality of urban life, being nowadays one of the main determining factors for existing urban patterns. The article presents the intersection of geo-biophysical and urban-architectural dimensions, the comparative study of landscape units and their type-morphological characteristics, by considering the occupation density, the structural physical elements of the urban fabric and the incidence of open spaces.*

Key Words: *Landscape Ecology, urban form, geo-biophysical constraints, territorial planning, environmental risk*

Introduction

In this paper, we will present the results of the morph-functional and morphological type analysis and classification of the study area in the city of Rio de Janeiro/Brasil, located in the area covered by the Urban Structuring Plan of Vargens, promulgated in 2009. In order to understand the relationship between the urban parameters and the occurrence of vulnerability and risk conditions in urban areas, especially when they refer to climate changes, the scope of this project covers the range of everyday relationships, of daily life achievements, hence it is restricted to the range of microclimatic action. Given the relief characteristics of the city, part of everyday life of the population occurs in settlements located in slopes and, in some situations, under conditions of extensive vegetation cover, such as forests and small farming areas, remnants of an agricultural past still recent.

This fact has reinforced the importance of the adoption of watershed cover unit as a criterion for defining the study area, taking as spatial delimitation of this research the Channel's Zone sub-basin, which integrates the Jacarepaguá Basin, located in the Western Zone and being the current urban expansion area of the city.

This article is the result of a multidisciplinary research project funded by Research Support Foundation of the State of Rio de Janeiro (FAPERJ-E-26/111.626-2011), aiming to analyze the impacts of climate changes in urbanized and non-urbanized landscape. It is associated with the project "From urban forests coastal plains: a geo-ecological approach on urban environmental systems" (FAPERJ-E-26/102.984-2012). To meet the proposed objectives, the following goals were set:

- (1) Relate social-environmental (urban), the physical-environmental (geo-ecological) and comfort parameters in the use of urban spaces;
- (2) Generate new ideas for urban laws and urban plans formulation that consider the environmental, climate, comfort and risk constraints;
- (3) Enhance researchers and student's training, with innovations in teaching and research in Geography, Urban Ecology, Architecture, Urbanism and Landscape, with the incorporation of methods for the preparation of three-dimensional scenarios considering socio-environmental, physical-environmental, comfort and micro-climate as related aspects.

The adopted strategy was to approach the concepts, methods and procedures through a trans-disciplinary, multi-scale and integrated vision to deal with the built environment in contexts of great complexity. In this article, we highlight the following themes, concepts and methods:

- a) Hydrology, forestry and urban climatology;
- b) Vegetation cover;
- c) Legislation and urban parameters;
- d) Types and characteristics of the built and non-built spaces.

Methodological procedures

The landscape was adopted as a spatial analytical category by considering the multiple interactions between its various constituents which, according to Forman (1995), compose “a mosaic where a cluster of local ecosystems is repeated in similar form over a kilometer-wide area”. Because it is an area of urban expansion of the city, the adopted delimitation encompasses a very heterogeneous mosaic where fragments of native ecosystems, already altered by successive uses, alternate with different land use and cover characteristics, resulting in a palimpsest with grooves of different economic times which Naveh (2000) identifies as co-evolutionary cultural landscape:

“Cultural landscape thus creates a tangible bridge between human minds and nature. Because of the co-evolutionary process of mutual modification and adaptation of humans and their natural environment in cultural Total Human Environment landscape, the delineation between social and natural systems in socio-economic models of landscape processes is completely arbitrary and artificial.” (Naveh, 2000 p. 18/19)

The geographical approach of landscape ecology and landscape architecture was used as a theoretical-methodological support to the urban and territorial planning underway. Two methods of analysis were adopted: a morph functional analysis of landscape ecology, based on the interactions between the landscape elements and their functions (Forman, 1995), and the urban morphological type analysis (Metzger, 2001; Forman, 1995; Macedo, 1993).

Starting from this principle, we selected the portion west of the Jacarepaguá water basin, since it is its last expansion frontier. Based on the experiences acquired in previous researches (Name, Montezuma; Sesana, 2011; Montezuma; Oliveira, 2010; Montezuma *et al.*, 2012a; Tangari *et al.*, 2007; Schlee; Tangari, 2008; Schlee *et al.*, 2009), and with the purpose of best describing the morph structural features that characterize urban space under expansion, the landscape was initially analyzed in its multiple interactions and constituents, according to Forman (1995).

From the identification of landscape units, defined in this work as land surface with similar hydro-geomorphological characteristics and human modification pattern's history (Metzger, 2001), we established the two major dimensions that comprise the study area: a geo biophysical dimension – which refers to the support condition on which human life and occupation are held - and the architectural-urban dimension, which comprises the set of objects that will promote the territorial configuration.

After the sub-division in specific landscape units and its analysis, thematic maps were produced featuring the systems of each dimension.

Geo biophysical dimension

This covers the set of elements of geo biophysical support, such as: relief characteristics; hydrology; surface coverage and land use. These were identified through the interpretation of satellite images, over flights photos and ground surveys (Forman, 1995; ROSS, 2009).

In order to characterize the relief, the mapping made by Roncarati and Neves (1976) was first used to help identifying the geomorphologic compartments. Both the ranking of surface coverage and use and the actual and potential drainage were taken from high resolution satellite image – Geoeye, 2011 (resolution 0.5 m) and then classified in a key based on the critical analysis of the specific literature and on the one adopted by the Brazilian Institute of Geography and Statistics (IBGE, 2012).

As a result of this process, maps were produced in order to represent the main features of the basin, such as: (1) Terrain Digital Model (MDT), featuring the relief surface and slopes in the mountainous compartment; (2) Hydrological Map, contemplating the characteristics of drainage and the representation of both potential and real water bodies, such as the main drainage axes, channeled or not, artificial channels, lagoons, lakes and artificial reservoirs, and (3) the Surface Use and Coverage Map, showing the spatial distribution of major vegetation categories in the conservation zones, built area and remnants of native ecosystems (inserted or not in the protected conservation zones) and features of exposed substrates, such as soils, rocks and access roads.

Urban-architectural Dimension

This dimension encompasses urban structural elements, according to their functional and formal profiles, identified through interpretation of satellite images, over flights photos and ground surveys. Based on previous work (Schlee *et al.*, 2009; Wopereis, Capillé and Tangari, 2011) and according to authors that conceptualize urban morphology (Lamas, 1992), the relationship between urban design, landscape (Campos *et al.*, 2012 and 2011) and open spaces systems (Magnoli, 2006a and 2006b; Macedo *et al.*, 2007), the following elements were considered in the first layer of analysis: land use and occupation; urban fabric and building typologies, including blocks, lots and buildings; circulation systems (streets and sidewalks); open spaces systems of environmental character (protected areas with restrictions on parceling regulated by environmental protection legislation, protected areas with no restrictions on parceling regulated by environmental protection legislation, conservation units); open spaces systems with urban character (areas susceptible to parceling, regulated by urban legislation codes).

Once the boundaries of the landscape units were defined, each one was described. Based on the morphological type analysis, each unit was divided into landscape subunits. This process enabled the identification of a second output level of heterogeneities in the spatial production and, consequently, of the diversity of the urban fabric in consolidation.

Results and discussion

The definition of landscape units from morph functional and morphological-type analysis proved to be a key tool for the identification of the urban characteristics and related processes in the study area.

Morph functional analysis: division into landscape units

The average rainfall in the city of Rio de Janeiro varies between 1000 and 1200 mm/year (Dereczynski *et al.*, 2009; Togashi, 2009). Galvão (2009) recorded, in 1958 in the Jacarepagua Plain: an annual total of 942 mm in the mountains; 1,288 mm in the piedmont; 1,872 mm in

the plain. In recent times, it was recorded in the Caçambe River basin an annual precipitation of 1900 mm in the mountainous area (Togashi; Montezuma; Leite, 2012; Montezuma *et al.*, 2012). These results highlight the localized distribution and confirm the function of relief subdivision as a major factor in the local dynamics. From this data we established that *a priori* the main risk factor is linked to rainfall and hydrological dynamics as a whole.

After identifying the risk factor, we analyzed the terrain features from the physiognomy by initially establishing three major analysis units: hill (mountainous area), mountainside base (peripheral clinopiano) and plain (lowlands).

Given the above, the geomorphology was identified as the structuring and conditioning element of the main characteristics of the terrain, establishing itself as the first item in the hierarchy of landscape division. The second parameter adopted was the characteristics of ground cover, since these summarize the behavior of the physical and hydrological conditions that prevail in each compartment (Montezuma; Oliveira, 2010). Both the remaining natural vegetation and the secondary coverage developed in unused, abandoned or cultivation areas were associated with the characteristics of urban fabric, completing the set of criteria used for the study area division and characterization. This classification resulted in four Landscape Units, ordered in the north-south direction and defined as follows: LU1, LU2, LU3 and LU4 (Figures 1 and 2).

LU 1: Slopes Forestry Domain: mountainous province/crystalline basement

Crystalline basement area (Roncarati & Neves, 1975; Costa Maia *et al.*, 1984). Vegetation in forests mosaic of different ages and single family cultures, mostly composed of banana plantation and in a lesser proportion subsistence plots, dominates. Few buildings, mostly one floor high, and low soil sealing rate. It encompasses the neighborhoods of Vargem Grande and Vargem Pequena.

LU 2: Interface Forest/Building Zone Domain: peripheral clinopiano/piedmont

Lowland zone slopes base, formed by sediments of continental origin (Costa Maia *et al.*, 1984). Vegetation can be found in private lots in the form of large backyards or gardens. There is a predominance of single-family units with 1-2 floors placed in large lots, low rate of soil sealing, occupied in general by small farms, orchards, farms and rare stables. It is located in the central portion of the neighborhoods of Vargem Grande and Vargem Pequena.

LU 3: Low Density Building Domain: paludial plains

Presence of swamps fragments and some remnants of sparse swampy woods. The soils are moist and very humid, with predominance of peat. This is a landscape unit with low density of buildings, occupied by small farms and orchards in progressive process of replacement by fenced residential condominiums, which are generally composed by two to three floors buildings. Low tree plantation and vegetation fragments can be found inside private properties. It corresponds to the southern portion of the neighborhoods of Vargem Grande and Vargem Pequena.

LU4: High Density Building Domain: elongated barriers

Sandy soils of the ridges associated with lagoons. High rate of fenced residential high-rise condominiums, low tree plantation, generally composed by palm trees, vegetation in private gardens. Located in neighborhood of Recreio, it corresponds to the main expansion area of condos of the entire Jacarepaguá Plain coastal line.

Considering the significant landscape transformation in Jacarepaguá Plain since the colonial period, the current observed physiognomy results of an already much altered cultural landscape.

The last transformation process dates from the early twentieth century, after a succession of production attempts started with the production of sugar cane plantations, coffee plantations, subsistence agriculture and coal and firewood exploitation, closing the last phase of rural economy in the area.

During this period, in the mountainous domain on the southern face of the Pedra Branca Massif, the agriculture activity of annual species was practiced, notably the cultivation of banana. This was due to higher period of shading, high humidity, more consolidated soils and better drainage. The plain domain was left to vegetables growing (potatoes, yams, tomatoes, cassava, chayote), mainly on the areas of the lowlands flooded portion. In the intermediate zone between the mountain and the plain (peripheral clinoplane) urban settlements were initiated, with the establishment of first roads, houses and mills, playing an important role as the center of economic convergence of production and exchange between the two adjacent zones (Galvão, 2009; Magellan Correa, 1932). The roughness of this historical process is present along the basin and partly explains the spatial distribution of the occupation patterns in the whole area.

The landscape morphological analysis reflected an occupation pattern that is repeated and results from a socioeconomic system of dependency between social classes whose settlements have clear distinctions in the built environment. This fact is interpreted by the high presence of informal communities in all landscape units, especially nearby private residential condominiums, along river margins or hillsides.

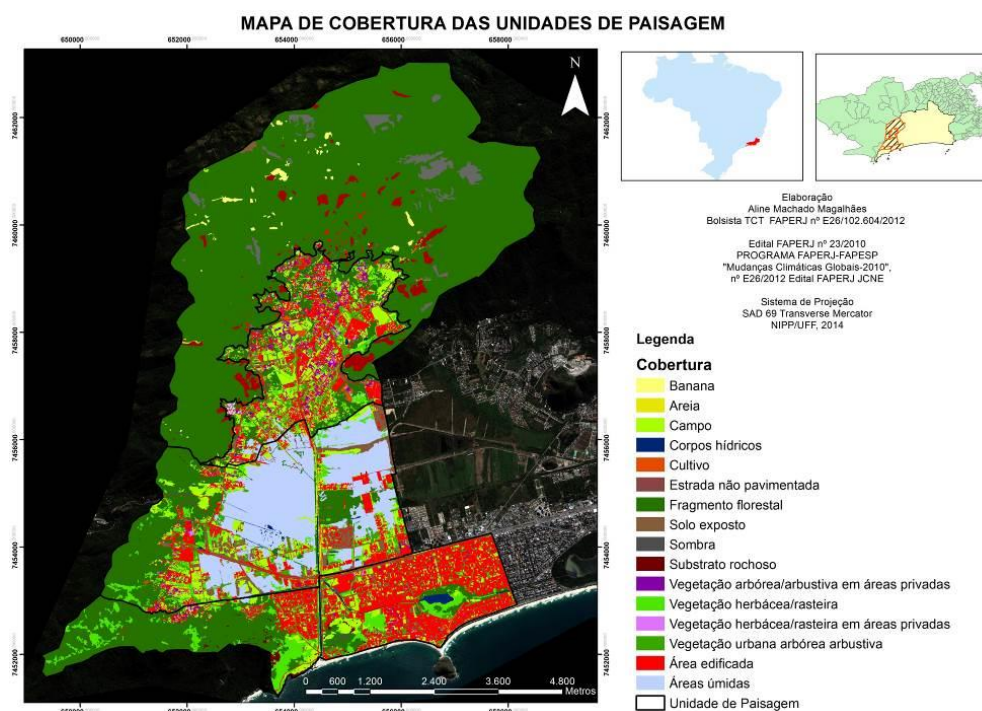


Figure 1. Map of cover and land use surface, with the delineation of the landscape units. Jacarepaguá Plain/Rio de Janeiro/RJ,Brazil (source: Ellaborated by NIPP/POS GEO-UFF CNPq Research Group, on 2011 Geoeye satellite image, 0.5 m resolution).

The morph functional analysis, revealed a spatial-temporal differentiation, which demonstrated a chronological alignment. Based on Santos (2012):

“The landscape is not created at once, but for additions, replacements; the logic by which an object is made in the past was the logic of production of that moment. A landscape is a writing over the other, is a set of objects that are of different ages, is an inheritance from different times (Santos, 2012, p.72-73)”.

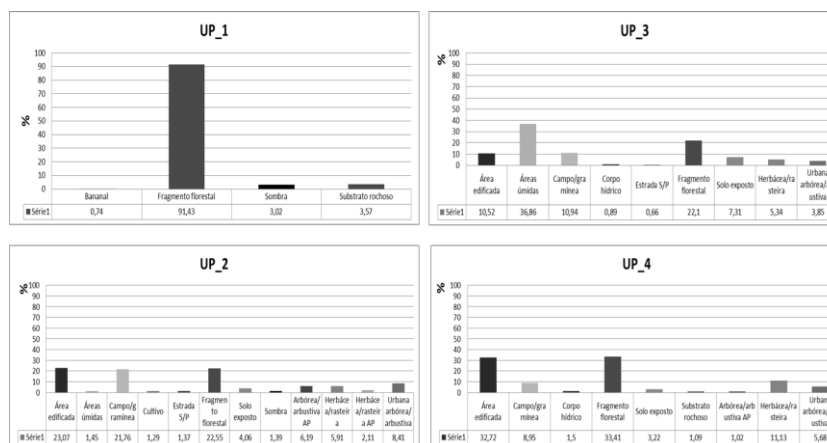


Figure 2. Percentage of surface use and coverage in the Channels Basin, Jacarepaguá Plain/RJ. (source: Magellan and Montezuma, in press).

The current territorial configuration seems to be founded on the compartmentalization of relief, but also on how it has conditioned occupation patterns that now influence the behavior adopted by the real estate capital. As reported in Galvão (2009), although there may be common elements in each unit, specific features individualize each region in which the land ownership system evolves depending on the economy or colonization type installed, but also grounded in different relief conditions.

According to that, the old production activities of rural past are concentrated to the north in the forest of hillside area, in LU1, and more modern occupation patterns are notably present in LU4, on the sandy soils of the ridges. The mountainous terrain conditions, where more than 80% of slopes range from less steep to severe steep slope (Montezuma; Oliveira, 2010), presented at the time a less immediate return to undertaken investments, allowing the persistence of preterit use and occupation patterns, associated with agricultural production - chayote, cassava, sweet potatoes and corn – and, to a much lesser extent, with the small livestock for subsistence and mules as a resource to the workforce needed to land management (Correa Magallanes, 1932), freezing the form aspects over time.

With the creation of the Integral Protection Conservation Unit in the form of the Pedra Branca State Park, the gradual reduction of subsistence plots and the restriction of residential uses in the higher portions of the coastal range took place. This system of land forms and uses in LU1 resulted in a setting of greater vegetation cover and restricted, sparse buildings, enhanced by the urbanization deficiencies due to the condition of the environmentally protected area.

In LU2 the concentration of large lots and land parcels in the foothills (peripheral *clinopiano*) and the ensured forested conservation areas add value to the land in the surroundings, valorizing the current occupations and attracting new ones. However it is permissible to consider that the geographical position of this area corresponds to the buffer zone between the depositional processes of the slopes at the interface with the low lands and that there are, in some parts, existing *talus* depots (Roncarati; Neves, 1976), which indicate the need for a more restrict occupation process.

In LU3, the rarefied occupation pattern in the central portion is primarily the consequence of wetlands and floodplain soils and of the remaining lots of temporary agriculture. The characteristic occupation condition and the fragile land ownership situation, developed during the first settlements period, facilitate the negotiation made by shareholders, reflecting the gradual replacement of extensive open private spaces by a pattern of fenced communities that stands out against the predominance of older and more modest and less urbanized dwellings.

Finally, the denser and built standard in LU4 is explained in terms of a prime waterfront location, established from recent years, along with soil structural conditions. The higher land values stimulate the highest number of real estate investments in residential units and the

difficulty of horizontal expansion, due to the lack of empty lots, leads to high rise building increase and to reduction of open and more wooded spaces, creating a more uniform pattern in shape and spatial organization.

Type-morphological analysis: division into landscape subunits

This study was based on field surveys, over flights photos and satellite images, and considered the urban fabric features as the second most relevant criterion of analysis, as they reflect, along with the remaining vegetation, the prevailing conditions on the ground surface. The result obtained for each unit landscape, described above, was the division into two sub-categories: Consolidated Urban Fabric, where parceling and building processes occur; Unbound Urban Fabric, referring, in general, to non parceled areas, where there are large tracts of specific use (clubs, studs, among others), land in the process of excavation works or sectors with isolated buildings, located mostly in the forested sector.

The Consolidated Urban Fabric was initially differentiated in terms of the existing morphological structure and according to the main element that defines that structure, which may be linearly guided by a track or orthogonally organized in a block system. Due to intense incidence of streets inside fenced communities, which therefore have low accessibility, this parameter was considered crucial for the study area characterization. The variables of the lots density occupation (low, medium or high density) were added due to the need for differentiating the residential types identified. The occupation density defined in this work refers to liquid density, analyzed through the occupancy of lots and blocks, withdrawing from that calculation the public open spaces (streets, squares, parks).

Thus, based on previous studies (Wopereis, B.; Capillé, C.; Tangari, 2011; Campos *et al.*, 2011, 2012), we applied the percentage of density, according to the incidence of open spaces and high rise building in private areas, such as individual lots or condominium blocks. The percentage incidence of open spaces matches: high density (up to 30% open spaces surface inside the lot or block); medium density (between 30% and 50% of open spaces surface inside the lot or block) and low density (more than 50% of open spaces surface inside the lot or block). The percentage incidence of high rise building (up to 3 floors or more) matches: intense high rise building incidence (over 50% of the surface inside the lot or block); medium high rise buildings incidence (between 10% and 50% of the surface inside the lot or block); low high rise building incidence (less than 10% of the surface inside the lot or block).

Within this sub-category, and based on the above classification, we investigated further the presence of empty land parcels or parcels with specific use, the latter with commerce, industry or services utilization. In total, a score-board with thirteen landscape subunits in the Consolidated Urban Fabric sub-category was obtained through the crossing analysis between the structuring elements and the occupation densities (Tables 1 and 2):

LU1 presents low heterogeneity and occupancy rate, because it refers to the coverage area of the Pedra Branca State Park. This unit stands out for the highest heterogeneity of the consolidated urban fabric (Figures 4 and 5). With 22 boundaries (including 16 inside the LU2), the areas structured through private access streets with medium occupation density were the ones most frequently identified. The presence of large tracts is considerably high, summing up to 14 lots of specific use and 15 without apparent use, also indicating an area with high potential for change and urban consolidation.

LU3 and LU4 Landscape Units show low heterogeneity. LU3 differs by presenting non built large tracts in areas already urbanized with geo-biophysical features which make them more sensitive to the occupation. LU4 is characterized by high degree of high rise buildings and dense occupation.

Table 1. Classification of landscape sub units observed in the Consolidated Urban Fabric category.

Street as the structuring element:	Block as the structuring element:	Large tracts
<ul style="list-style-type: none"> - Public access street (low density) - Public access street (medium density) - Public access street (high density) - Private access street (low density) - Private access street (medium density) - Private access street (high density) - Non paved street(low income communities) 	<ul style="list-style-type: none"> - Public access block (medium density) - Public access block (high density) - Private access block (medium density) - Private access block (high density) 	<ul style="list-style-type: none"> - Large tracts of specific use - Non built large tracts

Table 2. Landscape subunits identified within each landscape unit.

Landscape Subunits	Landscape Units				
	LU1	LU2	LU3	LU4	TOTAL
- Public access street (low density)	0	8	2	0	10
- Public access street (medium density)	0	8	2	0	10
- Public access street (high density)	0	1	0	1	2
- Private access street (low density)	0	6	1	0	7
- Private access street (medium density)	0	16	5	1	22
- Private access street (high density)	0	6	6	2	14
- Non paved street(low income communities)	0	5	5	2	12
- Public access block (medium density)	0	0	0	2	2
- Public access block (high density)	0	0	0	1	1
- Private access block (medium density)	0	0	0	1	1
- Private access block (high density)	0	0	0	2	2
- Large tracts of specific use	0	10	4	0	14
- Non built large tracts	0	13	2	0	15

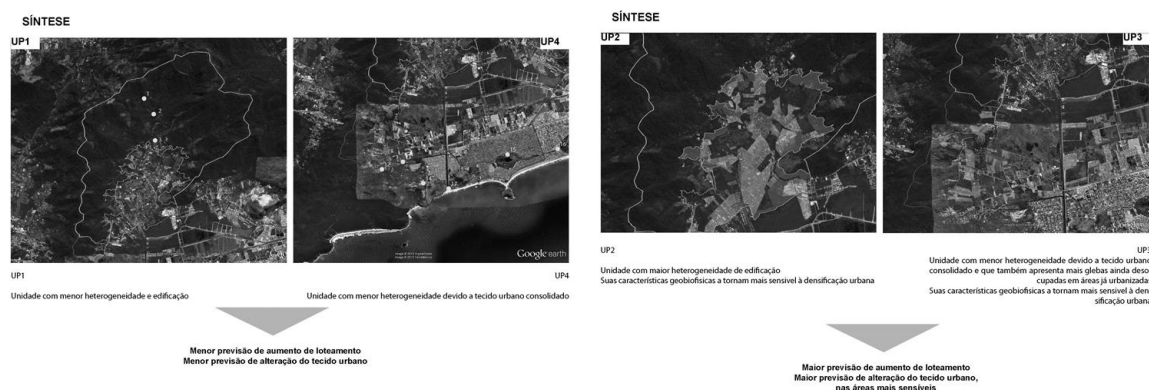


Figure 3. Subcategories - Landscape Units (source: Drawings prepared by Inês Isidoro, on Google Earth, 2013).



Figure 4. Landscape Subunits identified in LU2 (source: Drawings prepared by Inês Isidoro, on Google Earth, 2013).

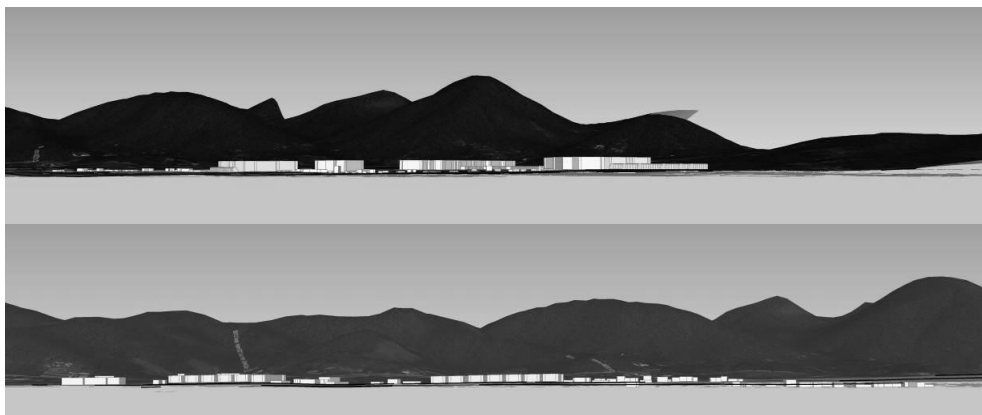


Figure 5. Relief characteristics of LU2 Landscape Unit showing the projected new building forms (source: Drawings prepared by Natalia Parahyba, 2013).

Final considerations

In landscapes Ecology, the systemic approach is widely used to understand the integration between the parts of a whole and the different levels of action, direct and indirect, of the landscape elements.

“... in applied terms it contributes when it proposes dealing with anthropogenic environments, in the scale in which man is transforming the environment, seeking to understand the structural changes and, thus, functional, brought by man in the mosaic as a whole,

incorporating explicitly all the complexity of spatial inter-relationships between its components, both natural and cultural.” (Metzger, 2001 p.7)

The combination of landscape units, besides being necessary to understand the properties that emerge from the set (Naveh, 2000), revealed a certain degree of interdependence between them. Forested areas upstream act as storage zone to supply the massive rainfall which has in the mountains its main barrier to transposition. The redistribution of the surplus that flows through the plain has the paludial zones of UP3 and lagoon systems of LU4 as the main reservoir.

Analyzing all together, we conclude that the extreme heterogeneity is also expressed in the urban fabric, prevailing the consolidated type, with structuring streets which cross through the landscape in a linear pattern and to which are coupled parallel systems of residential occupation of single family character. The current trend of the residential type points to the almost complete occupation of the land, whose lot dimensions are decreasing, but remaining single family use, usually not exceeding two floors buildings, but which will suffer intense transformation processes due to increase of soil and changes due to legislation codes, as is being studies in complementary researches with simulative occupation scenarios until 2016. This trend will cause changes in hydrology, urban microclimate and comfort, which represent aspects that have been developed by our research, trying to provide support for normative formulations and design alternatives that may enable more appropriate conditions to future the occupation.

Land use and occupation patterns of coastal plain require adjustment in order to prevent that both the density as well the soil sealing worsen the risk of flooding that are proper to the local dynamics. Therefore, it is essential that criteria for urbanization are adopted having as parameters the constraints associated to the particular landscape dynamics, such as topography and hydrology, the main landscape structural factors and regulatory agents of comfort and environmental health of the resident population.

Acknowledgments

The authors thank, on behalf of the teams involved, the research grants from FAPERJ and FAPESP (Climate Change Research/2011, State Young Scientist Scholarship/2012, Technical Assistance Scholarship/2012-2013).

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The landscape of sprawl: relationships between natural and urban dynamics in the Western Portion of the Metropolitan Area of São Paulo

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Abstract. *An increasing part of the urban development of the Metropolitan Area of São Paulo (with its population of nearly 20.1 million people in 2013), as so many others in Brazil, is structured on urban sprawling, conforming a variety of urban fabrics with different morphologic attributes – low-rise housing, gated communities, industrial areas, high-rise buildings, and so on – sometimes not related to each other and presenting a huge social disparity. Its Western Portion exemplifies these attributes, as it presents an urban development structured along the three main road axes, especially since the 1970's. These actions have a great impact on environmental dynamics and on its urban conformation. On the other hand, the urban sprawl contributes in an unplanned manner to the preservation of environmentally significant open spaces in this area. The approach from a landscape-planning perspective is imperative to portray the effects of this urban development process within the environmental dynamics and to elaborate urban projects and public policies for the area. However, we shall guarantee a proper connection between the remaining environmental areas, adding urban value in a way that honors the population's public right of use/enjoyment to these spaces in order to actually build an urban landscape.*

Key Words: Open spaces, urban sprawl, landscape planning, Metropolitan Area of São Paulo.

Introduction

When driving to the outskirts of large Brazilian metropolises, an observer has the chance to get in touch with successive landscapes that are characteristic of the Brazilian urbanization processes in the early 21st century. Vast gated areas enclosing residential wooded havens, large warehouses settled on huge land slopes, gas stations that actually end up hosting all sorts of services, remains of native woods, and large, precarious settlements that spread out to the horizon with substantial damages to the local terrain and hydrography. Urban fragmentation and dispersion are characteristics of this succession of landscapes (Figure 1).

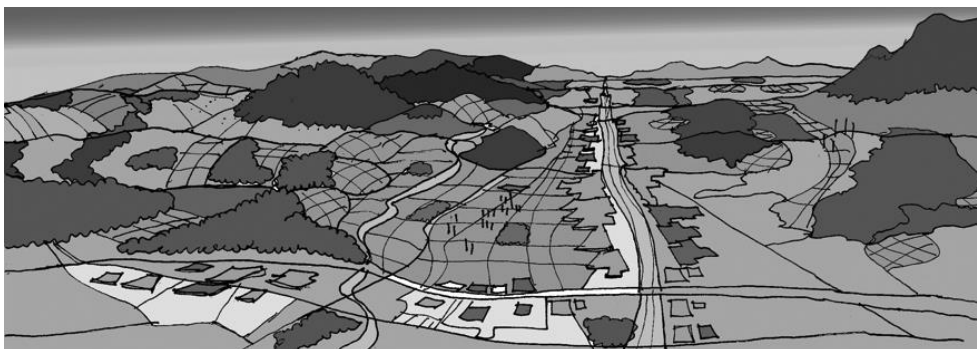


Figure 1. Landscape resulting from the disperse urbanization process. Drawing: Silvio Soares Macedo, 2014.

Relationships with new scales are also created, where large portions of the land are crossed by infrastructure elements, such as power transmission lines, water reservoirs, water dams, railways, or large urban portions deeply isolated from their surroundings. People - pedestrians, drivers, or commuters - are no longer able to comprehend the scale of such a landscape.

This work is part of a doctoral dissertation for the School of Architecture and Urbanism of the University of São Paulo (FAUUSP) and is included in the objectives of the research named "The open spaces systems in the Brazilian urban form constitution: production and appropriation" (2012-2016), developed by the network of researchers denominated Quapa-SEL and coordinated by FAUUSP Quapa Laboratory, in an attempt to understand the relationship between open spaces and urban forms through the analysis of several Brazilian cities.

Sprawl in Brazil

Sprawl is characterized by the creation of discontinuities in the urban fabric as a result of the occupation of areas that were originally rural, with gaps between adjacent, continuous urban clusters. Such definition is used as a reference in this essay and is based on that made by Reis Filho, who defines this concept as "the trend to distribute urban infills over all territories affected by the process among typically rural areas, leading to a relative homogenization of these territories." (2006, p. 51, free translation). With this definition, the author aims to differentiate it from the concept of "urban diffusion", as used by European authors such as Indovina (1990), Portas (1993), and Secchi (1995). Such differentiation is justified by the fact that the term "diffusion" evokes the possibility of a "complete urbanization" in the future, whereas Reis Filho understands the process as the distribution of urbanized points.

North-American theorists have approached similar issues since the 60's, with emphasis to the pioneer concepts of urban sprawl, proposed by Harvey and Clark (1965), and leap frog development, proposed by Gottman (1961).

The fragmentation of the urbanization process in Brazil is not recent. Significant parts of the urban history of São Paulo and Rio de Janeiro have occurred in this manner, when the perimeter of these cities went beyond their initial downtown area. What distinguishes recent dispersion processes from previous processes is not only the type of urban fabric produced, but also its structuring mode, which started to occur under the influence of legal mechanisms and not exclusively as the result of speculative land interests.

Reis Filho (2006) subdivides the Brazilian disperse urbanization into three types and classifies it according to the uses attributed to it: industrial, residential, and that related to commerce and services. These three types have intrinsic relationships, as the installation of industrial areas usually attracts housing areas to its surroundings (either formal or informal settlements), which, on their turn, demand a respective support infrastructure.

Pressured by the mobility problems of large cities and free from the technological restrictions that forced them to remain in close proximity to them, companies started to find productive advantages in moving away from the compact city and sought for sites near major connection axes. The social groups related to these productive activities try to accompany this relocation and create urban agglomerations near their job sites, either legally or not.

In addition to the productive restructuring, other factors have contributed to intensify the disperse urbanization process in Brazilian cities.

These factors include the residential dispersion stimulated by high costs of living and plots in the compact city, which motivate the search for new locations to live with lower buying power, but still quickly connected to access highways. This adds to the search for locations that meet the consolidated image of an isolated home with large backyards surrounded by nature.

Another important role is played by the search for a second residence in the surroundings of Brazilian metropolitan areas. In his work about the structuring of Greater São Paulo, Langenbuch (1971) shows that an occupation process occurred in the 50's in several peri-urban

areas for recreational purposes, with a model based on country houses resulting from a real estate speculation cycle.

Moreover, problems such as the increased urban violence and the low effectiveness of the Government Authorities to combat criminality in Brazil have given the private initiative the opportunity to offer walled, gated communities and the implementation of ostensive security systems.

As of the 70's, in the specific case of Brazil, this group of factors resulted in elite neighborhoods present also in urban fringes (Caldeira, 2000) using models inspired in suburban standards of richer countries.

Even though this form of urbanization is developed for small portions of the population, it has major implications for society (Ojima, 2007, p. 104), as the structuring of these areas is based on an extensive logic and involves the creation of large support structures.

The migration of a part of the elite to the urban outskirts gives rise to a new suburban standard in Brazil, with the periphery occupied by all income classes.

The urbanization of the contemporary city is characterized by the creation of spaces where the boundaries between rural and urban very often are no longer perceptible. The production relationships that used to have an urban character now take place in areas with rural characteristics²⁹².

This urbanization process establishes new dynamics, such as the higher dependence on automobiles. A new time-space relationship is created, where distances play a role that is less important than the time spent in commuting, and speed becomes less important than the traffic flow²⁹³.

Highways play a very important role in the daily lives of those who live in disperse urban areas. Whether in an SUV with a single occupant, on a shuttlebus, or on an ordinary bus packed with commuters, a considerable amount of time is spent on highways and one has at least a daily contact with them.

As a consequence of the popularization of mobility, urban centers to support these disperse housing areas grow in number, with an infrastructure of commerce, services, and leisure.

In addition to the appearance of support equipment motivated by a specific form of mobility, the disperse urbanization process has also fostered an increase in the number of private recreational open spaces. The private sectors finance an entire system to support housing areas destined to those who can afford these amenities. The migration of several types of equipment – such as shopping centers and recreation clubs – towards the private sector demonstrates its higher efficiency when it comes to understanding the several demands of the Brazilian population and making compatible responses feasible, when compared to the capacity of the State to manage such initiatives. Such incapacity is recognized by the Government Authorities itself when it permits the management in a condominium regime of areas that should be under its own responsibility.

Even when some open spaces resulting from a disperse occupation are incorporated to mingle with the compact city, many of them remain with no specific destination for an undetermined period (Campos, 2008). This fact reinforces the importance of understanding the role played by these spaces and the potentials they have when it comes to consolidating new forms of urbanization.

Even though this constitutes an essential phenomenon for the understanding of contemporary urban dynamics, a prejudicial vision on the subject still prevails among many Brazilian technicians. The proposals made on this matter usually consist of the application of proven solutions to the compact city, whose effects on the specificities of disperse urbanization are questionable (Limonad, 2007).

²⁹² This new condition is demonstrated by the creation in 2010, by the Brazilian Institute of Geography and Statistics (IBGE) of a range with seven transition categories of what is defined as rural and urban.

²⁹³ PROST apud Panerai, 2006, p. 22

At the same time, the Brazilian government incentives the national automotive industry by means of investments and expressive tax exemption, which usually ensures the constant increase in the production of automobiles²⁹⁴ and turn automotive vehicles into the main means of transportation in the country.

In this context, the creation of disperse urban centers on the outskirts of metropolitan areas of major capitals presents a contradictory relationship that is particularly interesting for the development of this work: the non-urbanized spaces generated by urban sprawl are fragmented, but at the same time they have enabled the unintentional preservation of an expressively amount of ecologically significant areas.

The West Portion of the Metropolitan Area of São Paulo

The area is characterized by a hilly plateau, with expressive hydrography and portions of dense Atlantic Forest, usually of primary growth. It is structured by three major road axes – highways Régis Bittencourt (connection with southern Brazil), Castelo Branco and Raposo Tavares (connections with the west of the state of São Paulo), and the west portion of Rodoanel (the local ring road), which connects the three other axes. This region comprehends the municipalities of Barueri, Cotia, Embu, Itapecerica da Serra, Itapevi, Santana de Parnaíba, and Vargem Grande Paulista, as well as the municipalities of Carapicuíba, Osasco, Taboão da Serra, and part of São Paulo (Figure 2). The latter four have not undergone a process of urban sprawl – opposite to the others – but have experienced a compact, continuous urbanization that connects them to each other. The non-urbanized areas also include several segments with small rural estates.

The population growth in the Vector started in the 70's, when the Metropolitan Area of São Paulo (*Região Metropolitana de São Paulo* - RMSP) started to receive migrants mostly from the Northeast region of Brazil. The group of municipalities in the West Portion with disperse urbanization occupies a total area of approximately 970 km² and, in 2012, held a population of approximately 1.7 million inhabitants, according to the data from State System Foundation for Data Analysis (SEADE).

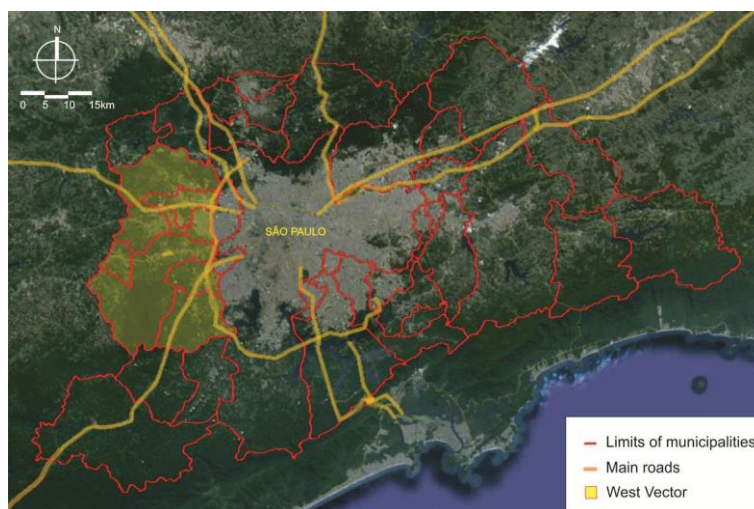


Figure 2. Western Portion of the RMSP. Source: Author's drawing based on images from Google Earth, 2013.

²⁹⁴ According to the ANFAVEA, the production of vehicles in Brazil in 2013 totalled 3.74 million vehicles, which sets an annual record in Brazil. In November 2013, Brazil was the 5th largest producer of vehicles in the world, according to data from Jato Dynamics.



Figure 3. Urban fabrics in the Western Portion of the RMSP. Source: Author's drawing based on images from Google Earth, 2013.

Sprawl in the West Portion

In the segment under study, the sprawl is comprised of the following urban fabrics, based on the subdivision established by the researchers of Quapa SEL Project:

Large Structures

Sectors with predominance of warehouses with several purposes – industry and logistics, corporate condominiums, and large shopping/recreation centers – with low-rise aspect and up to three stories (Figure 4). Most of them are located along the axes of highways Castelo Branco, Raposo Tavares, Régis Bittencourt, and Rodoanel, and in lower numbers in side roads.

As for the clustering type, they are organized in condominiums or in sparse clusters, configuring smaller patches. They may present an orthogonal mash road design, as in the case of developments such as Alphaville and Tamboré²⁹⁵, or an irregular road design, as found in most of the other occurrences.

²⁹⁵ Cf. Campos (2008).

Another form of organization of the urban fabric is found as industrial condominiums distributed in sparse patches, both along the major highways, such as Raposo Tavares, and along side roads.

Houses Groups

A house group (*casario*) is defined as “extensive areas occupied by housing or used for that purpose, configuring a particular and clearly identifiable landscape, both for its individual elements (buildings) and groups (fabrics)” (Carvalho, 2011, p. 96, free translation).

These are created by allotments open to public access, both formal allotments and squatters, comprised mostly of dwellings built manually by low-income populations (Figure 5). In some cases, they include small warehouses or housing projects. Due to the context of land irregularity that involves a significant part of these cases, the land occupation process takes place in a fragmented manner and according to the opportunities at hand, with many interstices left with significant green spaces. The most recurring type is comprised of elongated plots (5 x 25 m), where houses are built with no frontal or lateral offset, including a second, smaller construction at the back of the plot. There are cluster housings in smaller numbers.

This fabric is common to all municipalities in the Western Portion, configuring a vast, continuous urban patch that mingles with the municipality of São Paulo and extends through the municipalities of Carapicuíba, Barueri, Jandira, and Itapevi. This fabric also occurs significantly in the eastern portions of the municipalities of Embu das Artes and Itapeçerica da Serra.



Figure 4. Industrial and logistic warehouses along Presidente Castelo Branco highway, in the municipality of Jandira.



Figure 5. Low-rise housing in the municipality of Jandira.

Public / private housing projects

Fabric comprised of multi-family housing with three to six stories, no elevators, usually in monolithic shape or elongated “H” shape and little spacing between them. In most cases, they are built by Government Authorities initiatives (Figure 6) and by the Private Initiative (Figure 7) particularly as of the 90’s, for low-income populations. Public housing projects present undifferentiated open spaces and are usually irregularly appropriated by additional constructions with time, while private projects present some recreational structures in their open spaces. In both cases, a considerable part of the open spaces is dedicated to parking lots. These projects are usually large in size and comprised of buildings with homogeneous, repetitive volumes. In some cases, the private projects are associated with low-rise condominiums comprised of clustered houses.

These condominiums are found as sparse units along the houses groups in all municipalities. Most of the times, these projects are not developed near main roads or with better access to public transportation.



Figure 6. Housing project in the municipality of Itapevi.



Figure 7. Private housing project in the municipality of Cotia.

High-rise developments comprised of towers

These are comprised of buildings with more than six stories with elevators. They may be either residential or dedicated to commerce/services (corporate). The residential buildings include recreational open spaces with a diversified range of leisure structures. Disperse clusters are

found in the municipalities of Barueri and Santana de Parnaíba, with many of them associated with developments such as Alphaville and Tamboré.

Slums

Usually masonry buildings with up to five stories, mostly residential, built in properties to which dwellers have no titles. These buildings usually have less than 5 m in the front side and 15 m in length²⁹⁶, under the minimum dimensions defined by the Brazilian urban standards, as well as housing units with no direct access to the street. They occupy all sorts of area, most frequently those environmentally vulnerable, such as steep slopes or areas near water bodies. They are mostly located in the municipalities of Embu das Artes and Itapeverica da Serra, extending over the area that mingles with the municipality of São Paulo.

Low-rise residential condominiums

These are comprised of developments with clustered or individual houses built with the same design and in the same real estate development (Figure 8), usually on a street connected to highways or side roads. They are built on adjoining lots to gated communities and are usually oriented to families with medium and high buying power. These developments are located mostly in the municipality of Cotia.

Gated communities

These are comprised of gated allotments of different sizes, with common areas and preserved areas of different sizes, where residences or corporate developments are built by the owners of the plots (Figure 9). This type of development occupies extensive and continuous patches of urbanization over significant areas of several municipalities.

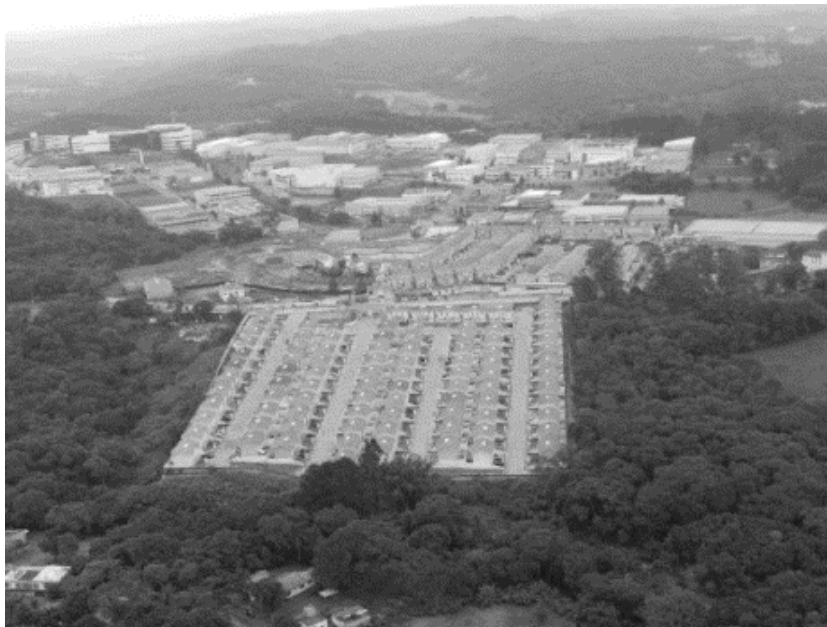


Figure 8. Low-rise condominium in the municipality of Cotia.

²⁹⁶ According to the parameters adopted by Carvalho (2011).



**Figure 9. Gated development in the municipality of Cotia.
Pictures: Leonardo Loyolla, 2012.**

Conflicts

The building types described above, added to the anthropic occupations related to open spaces²⁹⁷, have led to a series of environmental conflicts in the region, whose impacts are subdivided herein into four categories – vegetation, water, soil, and landscape –, all of which are listed in Table 1. An analysis of these conflicts demonstrates the severing of tree-covered fragments as the most recurrent impact resulting from the anthropic dynamics over natural dynamics.

Table 1. Impact of human occupation standards on the natural dynamics in the Western Portion of the RMSP.

Natural support	Impact	Precarious settlements	Open developments	Gated communities	Low-rise condominiums	Towers	Country houses and farm houses	Large Structures	Mining Areas
Vegetation	Illegal / legal deforestation	x	-	-	-	-	x	-	-
Vegetation	Severing or remaining woods	x	x	x	x	x	x	x	x
Waters	Contamination	x	-	-	-	-	x	x	x
Soils	Impervious surfaces	x	-	-	-	x	-	x	-
Soils	Destabilization	x	-	-	-	-	-	-	x
Soils	Marked disfiguration of the original topography	x	x	x	x	x	x	x	x
Soils	Contamination	x	-	-	-	-	x	x	x
Landscape	Loss/privatizing of visual relationships	x	-	x	x	x	-	x	x

²⁹⁷ The construction types now include country houses and mining areas, which, different to the other types, are spaces predominantly free of any constructions.

Natural and urban dynamics: possible interrelations?

It has been widely accepted that the disperse and fragmented urbanization process is necessarily harmful to the environment, as this not only contributes to reducing continuous green spaces that support the local fauna, but also causes the population to make an increased number of travels (and consequently, more pollution generated), as well as the recurring need to expand the urban infrastructure network.

On the other hand, the urbanization process usually leaves interstices that may be a result of the inherent interfaces with natural resources. In this sense, Peres and Polidori (2010) consider "the fragmentation of the urban form as an intrinsic aspect of the urban phenomenon that results from the morphological self-organization of the urban system in the scale of water basins" (p.9 – free translation). Said self-organization takes place by means of successive compacting – when urban fabrics reach a significant barrier, such as larger water courses or very steep terrains – and expansions – when these obstacles, for several needs, are overcome and new areas with less restrictions to urbanization are found, until a new obstacle is encountered.

The region under study herein had few physical restrictions to occupation and an ambiguous, more intense process took place, which weakened its environmentally significant areas through successive reductions in the sizes of its wooded coverage and their interconnections, while, on the other hand, the fragmented, disperse urbanization assisted in the preservation of these areas.

In view of the ambiguity of this process, the dispersion may represent the starting point to a more suitable urban occupation standard, provided that: i) environmentally significant open spaces are maintained in between urban occupations; ii) connections between these areas and natural resources are established; iii) the density of urban areas is increased with the respective and appropriate development of infrastructure in order to minimize the need for local populations to commute.

Thus, the urban existence with physical dispersion is not considered a problem in itself, but a process that generates an opportunity for environmental preservation and urban quality that can no longer be wasted. The problem lies in the functional dispersion and in the fragmentation of open spaces with significant natural resources without the necessary connections, which should be made by means of appropriate urban and sanitation measures.

Possibilities

Several mechanisms may contribute to improve the interactions between environmentally significant resources and urban areas. In this regard, the study developed by Forman & Collinge (1997) outstands for demonstrating that, when compared with the random removal of vegetation, the application of a localized urban occupation planning combined with environmentally fragile areas may increase in five times the level of protection to these areas.

As a measure to minimize the impacts of the disperse urbanization, Peres and Polidori (2010) indicate the creation of compact urban poles with higher self-sufficiency from all other built areas in the surroundings, so as to reduce the constant need for travels.

Non-urban, environmentally fragile areas need to be dependent on each other, and proper connections that ensure the maintenance and survival of biodiversity must be provided, as Forman (2014) indicates in his work.

Czamanski (2008, p. 324) proposes an approach that unifies both situations described above. By establishing peri-urban areas as one of the three main land use categories (along with urban and rural uses), he suggests possible and less conflicting interactions between the city and nature. However, he indicates in a more restricted way that said situation would be more likely to function properly in high-income areas and suburbs similar to those in North America.

As a complement to the provision of interconnections between natural and urban areas, mechanisms promoted by the Government Authorities should exist to prevent the isolation of

extensive gated urban portions, as this is a recurring problem in several new urban areas in Brazil.

In this sense, and in the Brazilian case, for instance, the size of gated communities should be limited, or larger interfaces with such developments with the surroundings should be required by means of mechanisms other than walls and fences, such as the fostering of the occupation of their perimeters by other uses open to the surrounding streets.

The definition of natural areas under the responsibility of the private initiative is also indicated as a possibility. This is based on the principle that the private initiative has better means to maintain environmentally significant areas in the form of Private Natural Heritage Reserves²⁹⁸, or biological reserves. In developments oriented to higher income populations, the future owners have sufficient resources to incur higher land prices in order to maintain environmentally fragile areas unoccupied, according to the idea of better quality of life. This mechanism is also used by developers as a sales statement implied in the concept of “living closer to nature”, which is encouraged by the restrictions imposed by the environmental legislation, even though still slowly and gradually.

The occupation density of urban settlements establishes a direct relationship with the proposals of alternative interfaces between natural resources and urban areas. Arendt (1996) argues that the urbanization model based on large plots may be harmful to the existing natural resources, as it fragments them inside different estates. The result of this urbanization model can be easily observed in high-income patches that exist today in the Western Portion, such as Granja Viana, for instance. The significant wooded areas are gradually subtracted by means of the occupation of each plot, and the result of these allotments tends to be very similar to the conventional neighborhoods of the compact city (Figure 10).



Figure 10. Granja Viana – Cotia – SP. Picture: Leonardo Loyolla, 2013.

The author suggests that areas containing significant natural resources should be shared by residents as common areas. This logic may show to be feasible in countries where the culture of sharing woods and wooded areas is already in place, such as the United States, but a similar implementation faces evident difficulties in the Brazilian reality, which is characterized by the abandonment and degradation of environmental preservation areas.

Recent experiences in the Western Portion have worked better with this issue, as exemplified by the developments of Alphaville Burle Marx (Figure 11) and Granja Viana (Figure 12), which incorporate significant masses of wooded areas inside and outside the development to meet

²⁹⁸ Legal mechanism created by the Brazilian System of Preservation Units (*SNUC*) in the year 2000, defined as “a private area with a remarked perpetuity aspect in order to preserve the biological diversity”.

legal obligations, while, at the same time, trying to add value and use this resource as a marketing tool.



Figure 11. Gated development Alphaville Burle Marx.



Figure 12. Development Alphaville Granja Viana.

The use of occupation models based on country houses may also constitute an alternative of interface between human occupations and natural resources. This form of occupation with scarce constructions allows for larger extensions of pervious surfaces and wooded coverage within the boundaries of each plot, and are also associated with potential economic activities, such as fishing parks and weekend rentals.

Possible actions also include the reinforcement of current directives in force in the region that have not yet been effectively practiced. One outstanding directive includes the application of buffer zones, with more restrictions to the use of the soil in urbanized areas around environmental resources, so as to reduce their impacts. Moreover, it is necessary to expand the areas protected by parks and reserves by means of the full restriction to the occupation of areas with more fragile and significant natural resources.

This should also require the creation by each municipality of a system of public open spaces for recreation and preservation interconnected to each other, so as to make use of the several existing natural resources as the base for their construction.

Furthermore, the policies and directives should be defined jointly by municipalities in order to promote necessary connection between environmentally significant open spaces. This seems to be critical to accomplish the objectives stated above and has virtually not been practiced in Brazil, a situation that is made even more difficult by the chronic and current incompetence of public authorities when it comes to administration.

It is also important to enforce the consolidation of the existing urban centers and the accurate boundaries of new urban developments with the previous provision of infrastructure in these areas. That is: the advance planning of urbanization or at least its basic infrastructure – something that has rarely been done in Brazil to this date.

Considerations

Although the spatial fragmentation has contributed to the maintenance of some integrity of environmentally significant spaces in the Western Portion, the continuation of this process will bring more and more irreversible consequences. The number of open spaces created before still offers preservation opportunities that should not be wasted. To do so, the application of mechanisms different from those usually applied in this area is required. This work presents several instruments intended to demonstrate the existence of significant opportunities to establish less conflicting interfaces between urban occupations and significant natural resources in the Western Portion, as it is still possible to make good use of the disperse urbanization process in that area. However, the application of this idea requires joint actions by the several agents of transformation of these spaces in order to change the current occupation paradigms.

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Integrated approaches in *Vitória* workshop: a study on open space system and the urban form in Brazil

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Abstract. *This paper presents the experience regarding the workshop in the study about “Open Spaces Systems in the Formation of Contemporary Urban Form in Brazil: Vitória’s Case”. The activity is part of a national research coordinated by São Paulo University, which links a broad range of researchers from several Brazilian universities (Campos et al., 2012). The concept of open spaces originated in Magnoli’s study (1982) as the space free from construction. Urban form involves the relationship of open and built spaces—(Lamas s/d; Panerai, 1986). The workshop was coordinated by the national and local team, Vitória Nucleus of Espírito Santo Federal University. The workshop dealt with the relationship between Open Spaces and Urban form in Great Vitória, in Brazil’s southeast, and possible trends from integrated approaches involving representatives from the Government, Academics, and real estate market, addressing different scales and thematic areas. The activities were carried out in three days and had overflight and land route, lectures, group activities in themes: landscape units, morphologic patterns, legislation and the role of agents. The success of the activity was reached due to the quality and diversity of the participants, allowing achieving complex knowledge in a short time, identifying conflicts, potentialities and trends.*

Key Words: urban morphology, open spaces, workshop, integrated approaches

Introduction

Methodological Aspects

As part of the research *Open Spaces Systems in the Formation of Contemporary Urban Form in Brazil: Vitória’s Case*, the 4th VITÓRIA WORKSHOP, held from September 1st to 3rd, has contributed to the debate and understanding of the urban morphological aspects of Vitória’s region, its open spaces systems the main public and private agents performance and to the urban legislation in the configuration of this morphology and of these open spaces.

Considering open spaces the environment free from buildings (Magnoli, 1982), including streets, squares, parks, remaining areas from plots occupation, expansion areas and conservation units, the current phase of the research tries to characterize the main morphological structures of Brazilian cities’ landscape.

The research’s national coordination was done by QUAPÁ laboratory of the Architecture and Urbanism College at São Paulo University – FAUUSP –, that currently holds thirty five cities, being Vitória, Espírito Santo state capital, located Southeast of Brazil, one of them. The coordination in Vitória is done by the Architecture and Urbanism Study Nucleus of Espírito Santo Federal University – NAU/UFES –.

The 4th Vitória Workshop, coordinated by these two labs, aimed to support the research, based on an exchange of experiences arisen from distinct fields related to the city, as the academic environment, the government and real estate sector aiming to debate, under different points of view the relation between open spaces and urban form in the Greater Vitória.

Therefore, the methodology adopted followed the usual workshop procedures coordinated by QUAPÁ lab, on Open Spaces System, held for 3 days including over flights, field work, lectures and the workshop. So, during the first day there was a flight over the studied area to monitor the

occupation process and for photograph recording. On the second day, there were lectures in the morning and in the afternoon activities directly related to the workshop. On the third day there were also some lectures although the main activities were focused on workshop the works, in groups, finished at the end of the day with a presentation and a debate.

Complying with the dynamics proposed by the research's national coordination, the lecturers should draw in besides the academic world, the technical world linked to the government responsible for the urbanization and environmental preservation, real estate agents as well. Thus, lectures by professionals from state agencies were held addressing environmental aspects and large public and private projects planned for Espírito Santo, representatives of the real estate industry featuring the real estate trends in Great Vitória, professors coordinators of the national and local nucleus presenting the general framework of the research about Brazil and Vitória's region and researchers teachers dealing with the characteristics of urban expansion in Greater Vitória, including the aspects related to the current housing policy.

The workshop activities *per se*, were carried out by dividing the participants in four groups related to the following themes: urban morphology, open spaces systems, main public and private agents, and urbanistic legislature. The participants of this stage were mostly Architecture and Urbanism and Geography Msc students, Architecture and Urbanism graduating students, participants of the Scientific Initiation Program, professors and professionals of these fields linked to state and municipal agencies, besides the coordinating teams. These participants were divided into the four groups mentioned above to meet their studying interest as well as the composition diversity.

To support the activities, the coordinating teams previously elaborated certain products, made available to the participants at the workshops. The local coordination team prepared a series of maps about the studied area with information such as, the road system, urban occupation, areas of environmental concern and on each town urbanistic law. The national coordination team besides guiding the local team preparation, prepared a specific activities script to support each group's activities reflex on their specific theme, accompanied by a synthesis table to be filled. There was also available waxed paper, unlined A3 and A4 paper as well as felt pens.

The groups elaborated maps and tables, demonstrating the results of their activities presented for debate at the end of the workshop.

Before dealing with the main aspects related to urban morphology as to the open spaces system in Vitória region and of detailing methodological aspects enhancing the integrated approach in the analysis of area's urbanization process, it is proper to briefly present this field of study characterization that goes beyond the municipal boundaries.

Characterization of the study area

Vitória, the capital of Espírito Santo, is characterized as the main municipality in the metropolitan region which is composed of seven municipalities (Vitória, Vila Velha, Serra, Fundão, Cariacica, Viana e Guarapari). In Vitória there are 327.801 inhabitants, while in the metropolitan region there are 1.687.704 inhabitants, and in the state there are 3.578.067 inhabitants (IBGE, 2010).

The works done during the workshop include the city of Vitória and the capital's urban contiguity of the capital on the neighboring municipalities therefore including Vila Velha, Cariacica and Serra covering an urbanized area of approximately 1.139.807 Km² (IBGE, 2014).

The state of Espírito Santo comprehends the landscape domain characterized by the Atlantic Rainforest, with "sees of forest hills" (AB' SÁBER, 2003), whose process of deforestation and quarrying sped up in the second half of the XX Century. The field of study comprehends the region with the highest hierarchical level in the state, urbanistically speaking, while it retains important environmental areas, exposed to a conflicting dynamics and urban characterization in its preservation.

Part of the capital is in an island and part in the mainland, besides some small islands forming an archipelago and the oceanic islands of Trindade and Martins Vaz. The island of Vitória, ingrown in Vitória Bay, presents a relief composed of prominent elevations, highlighting the Central Peak and there Olhos Rock. The mainland, flat features in the northeast, a vast mangrove that expands into the municipalities of Serra and Cariacica forming Lameirão Ecological Reserve. The nearby municipalities present urban sprawl limiting landscape elements as Ecological Corridor Duas Bocas - Mestre Álvaro, that comprehends the Southeast and Northeast area, traversing the municipalities of Cariacica and Serra involving basins and ponds in Serra. The urban area follows major national roads that cut the state territory as BRs-262 e 101 and also extends along the vast coastline and its beaches, cliffs and sandbanks in the north, in Serra surpassing Reis Magos river reaching in the south the municipality of Fundão and south in Vila Velha reaching Ponta da Fruta boarding Guarapari.

Besides the federal roads mentioned above, the state road ES-010, known as Sun Road is highlighted in this study, located closer to the ocean than BR-101, plays an important role in the mobility between metropolitan downtown and all the state coastline (Map 1). Vitória, as the main town in the metropolitan region, contributes to the great number of daily trips, besides centralizing trips from nearby municipalities. This aspect contributes to the intense vehicular movement in the capital in the early morning and evening.



Figure 1. Vitória Road map.

To end this brief characterization of the field area it is appropriated to note that the region's occupation goes back to the time of the Portuguese colonization, in the XVI century only intensified in the second half of the XX century due to industrialization.

Facing this context, a diversity of urban morphologies can be seen currently, majorly due by the vast occupation history (MENDONÇA, 2013) and a diversity of balanced environmental areas, consequence of the coast, hydrographic and relief presence highlighted by rocky and forest hills. In this context of ever going urbanization conflicting with the importance of preserving areas of environmental interest, there are huge open spaces remaining of big industrial or logistic constructions, currently resulting in enclaves, which hold important potential: they stay as they are or cede space to the urban articulation integrating the occupied and open spaces in a continuous way.

A reflection on this approach was favored by crossing different points of view during the 4th Vitória Workshop, whose methodology is highlighted in the next chapters.

Integrated approaches to understand urban form and open spaces: the invitation to the lectures

The 4th Vitória workshop contribution to the understanding of the urban morphology in Vitória's region, and its connections with open spaces resulted in several factors, all consequences of the methodology used. This methodology generally introduced in the last

chapter indicates among other aspects the importance of adding distinct interests and participations to building the city. Although all methodological aspects shown have relevant contribution to the nature and content reached, this article highlights the value of enabling, in this sort of activities the integration of several, sometimes opposing, points of view to understand the proposed reality.

Keeping this in mind it is noted how fundamental it is to approach the characteristics of the invited lecturers and some elements of the content presented and debated. So it is proper to highlight that besides the careful selection of these lecturers, there was a an agreement about the theme to be dealt, taking into consideration the specialization and in some cases the notoriety of some of them in relation to the subject and the workshop theme priority considering the time frame and the success desired. Of foremost importance there as the proposed approach from the four themes and the diversity strived by the participant's distributions in their groups, linked to these themes.

Dealing first with the lecturers' approach it is possible to point in the guests selection the inclusion of professors and researchers from the national coordination, professors and researchers that do not participate in the research, real estate personnel representatives, state government officials all involved in the environment development.

The professors and researchers directly related to the research about Open Spaces Systems enlightened the participants on the theme in study and the current stage of the research.

The research's national coordination, besides general concepts on open spaces, demonstrated the spatial scope in a vast field area comprehending thirty five Brazilian cities in every region of Brazil. It was essential in this approach to clarify the importance of the research due to the fact that open spaces are in most situations the spaces left from urban occupation process and that are becoming exiguous, due to urbanization rhythm and characteristics. The approach presented by the national coordination throws a real planning perspective, open space management and acquisition in an articulated, systematic way in its several forms, in remaining areas of plot occupation or streets, squares or even enormous environment conservation areas.

It was also interesting for the work evolution the exposition of the research historical that since 2006 identified the open spaces and reflected its role in the public contemporaneous sphere an recently deals more precisely on the relation between urban morphology and open spaces. So it was fit to indicate this new theme emerged from the previous phase arisen, mostly in the studies on private open spaces and their architectural typology and soil use relationship. So when joining the studies to the open spaces the research on urban morphology widens the focus on urban life and how far urban planning should be considered.

The research local coordination's role was to present the history and its insertion in the national research indicating what has been produced in Vitória's open space system since 2006 highlighting the current stage in the research. The importance of this approach is to enable the workshop's participants to visualize the theme directly related to the field studied. This procedure allows not only to know or recall the main features of open spaces as well as sharpen the attention to the main elements to be preserved, the emerging conflicts in terms of use and occupation and the transformation potential in order to feed the debate and to provide suggestions.

Professors and researchers that do not participate in this research performed in the workshop a distinct role from those who directly act in the research. Because they were completely oblivious to the methodological procedures and results already reached, they could, within their field of expertise add important elements for reflection. The invitation was sent to two professors, one from the Architecture and Urbanism and the other from the Geography course. These were no random choices and aimed beyond the professional characteristic and themes involved. In the first case the invited professor had been for 8 years municipal secretary in the capital, having accumulated extensive experience in the city's dynamic, the planning processes and management and also about the main influent agents on this dynamic as well as on the processes. In the second case the invited professor researches and guides studies related to metropolitan expansion, approaching mainly the investigations focused on the government's

recent housing policy for people with limited income and for the current real estate phenomenon of condominiums or closed allotments. The expressivity of these ventures in characterizing the new urban outskirt or Brazilian metropolis places this issue as a special interest in the study of urban morphology. This approach has met the specific thematic recommendations of the national team, aiming to know motivations and features of this kind of manifestation on the expansion area of Greater Vitória. The first of these lecturers highlighted the important centralizing and hierarchical role of Vitória in the state, the beauty of its landscape and the intensity and versatile use of its public spaces despite the persistent academic criticism that claims otherwise. At the same time it drew the attention to Vitória's dependence to the other centralities which contributes to restrict opportunities and to export knowledge. However, the keynote of the approach guides to the importance of the places potential and in this case of Vitória to favor the happiness of who lives there. The second lecturer drew attention to the severe land ownership issue in Brazilian middle and metropolis cities, from the performance of the real estate industry in capturing land income, highlighting the monopoly income which has exacerbated the appreciation of the property. The lecturer pointed out that urban expansion has been happening in precarious areas from the geomorphologic point of view and advancing on rural areas that border the city limits. It highlights that in the case of Great Vitória, specifically in the municipality of Serra this kind of area is on the hands of a few landowners who have extensive areas of metropolitan importance. Another aspect questioned is the contradiction between the large number of vacant houses and the housing deficit in a smaller number and the ongoing construction of houses. It was also pointed out the continuous increase in the value per square meter, which doubled in Great Vitória between 2005 and 2012. When dealing with the current housing policy in Brazil, mentioning the Federal Government Program called My House My Life, the professor indicates that all units in Espírito Santo, the majority is in the Metropolitan Region of Greater Vitoria, and that in Serra there isn't any enterprise aimed at up to three minimum wage salaries. Thus, it emphasizes the appreciation of the land in this municipality and the typology of these ventures similar to condominiums or closed allotments that have also shown preference for this site with guard houses, monitoring cameras, private security etc. The lecturer sees this kind of project as something far from the city meaning, in its full meaning and makes a point to investigate the main agents of this urbanization process involving the State, real estate set, land or construction value capturers.

In contrast to this approach, the invitation to the representative of the real estate business was sent to the vice-director of the Industries Federation in Espírito Santo – FINDES –, an entrepreneur of the Civil construction with extensive experience in participating municipal councils focused in urban decisions in Greater Vitoria. The lecturer highlights initially FINDES investment in education and points out the federation interest in the urban mobility theme. The lecturer also said not always keeping buildings with few floors contributes to the open spaces system, preaching about the opportunity to create open spaces as buildings go vertical thus reducing the occupancy rate.

Among the real estate trends in Greater Vitória, the construction of seven shopping centers was the highlight demanding an urban mobility project.

Mentioning developments in the four municipalities that make up for the main urban core of Greater Vitória, some highlights were presented. The promising gaze of the market is aimed at Vila Velha and Cariacica that besides shopping centers present prospects for investments in condos for different income levels including My House My Life. In Vila Velha this emphasis is aimed at Terra Vermelha region. In Cariacica there is the expectation in the closing of CEASA's installations, generating new real estate opportunities and work on Kleber Andrade stadium, that will host the training of international teams during the World Cup in 2014. In Vitória, Jardim Camburi boarding Serra was introduced as the largest construction site in the city; there is also mention of Enseada do Suá surrounding the shopping center and the technological center planned for Goiabeiras. In Serra it was emphasized the building of the downtown in Civit avenue, of a trading and college center in Portal de Manginhos and Alphaville condominium.

The invitation to the state government representative was sent to the Jones Santos Neves Institution directors, a research government agency in Espírito Santo State, position held at the time by a geographer and Architecture and Urbanism Master. The data presented refer to the investments planned for the state in the period 2012-2017, with 57% directed to infrastructure, especially energy, oil and gas, 27% to industry and 3.7% to construction. The speaker notes that 26% of these investments refers to the metropolitan region and draws attention for the south coast region scheduled to receive 42.3% of the investments. He highlights the concentration of GDP in the metropolitan area, corresponding to 63% and observes the economic characteristic of the current period related to the base of the oil and gas chain indicating the importance of relating this process to improving the quality of life of the population.

Representing the state point of view linked to the environment the invitation was sent a employee of the state agency, that has just finished the Masters in Architecture and Urban Planning, studying the prospects for transformation in the land use in the State south coast because of the planning of installing large equipments. The speaker gave prominence to the existing areas of environmental interest in the studied field composed by the four cities in question, Vitória, Vila Velha, Cariacica and Serra watching the importance of planning urban development in the most urbanized region in the state in line with the preservation of the environment. In this context are located and presented images of various Environmental Protection Areas, National Parks, Reserves and Ecological Stations, which in some cases cover areas of several municipalities. Since these approaches appear to support the practical workshop activities, it is noted from the methodological point of view of the invitations made to key people with the strategic knowledge on the subject and in many cases critical thinking on the issue, depending on academic training, even before the institutional representation. In summary, these various approaches indicated the growing urban and economical vitality of Greater Victoria and the State of Espírito Santo region and the challenge of reconciling the exploitation of natural resources with the preservation of valuable environments from the natural point of view, and the generation of social benefits to the population. It was also possible to notice the fundamental importance of land ownership

In the speculative context of ongoing activities and the expansion of real estate appreciation beyond the capital, covering the immediately surrounding municipalities.

From these results it is possible to also monitor, some interpretations articulated from the products carried out by the work groups, confirming the validity of the integration of participants from diverse backgrounds.

Integrated approaches to understand urban form and open spaces: The invitation to the participants

The invitation to the workshop participants was similar to the procedure carried out to the lecturers, aimed at specific professionals to comprehend qualified performances and a diversity balance in the number of guests involved.

The quality of performance was achieved by the selection of professionals that somehow act or acted on the theme in question. The identification of these professionals was conducted by the local coordination of the research, considering previous involvement with them or participation on the subject, acknowledged publicly. The diversity of areas and number of people involved were also controlled by the local coordination. The areas involved are linked to Architecture and Urbanism, Geography and Environment, with some specializations focused on design of public spaces, environmental preservation, landscaping, planning law, urban development, real estate dynamics, physical geography, human geography, spatial segregation, among others. Besides the diversity of practices, diversity of professional roles among the participants was sought. Thus, as to the academic environment, the invitation was addressed to professors, graduate and undergraduate students the latter linked to the Science initiation research, as for municipal agencies we attempted to involve the technicians from urban

development and environment agency as to state agencies the guests were related to two institutions, on linked to research - Instituto Jones dos Santos Neves – and the other to the environment - Instituto Estadual de Meio Ambiente e Recursos Hídricos – IEMA –. As to the municipal agencies, due to the coverage area attempts to receive professionals engaged in the four municipalities were done. However, the possibilities of participation occurred only by officials of the municipalities of Vitória and Serra. To aggregate knowledge about the remaining municipalities, some strategies have been used, such as direct invitation to professionals who had already worked in similar areas of the workshop in Vila Velha and Cariacica Town Hall. The organization of prior workshops, the professional experience of the local coordination in activities directed to the urban development in Greater Vitória and the interest of these determined professionals in the academic research and post graduation, even without a formal connection to the University, contributed for the welcoming of the invitation.

The control on the number of participants was done by asking guests to RSVP in a certain deadline. This strategy helped to check the necessity of broadening or diversify the invitations. Also taking into account that municipal and state technicians, by function are not always available during the workshop the invitation tried to reinforce the importance of full participation to those who accept the invitation.

The amount indicated by the national coordination was of about 40 participants. In 4th Vitoria Workshop, 36 people attended and 30 participated assiduously. These 30 participants were divided into four groups, in order to combine their fields of interest and the always longed diversity training, involving the following issues: 1 - The open space in the constitution of landscape units, 2 - The open space in the constitution of morphological standards, 3 – Proposed forms by the law (open and built areas) and 4 - The actual role of agents of production of open and built spaces. Thus, the groups ranged from nine to six participants, adding to these, coordination personnel equitably distributed with the role of feeding the debate and guiding the activities to be developed, based on pre-arranged script. The activities were carried out so that each group during the debate would define in map and table aspects for each topic related to the area of Vitoria, by oral presentation at the end of the last day of activities. Based on the technical quality and diversity of participants was possible to understand the main characteristics of the study area regarding the aforementioned topics. The maps were hand-drawn (Figure 2) for subsequent digitization (Figure 3).



Figure 2. Group 1 Map on landscape units.

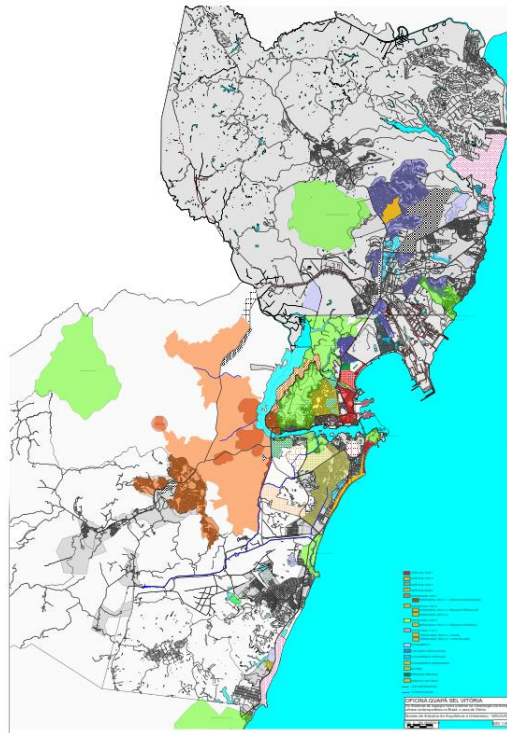


Figure 3. Group 2 Map on Morphological standards.

The exception occurred on the initiative of the group on the study of urban laws, that produced during the workshop, the georeferenced map (Figure 4) and constructive models scanned in three dimensions (Figures 5, 6, 7 and 8).

Thus, the groups that have studied the landscape units, the morphological patterns and the main agents acting on space, sought to encompass the entire territory subdividing it according to the situations considered homogeneous. The group that studied the urban legislation defined areas of study to cover the four municipalities and distinct situations as to the possibilities of land occupation, such as areas of intense interest in real estate and coastal areas, as demonstrated with respect to the municipality of Serra respectively in figures 5, 6 , 7 and 8.

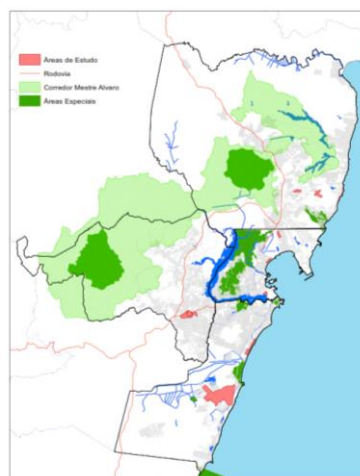


Figure 4. Group 3 map on Urban Legislation.



Figure 5. Deployment and maximum volumetric for Av. Civit, Serra, ES.

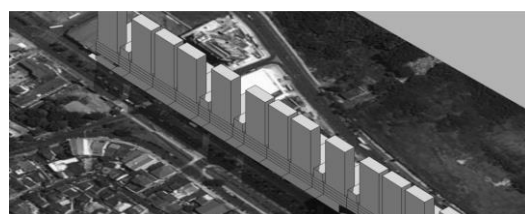


Figure 6. Deployment and maximum volumetric for Av. Civit, Serra, ES.



Figure 7. Deployment and maximum volumetric in Manguinhos, Serra, ES.



Figure 8. Deployment and maximum volumetric in Manguinhos, Serra, ES.

During the presentation of the work, the national coordination proceeded to a series of notes and graphical illustrations so that at the end it would present a summary its apprehension about the reality in study, from the workshop held. In this synthesis, the national coordination has highlighted the aspects considered special, provoking debate and pointing peculiarities perceived on the study area.

Among the issues raised for discussion the most striking were the morphological diversity of the region and the intensity of interest in real estate expansion along the coast and nearby areas of environmental interest. It was further observed that the dominance on the coast refers to the vertical format construction while in other areas of environment interest prevail single or multifamily condominiums or closed allotments for population of high, middle and low income.

The strategy to provide in each group, a scientific initiation scholarship student, a graduate student in Architecture and Urbanism, allowed them an advanced learning by the opportunity to participate in qualified debates on their respective fields of study. The benefit to the participants of the workshop was the possibility that these students could act later in digitization and printing preparation of the workshop final report. The integration of in these same groups of postgraduate students made possible, besides the learning acquired throughout the activity, their

counterpart in the organization of the preliminary reports on each theme. All these methodological and practical aspects contributed to the debate about the urban and environmental processes in Vitória's region and the opportunity to unfold these considerations into actions.

Final Considerations

Given the above, we can conclude the success of adopted dynamic in 4th Vitória Workshop, due to the method developed by QUAPÁ Laboratory from the School of Architecture and Urbanism at São Paulo University, national coordinator of the research and performance, articulated to this, the Nucleus for the Study of Architecture and Urbanism of the Federal University of Espírito Santo, local coordinator.

The methodology adopted, especially regarding the diversity and technical quality of the participants has provided in a fairly narrow time the grasping of general features related to open spaces and the urban form of the region of Victoria.

On the other hand, one must recognize the presence of a number of differences in the detailing of the activities of each group depending on the specific methodology established by it, the dynamics of the debate and also the personal characteristics and the ability of mingling of each participant in the group.

These aspects are understandable, since it was not a homogeneous group and that not all members had known each other beforehand. In any event, even considering these issues, it was possible to gather in the results, the most significant features about each theme.

As an important role in the workshop, one also considers the fact that each theme, from the discussions and the conclusions drawn, counts with an embryo of reflections, with potential to be developed in future studies.

The diversity of participants lets the unfolding of the activity in multiple actions as academic performance in research, structuring topics for dissertation and thesis development and enhancement of professional practice in public sector activity.

Anyway, the aim is the activities developed allow participants to carry forward methodology, considerations and commitments with the qualification of open spaces and urban morphology of the region of Vitória.

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Brazilian Morphology

The urban form of the housing policy “Minha Casa Minha Vida” in the Metropolitan Area of São Paulo

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Abstract. *This work is intended to discuss some of the results of the recent Brazilian housing policy “Minha Casa Minha Vida” (PMCMV), created in 2008. This policy has been created to address housing needs over several economical fronts. This forms part of a doctorate research program developed by the QUAPA’s group of the Architecture and Urban Planning School of São Paulo University (FAUUSP). The PMCMV has been created for the first time with Brazilian housing policy in conjunction with the private sector’s participation for the construction of social housing. This production model for urban space resulted in a formal conclusion based on a decrease of the overall cost of construction. However, this also resulted in an increase on profitability for the builder whose urban form is agreed based on financial criteria and, assisting minimally with the demands of the program and the daily needs of the population. The formal result is homogeneous, besides a uneven distribution of open spaces and community areas.*

Key Words: housing policy “Minha Casa Minha Vida”, open spaces, urban form, urban space production.

Introduction

This work is part of the theme research of the Brazilian open spaces system, by the National Research Group QUAPÁ-SEL, coordinated by the Laboratory QUAPÁ, of the Faculty of Architecture and Urbanism of the University of São Paulo (FAUUSP). The actual theme project is named “The open spaces systems in the Brazilian urban form constitution: production and appropriation” (2012-2016) and presents some analyses of several Brazilian cities, looking to understand the relationship between the open spaces and the urban form.

In the theoretical approach about the open spaces is observed not only the vegetated areas, but also all spaces free from construction which are either public or private, that are part of the systemic relationship that is settled among non-constructed spaces and cooperates with environmental, visual and social relationships. Thus, those spaces are analyzed inside of an open spaces system (SEL), and the importance of those spaces goes beyond the environmental perspective since the social relationships that occurred in those spaces are mainly observed in this theoretic point of view.

The concept of SEL, frequently used in landscape Brazilian studies, steps forward the usual concept of green areas, since it considers not only the environmental function of the open spaces areas, but also and mainly, the complexity and the diversity of those open spaces, their functions and uses, and also the forms of appropriation and apprehension of those spaces by the users. (Donoso, 2011, p. 23)²⁹⁹

Some results of the doctorate research entitled “Dynamics of the contemporary real estate production and their impacts in the landscape of Latin-American cities: the case of the Metropolitan Areas of São Paulo Brazil and Santiago from Chile” are presented, which was

²⁹⁹ This quote was freely translated by the author for academics motifs.

accomplished in collaboration among the University of São Paulo and the University of Chile. The research aims to enlarge studies about the urban Latin-American landscape, and particularly of social housing production, exploring the singularities of each reality.

For this study the Brazilian case of the housing program “Minha Casa Minha Vida” (“My House My Life”) – PMCMV was selected to show how this program has stimulated the housing form in the Metropolitan Area of São Paulo (RMSP).

The Metropolitan Area of São Paulo is composed by 39 municipal districts, and has a total of 20.775.114 inhabitants (IBGE, 2013).



Figure 1. The municipal districts that compose the Metropolitan Area of São Paulo (RMSP). (source: Donoso, 2014).

It's considered that the current urban form of the social housing products is resulting not just by recent transformations in the public politics, but also, historical inheritance of politics, economical and social actions that were presented spatially both in material, social and symbolic form along the years. Thus, the historical events of the Brazilian housing politics are presented for the best understanding of the current formal results of the Program “My House My Life”.

Historical facts of the Brazilian housing politics before the emergence of the Program “My House My Life” (PMCMV)

The Brazilian housing politics was marked by several programs that were created during economic and political transitional moments and they had not presented – until the current period – a continuity of actions for the production of social housing. On the other hand, it was a starting point of debate regarding this subject.

The first important actions related to the production of social housing were made during the military dictatorship which was initiated in 1964. Before this period, the state intervention was very limited, although the need of the creation of a public politics had being already acknowledged at that time due to the fast growth of the great urban centers since 1930 (Cardoso and Aragão, 2012).

During the military government, the housing policy used to be centralized by the State with own resources for the production of popular housing since the creation of the National Bank of Housing (BNH) and financing by the Financial System of Housing (SFH). Those resources aimed to assist the formal urban workers, however, it did not resulted in a decrease of the informal housing production driven by the urban growth, but it was tactic to boost the economy and to attend part of the claims for housing.

The housing politic model practiced by the military government had authoritarian strategies to control the population; it was also aimed to get support from the popular masses and pacific movements, since there were clandestine political organizations and social movements that had appeared in the context of revolutionary fights in Latin-American countries against military regimes.

During the military regime that happened from 1964 to 1985, 4.3 million housing units were built (Bonduki, 2009) and they were located in peripheral areas. The urban drawing of those housing products didn't encourage the conviviality and interaction of social groups, due to the ruse strategic to oppress popular movements, and also it did not allow those groups to release from the sad reality of social and economic discrimination. There is, thus, a poor housing production, both in the sense of the quality of housing provided to the population and the quality of urban space created, and that, besides, it did not reduce the housing deficit, so new periods of growth of informal and precarious houses continued to happen, occupying mainly in rejected areas by the formal market.

This housing production resulted of the BNH period were based on the modernist architecture and the Athens Charter, but it was not able to adopt all of modern principles which resulted in a dissemination of unfunctional and inadequate housing units. In agreement with modernist presupposition, the land unit should be extinguished and the streets and vegetal masses would acquire a new meaning at this composition. Buildings would be organized freely in great surfaces. In that conception, open spaces area protagonists in the final formal results, since they are responsible for the connection among constructed blocks. Besides that, open spaces do not have access restriction and they are always projected for a collective use (Benvenga, 2011).

Many issues were generated when this concept was applied in social housing projects accomplished by BNH, as the Brazilian social and spatial reality is far different from the described on Athens Charter, which means it was necessary to have made adaptations to apply the modernist model in the Brazilian case. However, it did not occurred at that time.

The simplification of the floor plant and the repetition of building blocks without criteria caused a negative alteration on the application of the modernist idea for housing production. But one of the key aspects that critically compromised the proposal was the lack of project in the open space areas, in general characterized of what was left, not part of the connection between blocks and even less as area for sociability.



Figure 2. Housing Project accomplished by Cohab and BNH, in Itaquera, São Paulo-SP, in the 1970's . (source: City Hall of São Paulo, 1979, apud Ramalhos (2013 p. 102)).

In spite of the formal poverty of the housing production in the military period, that was the result of the first housing politics in national reach created in Brazil, and that was kept articulated and centralized, which was drastically altered with the end of BNH, in 1986, and also with of the military period. That political rupture engendered an institutional disarticulation and pulverization of competences, that were before realized by BNH, and that were then sprayed to a number of public fronts.

That decentralization aided the retaking of democratization and of federal bases of the Brazilian State, which culminated with the Constitution of 1988 that distributed political authority in different government levels. Besides that, there was also the impact of the macroeconomics reforms of liberal character in the years 1990's, and the period of privatizations that proceeded, which meant alteration in the financing of the production of housing, and introduction of market mechanisms in the social housing politics (Arretche, 2002).

That period, called by after-BNH (Bonduki, 2009), presented several isolated initiatives that appeared with the decentralization, many of them associated with social movements and popular pressure in municipal governments. Those initiatives presented positive formal results, mainly associated to projects with popular participation and urban projects of slums areas, but that in general didn't make part of an articulated proposal or urban politics. Also with the end of the military dictatorship there were institutional progresses in the right to the city, with larger recognitions of citizens' right and larger performances in the fight for democratization of the access to the city.

The housing program “My House, My Life” – PMCMV

The housing policy structure in a federal level was retaken by the government of the president Luis Inacio Lula da Silva who adopted a decentralized perspective where different levels of government participate with the coordination of the Ministry of Cities.

The Ministry of Cities was created in 2003 to supply the institutional emptiness that removed the federal level of the discussion on urban politics since the end of the military regime. Their main actions were related to the democratization of the country, housing politics, sanitation and transport.

The Ministry presents a very infusive proposal for the promotion of changes and treatment of the population claims, however, the key challenge is to take the discussion to the municipalities' agenda. In spite of that, the Instruments of the Statute of the City and the performance of cities Master's Plans³⁰⁰ aided to enlarge of the discussion, and to fight against political strategies based in corruption and clientelism, that are in the root of the problem of the historical formation of the Brazilian urban space (Ferreira, 2010).

At Lula's second government which was during the financial world crisis in 2008-2009, two fundamental programs were created: the “Growth Acceleration Plan” (PAC) in 2007, and the “Program My House, My Life” (PMCMV) in 2009. Both programs had the intention of reheating the economy and to generate job through the real estate section. Thus, when the PMCMV was created there was a clear objective to leverage the economy and enable the country to step beyond the world crisis and also support a social objective of home construction and overall housing improvements.

It was announced the government's target of building one million housing units when the PMCMV was released. Although this goal seems extremely high, is not so significant for a country that had, at that time, a deficit of more than seven million housing units. (Bonduki 2009b).

³⁰⁰ More information about the Instruments of the Statute of the City and cities Master's Plans: Carvalho, S. N. de. (2001). Estatuto da cidade: aspectos políticos e técnicos do plano diretor. *São Paulo em Perspectiva*, 15(4), 130-135. ([http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-88392001000400014](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-88392001000400014&lng=en&tlng=pt)) accessed on 5 may 2014.

The Program has a broad scope serving families from zero to ten minimum wages, and it is divided into three approaches: first, for families from zero to three minimum wages – income up to R\$1.600,00 (717,94 USD) which is called Track 1; second, for families from three to six minimum wages – income between R\$1.600,00 to R\$3.275,00 (between 717,94 and 1.469,53 USD) which is called Track 2; and the third, for families from six to ten minimum wages – income between R\$3.275,00 and R\$5.000,00 (between 1.469,53 and 2.243,56 USD)³⁰¹ which is called Track 3. In addition, the Program is structured in modalities:

- PMCMV Companies
- PMCMV Companies (Track 1 – municipalities with less than 50.000 inhabitants)
- PMCMV Entities
- PMCMV Rural Group 1, 2, 3

Regarding the Track 1 group, some peculiarities can be noted, related to the municipalities demand housing production units. There is a need of registration of the families to be attended and a public investment can be used from the Federal Budget – OGU, allocated in the Residential Lease Fund – FAR.

The Tracks 2 and 3 use resources from the Guarantee Fund for Time of Service (FGTS), and focus families with a percentage of funding and another of financing, facilitating the access to credit with low interest rate. However, in Track 2, there is also a percentage of use from the Federal Budget – OGU, which means that the public subsidy for families which concentrates the largest housing deficit also serves families with better economic conditions (up to six minimum wages).

Table 1. Characteristics of the Tracks 1, 2 and 3 of the Program “My House, My Life” (source: Donoso (2014) with data consulted in march 2014).

Track	Income	Instruments	Modalities	Source
1	Until R\$1.600,00	Almost integral subvention + beneficiary feedback	Companies/FAR Entities/FDS Municipalities with less than 50.000 inhabitants Rural Group 1	OGU
2	Between R\$1.600,00 and R\$3.275,00	Subvention + Financing	FGTS Rural Group 2	OGU + FGTS
3	Between R\$3.275,00 and R\$5.000,00	Financing	FGTS Rural Group 3	FGTS

The PMCMV in the Metropolitan Area of São Paulo (RMSP)

In the municipalities of the metropolitan area there is a significant variation between the number of inhabitants, population density, and poverty incidence. However, the number of housing units related to the Track 1 is not always aligned to the poverty incidence (Table 2).

The PMCMV Entities is a very particular modality, which exists due to the housing movements and urban reform. This modality acts similar to the Companies one, however, it is a non-profit organization that operates the Program, with citizen participation “as a shelter”. The entity is responsible for the entire process: selection of families, housing project and approval processes, construction, and also with the social inclusion.

³⁰¹ Conversions realized by the dollar quotation of 05/05/2014, where 1 dolar = 2,2286 reais.

Table 2. The PMCMV in the RMSP – Distribution of housing units contracted for Program Track 1 by municipality and relation with incidence of Poverty (source: Donoso (2014), with data from the Ministry of Cities (2014) and IBGE (2003 and 2013)).

Municipalities	Population (IBGE 2013)	Population Density (hab/km2)	Incidence of Poverty (IBGE 2003)	Number of housing units contracted for the Track 1 of the PMCMV (all modalities)
Arujá	81.326	779,33	50,75%	
Barueri	256.756	3.665,21	45,46%	
Biritiba-Mirim	30.492	90,03	60,93%	
Caieiras	93.215	900,37	44,93%	
Cajamar	69.584	488,18	56,52%	311
Carapicuíba	387.788	10.698,32	46,74%	816
Cotia	220.941	620,81	45,80%	1212
Diadema	406.718	12.536,99	43,81%	1250
Embu das Artes	256.247	3.412,89	49,58%	906
Embu-Guaçu	66.273	403,32	53,86%	660
Ferraz de Vasconcelos	180.326	5.692,55	57,38%	
Francisco Morato	164.718	3.147,80	66,89%	300
Franco da Rocha	141.824	980,95	53,46%	
Guararema	27.679	95,43	49,56%	458
Guarulhos	1.299.249	3.834,51	43,21%	8546
Itapevi	217.005	2.428,88	61,86%	
Itapeverica da Serra	163.363	1.011,57	54,62%	
Itaquaquecetuba	344.558	3.895,24	65,20%	1850
Jandira	116.041	6.207,76	50,81%	
Juquitiba	30.239	55,03	52,16%	
Mairiporã	88.883	252,44	39,74%	1100
Mauá	444.136	6.741,41	46,61%	1352
Mogi das Cruzes	414.907	544,12	43,60%	5240
Osasco	691.652	10.264,80	38,75%	1122
Pirapora do Bom Jesus	17.091	144,98	67,84%	
Poá	112.015	6.141,05	47,21%	352
Ribeirão Pires	118.871	1.140,73	36,27%	
Rio Grande da Serra	47.142	1.210,04	61,04%	
Salesópolis	16.462	36,79	47,22%	
Santa Isabel	53.784	138,87	44,82%	
Santana de Parnaíba	120.998	604,74	43,13%	
Santo André	704.942	3.848,01	26,73%	1528
São Bernardo do Campo	805.895	1.869,36	28,03%	420
São Caetano do Sul	156.362	9.736,03	12,18%	
São Lourenço da Serra	14.874	74,99	52,41%	
São Paulo	11.821.873	7.398,26	28,09%	12408
Suzano	279.520	1.272,93	53,99%	2936
Taboão da Serra	264.352	11.994,31	39,84%	1044
Vargem Grande Paulista	47.013	1.012,10	53,80%	
TOTAL	20.775.114			43811

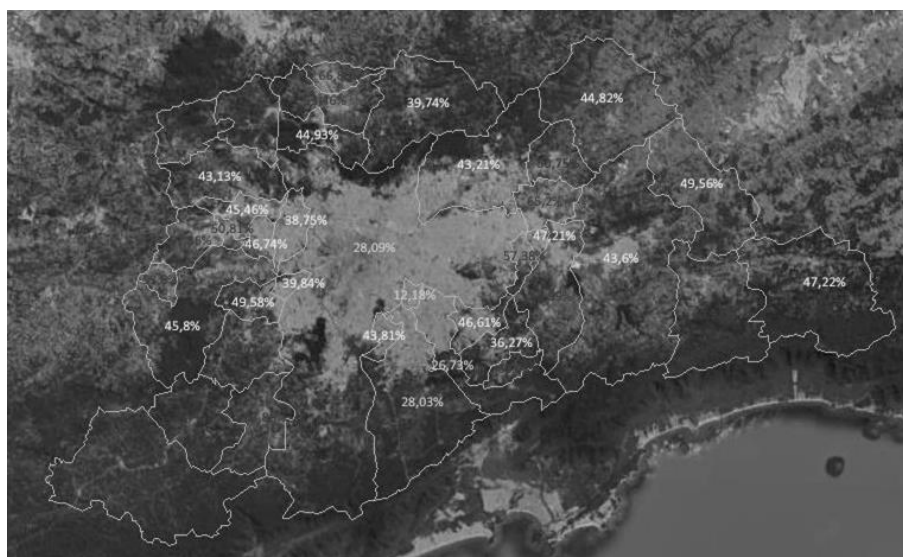


Figure 3. Incidence of poverty in the Metropolitan Area of São Paulo. (source: Donoso (2014), with data from IBGE (2003)).

The formulated policy to the PMCMV Entities assists strengthening social movements with greater involvement of the population in the process of acquisition of a home, which encourages larger notions of citizenship and also social-interest in the housing complex built.

Thus, there are more possibilities of morphological changes in projects in the Entities modalities, since the citizen participation can result in more attentive projects to the specificities of a social group, and there may be a bigger demand for open spaces projected for the family needs. However, there are just a few projects already delivered for the population in the Entities modalities for the Metropolitan Area of São Paulo (of the thirty four contracted projects, only two were delivered until the present moment), which difficult the verification of better formal results due to community participation.

Both the initiative of the PMCMV Entities and Companies, acting in Track 1, bring more hope in the fight for land access by the social group with lower income. But, unfortunately, there is a discrepancy between the conceptual policy and the realized policy, especially when is considered that it is a new and recent policy, whose results are still being realized in the territory.

One observation that can be made regarding the difficulties encountered is in relation to the land access: historically, the Brazilian urbanization process is based on the maintenance of social spatial differences, which is not easily equalized. As a result of historical differences and socio-spatial segregation has, since the military dictatorship until now, the location of social housing in urban sprawl areas, where land is cheaper. With the new housing program, unless there is a very strong intention to change this logic by the municipalities, the location will remain in remote areas, that area often without urban infrastructure.

(...) When housing decisions are dislocated to the private sector, which is what is currently happening in Brazil and what occurs in Chile since the period of dictatorship, the difficulty of dealing with the land issue, the dynamics of housing market and the value of the urban land are increased. The land issue is a major obstacle to the achievement of social housing, because if there is no public land donation or use of a well located land from the land banking of the real estate company, it won't be possible to enable construction of social housing in well located and valued urban areas. (Donoso, 2013, 0. 110).³⁰²

³⁰² This quote was freely translated by the author for academics motifs.

This logic can be modified with the donation of well located public land for the social housing construction, or with the willingness of entrepreneurs to make possible a development well located. However, it is not what recent data collected show: a map of all approved projects of the PMCMV Track 1 in the Metropolitan Area of São Paulo (some already built, others in construction) showed the continuity of the peripheral location of social housing (image 4).

Table 3. Active modalities for the Track 1 in the PMCMV (source: Donoso (2014), with data from march 2014).

Modality	Source of funds	Operation Bank	Amount of the housing unit ³⁰³	Payment by the beneficiary ⁵	Particularities
Companies/FAR Municipalities with more than 50.000 inhabitants	Residential Lease Fund – FAR	Caixa and Banco do Brasil	R\$ 54.000,00 a 76.000,00 (\$24.355 USD to \$34.277 USD) (variation according to region)	5% of the family income, with payment during 10 years, with minimum quote of R\$25,00 (\$11 USD)	Families are indicated for the Program by the municipality.
Companies/FAR Municipalities with less than 50.000 inhabitants	Residential Lease Fund – FAR	Caixa and Banco do Brasil	R\$35.000,00 (\$15.785 USD)	5% of the family income, with payment during 10 years, with minimum quote of R\$25,00 (\$11 USD)	Families are indicated for the Program by the municipality. Municipal contribution is obligatory.
Entities/FDS	Social Development Fund – FDS	Caixa	R\$ 54.000,00 a 76.000,00 (\$24.355 USD to \$34.277 USD) (variation according to region)	5% of the family income, with payment during 10 years, with minimum quote of R\$25,00 (\$11 USD)	Entities are responsible for: selection of families, project and construction.
Rural Group 1	OGU and FGTS	Caixa and Banco do Brasil	R\$ 28.500,00 (\$12.854 USD) (for the construction) R\$ 17.200,00 (\$7.757 USD) (renovation)	4% of the housing unit amount, paid in 4 annual quotes	Entities are responsible for: organizing the demand, project, construction attendance.

³⁰³ Conversions realized by the dollar quotation of 12/05/2014, where 1 dolar = 2,22 reais.

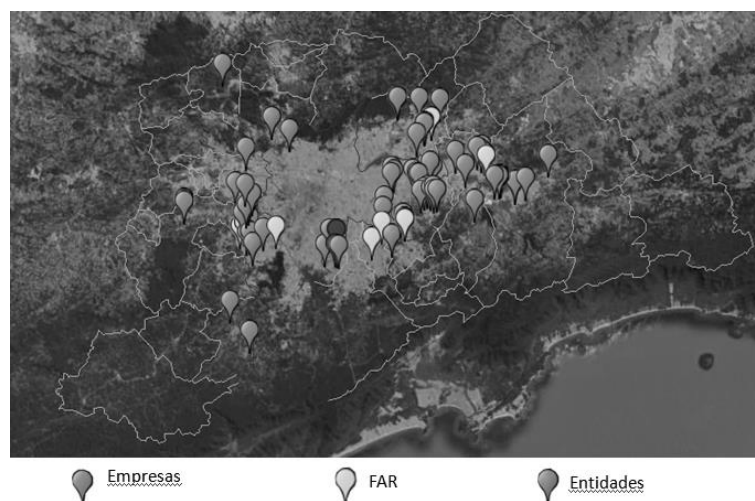


Figure 4. Distribution of approved projects of the PMCMV Track 1 in the Metropolitan Area of São Paulo (Modalities: Companies, FAR and Entities). (source: Donoso (2014), with data from the Ministry of Cities (2014)).

As mentioned, the program sets a maximum value for the housing unit in each attended Track. This unit value considers both the value of the construction as the value of the land. Thus, if there is no public donation of a well located land for the construction of the housing development, it will be relegated to an area with lower cost land. In the *Companies* modality, entrepreneurs need to decrease the value of the land to enable improvements in housing construction, and to increase profit he needs to decrease the value of both.

Entities modality has to fight against the market logic to find better located land and enable the housing development. There is clearly a dispute over land in the Metropolitan Area of São Paulo, and builders and developers step forward social movements in land acquisition. Mapping the developments of PMCMV *Entities* also shows the concentration of them in urban fringes, and in many analyzed cases there is also a lack of city (Lago, 2011).

Besides, there is also a challenge for the municipalities to regulate and control urban expansion processes and work with pressure to facilitate real estate actions that benefits the speculative capital.

For entrepreneurs, the villain of the Program is the owner of land, mainly in the great city centers, responsible for the high price of land still available. This discourse has a double effect: legitimizes the demand to Caixa Brazilian bank for an increase in the amount of funding for the poorest population and hides the speculative practices of builders, which generate by the combination of land value - caused by the land banking in urban fringes - with the large scale production of housing for families above three wages. (Lago, 2011, p. 7).³⁰⁴

There is also need for local government to combine two demands: attend popular claims and the Program “My House, My Life”, which facilitate the creation of as many social housing developments as possible, even in questionable locations. Again, the desire of producing housing in quantity is higher than producing with quality and yield higher in producing houses than producing city. (Ferreira, 2012).

In the same logic of lowering production cost is the dramatic repetition of the housing solution, which has occurred since the BNH in the military dictatorship and, as was expected, continues to happen with PMCMV. This results in a homogeneous landscape of identical housing blocks, badly located in the city, not always well constructed, which only follow the minimum required standards in architectural and constructive terms, and that cannot go against the real estate and market laws that control urban growth.

³⁰⁴ This quote was freely translated by the author for academics motifs.

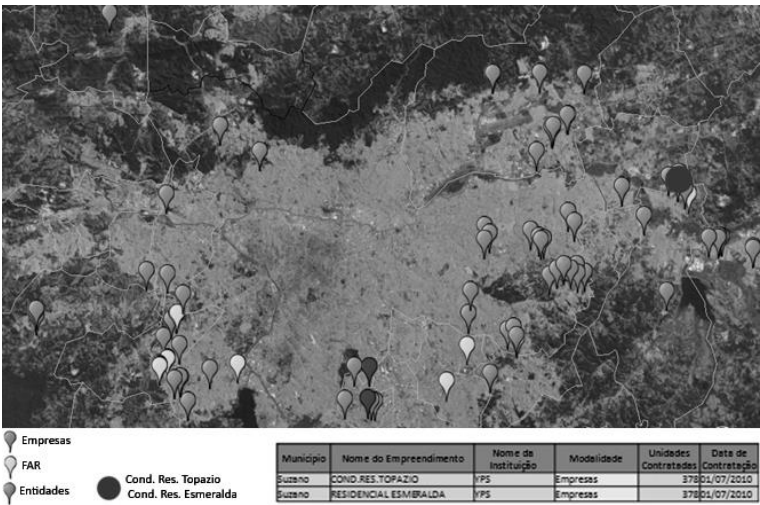


Figure 5. Location of the apartment complex Topazio and Esmeralda, in the municipality of Suzano, realized in the modality Companies of the PMCMV Track 1. (source: Donoso (2014), with data from the Ministry of Cities (2014)).



Figure 6. Apartment complex Topazio and Esmeralda. (source: (www.yps.com.br)).

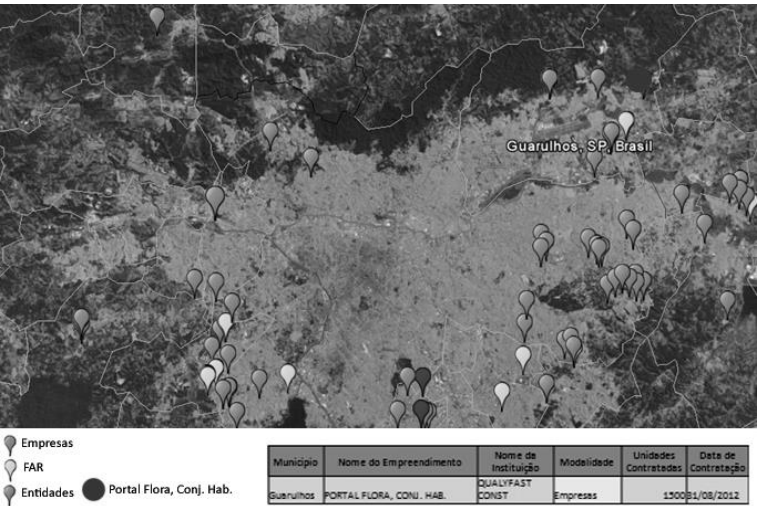


Figure 7. Location of the apartment complex Portal Flora, in the municipality of Guarulhos, realized in the modality Companies of the PMCMV Track 1. Source: Donoso (2014), with data from the Ministry of Cities (2014).



Figure 8. Apartment complex Portal Flora. (source: www.qualyfast.com.br/imoveis/residencial-portal-flora/23).

As mentioned, the PMCMV aims to boost the construction market, which means that exist a higher stimulus to build new units that renovate vacant buildings. If there were more interest in remodeling existing buildings for social housing that would be easiest to promote social housing in central areas. So far, there is only one remodeling initiative in the central area of São Paulo.

The repetition of standardized buildings with blocks or identical housing units ensconce a single function totally distinct from the urban reality of families that are relocated to those buildings. Thus, it is harder to promote appropriation and interest of maintain common open areas of the housing complex. Open areas should be positive in those projects, but ends up as no one lands that terminate with individuals invasions or even depredations.

Part of the open space invasions occurs in one story houses, or even blocks with housing units in the ground floor, and families expand their house due to lack of space, that are inadequate considering the size of most families registered in Track 1.

However, there is a very interesting dialectic between the visual homogeneity and the real heterogeneity in the housing units, since families tend to personalize particular and collective areas considering the individuals and collective needs and tastes. Thus, to consider this dialectic between homogeneity and heterogeneity it is necessary to sustain in the complexity of everyday life, seeking in the population narration the understanding of everyday activities. Therefore, it is urgent to develop popular practices together with the project and construction of housing complex, to extend the dialog with the population and use guidelines for the project conception. (Donoso, 2013, p. 114).³⁰⁵

Final considerations

With the PMCMV creation, 108 enterprises based on the *Companies* modality, 26 enterprises with FAR resources, and 34 projects based on *Entities* modality were approved until April 2014. Regarding housing units, there are 30.261 housing units approved in the *Companies* modality, 4.710 housing units with FAR resources, and 8.840 housing units in *Entities* modality, with a total of 43.811 housing units to the Track 1 in the RSMP. The number of housing units that have been delivered by April 2014 is around 7.500.

There is a clear success considering the quantity production, attending part of the social group that until then had no assistance to obtain a home. However, some reservation needs to be made, in order to enable progress in the program continuity.

Finally, the PMCMV, especially in the range from zero to three minimum wages, presents three different scales of issues that need to be discussed: the housing complex insertion in the city; the architectural quality; and the urban and architectural proposal of the complex, not continuing to repeat morphologic solutions that do not stimulate space appropriation and communitarian notions. Those scales are still issue to discuss due to the minimum exigencies of

³⁰⁵ This quote was freely translated by the author for academics motifs.

the Program, which consider mostly questions of the housing unit itself, and do not consider the social relation created in open space areas of the complex.

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Open spaces system: describing the urban morphology of Vila Mariana's district

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Abstract. *Many analysis of urban morphology have been done and generally, they emphasize the relationship between the architecture of the buildings, urban land subdivisions and street patterns. The paper proposes another fresh perspective: to consider open spaces as a system, or better, as one of the urban infrastructures responsible of the urban morphology of human settlements.*

In Brazil in many cases during the XX century, the places where the rich and medium class citizens and sometimes poor people live their public life have been projected, organized, located and distributed from the obedience of public plans by real estate developers and state agencies. Although this adjustment provided developers to accommodate recreation areas, sidewalks and many other places to people, it also created a city with open spaces that seem to be fragments poorly located, unevenly distributes and dimensions and morphology unpredictable not always facilitating the realization of public life or even urban appropriation.

Formal and spatial typologies, the concept of functionality of open spaces associated with them and also the role of the spatial fragments created by according to on percentages laws originated by urban plans, are some of the aspects that will be presented. The paper will present a result of a research based on a , São Paulo's district known as Vila Mariana, that is a part of QUAPA-SEL- Network's research, which is developing the national research project entitled "Open spaces system in the constitution of the contemporary urban form in Brazil: production and appropriation".

Key Words: urban morphology, open spaces system, human settlements, landscape architecture

Introduction

The article aims to present the square as one of the most important public spaces in the city: a place where people can call upon to exercise idleness, exchange ideas, the most diverse gatherings, make public life.

In the city of São Paulo, the center of the metropolis of the same name, live about 12 million people, which, added to the population of the other 39 municipalities in the metropolitan spot, reach about 20 million people.



Figure 1. São Paulo view of the southwest area.. (Vera Tangari 2012)

Many arrangements occurred during the last decades creating new urban forms. All those forms and typologies were the result of the implementation of various programs, plans, and urban actions, each of them, carrying various ideologies of how public life should be. For example, the 1910 plan for a European city of Joseph-Antoine Bouvard; the plan of 1930 that suggested the crossing of various sectors of the city through avenues called Avenues Plan Prestes Maia. the plan / report of Padre Lebre, at the second half of the 1950's warning to urban problems resulting from uncontrolled creation of allotments and the uneven distribution of infrastructure and public facilities in the city. The PUB - Basic Urban Plan commissioned by Mayor Faria Lima (1960) recommended that the occupation of the central region would have high population densities and distribution of residential areas should be around this, leaving the county to provide the city with a road-reticulated network. The PDDI – Plano Diretor de Desenvolvimento Integrado during 1971 were created on Mayor Figueiredo Ferraz's administration and defined the permitted uses on urban sectors with maximum rates of constructions and lots occupation, controlling the density of buildings, the lots retreats, among others; and three other master plans. A proposal made in the administration of Mayor Mario Covas (1985), and Mayor Luiza Erundina's management (1991) and the last one in 2002 in the management of Mayor Marta Suplicy.

This work is the result of the study "The production of urban form and open space system - the qualification of the public square". It integrates the studies conducted by the research group of QUAPA SEL-II led by PHD Silvio Soares Macedo and PHD Eugenio Queiroga both professors of FAUUSP Faculdade de Arquitetura e Urbanismo da Universidade de São Paulo.

Historical aspects

In the late nineteenth century and early twentieth century, the city goes through an intense process of growth and modernization of its infrastructure. Its colonial features are transformed into European features, aligned the image of the city of São Paulo to the big cities of that time. The city was composed of a dense houses interspersed with ancient terraces intended for planting, grazing, bullfights and festivals, broad originated by the disarrangement in the organization of the streets, churchyards of chapels and churches. At this time both public areas intended for trade fairs and located in the central regions, as spaces for parks in wealthier neighbourhoods begin to be landscaped, along with the few existing plazas. The squares in the Brazilian colonial city were the heart of urban life. Celebrations, market, religious and secular festivals, water in the rivers and fountains, happened in these venues and socialization: a public life happen for many different manifestations.



Figure 2. Colonial square in Brazil. (Silvio Macedo 1999)

In a way, the concentration and the free movement of the public begin to undergo organization through the design and treatment of formal gardens, as opposed to the figure of the square where public life is spontaneous. There emerged in Brazilian imagination, the figure of the “square as public garden” with its paths sometimes meandering, landscaped flowerbeds, fountains, kiosks and gazebos.



Figure 3. Typical square of the early years of the twenty century in Brazil.(Silvio Macedo 1999).

During the twentieth century, relevant urban transformations occur profoundly changing the settings, programs and types of both public and private open spaces. New aesthetic references arise. The European cultural influence generates new needs and desires of the population leading to the introduction of other modes of use. Urban public open spaces undergo on requalification.

The aforementioned urban plans aimed for city beautifying and renovations. Hole urban sectors are demolished for the opening of streets, avenues and boulevards. Neighbourhood's garden and parks are built and Colonial Square nineteenth used as market, political demonstration area and socialization loses some of its functions. The appearance of the garden square shifts the collective public life.

The open space trade is transferred to commercial buildings, although it is still possible to find a few areas of the city, both in weekly fairs neighbourhoods, as in informal trade, which occupies the pedestrian streets of central areas invaded in part by such type of trade. Religious manifestations go into the churches, military demonstrations that took place in Largos (some kind of wide streets with regular form, a common urban type in Brazilian cities) before settled in large avenues. From the landscaping, the square becomes a major urban setting geared for recreation, walking and contemplation. Rules of etiquette and behaviour come to regulate public life in these spaces.

In the mid-twentieth, large populations begin to migrate to urban canters in search of jobs and better living conditions. The ancient city now requires extreme changes to accommodate the new residents. With the emergence of electricity, the coming of the automobile and the expansion of public transportation, boulevards and parkways replaced the ancient streets and winding pathways.

The lack of public policies designed for housing and implementation of public infrastructure to the poorest citizens led an uneven distribution of public facilities (health, education, sanitation etc.) in cities. Central areas pass to be valued more; open spaces on private property intended for recreation and contemplation are built while the city becomes denser. The public open spaces become the refuge of the resident population in the central areas.

In the mid-twentieth century, some parks are built at the expense of the remaining squares with the same character and landscaped in equal quantity.

The neighbourhood's gardens and parks

Created by Cia City in São Paulo, landscaped neighbourhoods incorporate in the design of allotment, wide sidewalks and corners widely apart forested, and also areas to set public squares: the inner court and also entrenched in the urban fabric. These planned neighbourhoods have deeply changed public life: the relationship of the street and the square with the surrounding buildings are broken.



Figure 4. Alto da Lapa a landscaped neighbourhood in São Paulo. (Silvio Macedo 2013)

In the colonial city, the surrounding buildings and doors, windows, looks, configured the squares and movements of people took place directly, free with no barriers. Already in planned neighbourhoods, the route of the street layout, the hierarchy for accommodation of public and private transport, prioritized the locomotion of the people. The location of the square can now be defined beforehand on urbanization project although its morphological structure will be set only after the construction of all the buildings around it. Now, between the square and the building, the relationship between the doors, windows, looks and movements of people happen just after crossing some barriers, among them the street and their vehicles (transit and speed) and the walls of houses and gardens. Breaks up the direct link between resident public spaces and thus breaks up the direct relationship with the square near community. The square in the modern city acquires new meanings.

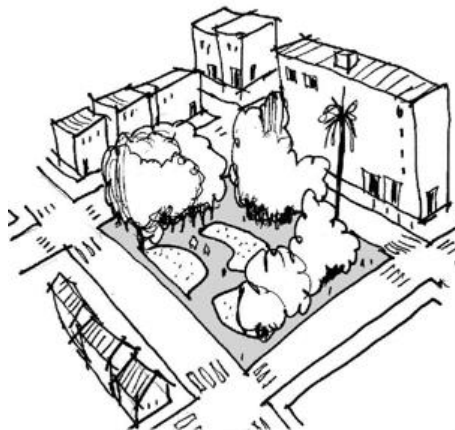


Figure 5. Typical modern square in Brazil. (Silvio Macedo 2014).

In Brazil, from the mid-twentieth to its end, the city becomes populous, productive, motorized. Reigns functionalist planning: it is necessary to supply the demands of the population across the leisure, circulation, housing, and labour. The garden square intended for

contemplation and circulation shall receive a "program of activities" incorporating "active recreation" with an emphasis on sports and playgrounds.



Figure 6. Typical modern plaza in Brazil. (Silvio Macedo 2002)

Metropolises such as São Paulo, high-rise and rebuild its infrastructure especially transport (the metro), housing (housing programs for low-income) and leisure. Parks and squares appear as essential to the recreation of the entire urban population condition, becoming objects of political interest.

The population begins to increase value these spaces as a counterpoint to the vertical and condensed city. The garden square, the active and passive leisure remains, joining cultural activities with nature scenes and outdoor amphitheatres. With this, the design changes: the square is no longer just for the local citizen movement and appreciation of plants and water elements, and becomes a space, which hosts coexistence and permanence. Arise in São Paulo city a number of squares linked subway stations, especially in the central area, while many other neighbourhoods are destroyed for its passage.

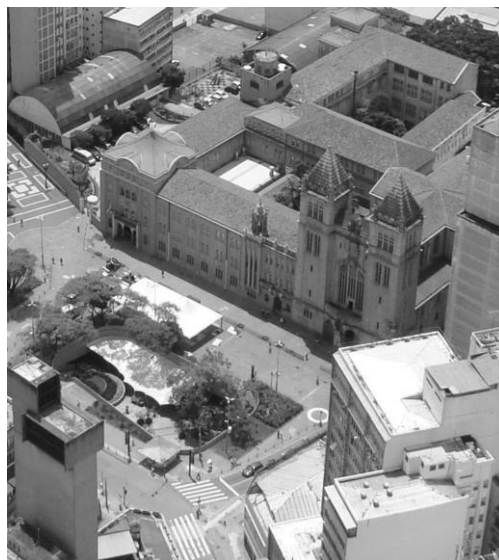


Figure 7. São Bento square in São Paulo's downtown, a new pattern of square created during the construction of the subway in the city (Silvio Macedo 2012).

On the other hand, the urgent need for hierarchical organization and expansion of the road network replaces the narrow streets that prioritize avenues for the rapid movement of vehicles without barriers (no traffic lights) organizing the forms of movement: the pedestrian is born... slowly citizen leaves the scene ...

Many of the public spaces are cut by new routes, now wider, and allow greater flow of traffic. With more freedom on project design, public spaces reproduces the traditions of use and

occupation that was common in the city's past: returning vendors, fairs, exhibitions, feeding areas - all with the goal of attracting users-citizens. Returns informality to the public, in other words, squares occupied by street vendors and markets.

The squares at the beginning of XXI century go through a process of transformation. Public open spaces for the collective appropriation of the public, the majority being spaces that require formal and functional retraining so they can be appropriated by the public. Traffic areas and circulation; suffer from increased vehicle traffic, violence and lack of security, with the degradation of the environment by the lack of maintenance of these spaces by the government. During the first decade of this century is also the stage for the resumption of landscaping, this time focusing on the permeability of the soil and vegetation for maintenance of environmental quality.

Although the free markets and eventually the water spouts still remain (in older cities or possibly in distant suburbs, the act of using them to supply water to our house or go to the squares to know the latest news about politics or other issues are no longer part of our routines), as are the other media, like television and social networks.

Citizen's demand and public space

The human need to socialize is inherent in life, occurs in public space and privacy of our homes that have all the resources (water, electricity, or information not face connection to the world) to make our lives easier. One might even think that this is a situation that makes us less attend public areas, whether squares or not, getting your restricted use only a few moments of the day: whether in the form of passage, whether for recreation. As mentioned, part of the activities and tasks of everyday life migrated from space, leaving free the inland areas of a building. Public life has been transformed and occupy new public spaces and semi-public. The complexity involved in contemporary life fragmented society into specific groups when in not individuals. That is to say, that answering the diversity of interests that may occur free in open public spaces becomes a necessity if the objective is that these spaces mean something to citizen or neighbourhood or are part of the everyday life people. You can no longer keep on landscaping all squares and with it, attend the new user-citizen. In addition, you cannot call "squares", green areas by morphological, locational, formal or programmatic peculiarities that are detached from the reality of the groups to which is intended to reach. The question that arises among urban designers engaged to the definition of social space question is - what are the basic and distinct features of society or group that interests us express and accommodate? Moreover, how to achieve a program of activities and qualify landscaped sites that could host life enabling public appropriation?

Vila Mariana's squares

The article will present the results of studies on qualification of public spaces for the materialization of public life based on four categories: location, shape, treatment and appropriation.



Figure 8. Vila Mariana's general air view. Silvio Macedo 2014.

The description will ally open spaces formally named as municipal government, and were identified in our study area - the neighbourhood of Vila Mariana from the following new spatial types as identified by the city council . They are:

Type 1: Squares - sidewalks

Morphology:

Blocks formerly occupied by squares but remain with the name of the old street, although were occupied either by the city council by building public facilities such as schools and public libraries, or by the construction of buildings by private enterprise against the law. On the other hand, even, they were subject of low-income housing – public places invaded.

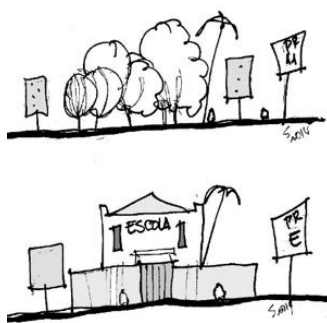


Figure 9. Square type 1.(Silvio Macedo 2014.)

Type 2: Widening of sidewalks

Morphology:

Several of the identified public grounds are small pieces of open spaces that are physically connected to sidewalks which are simple enlargements resulting from the construction of walls (fences) aligned or not aligned to the front of the lot. There were found (and its common in our lands, someone not find even a sidewalk) many narrow sidewalks with approximately 50 cm width, which make impracticable the walking tour. Positioned on those spaces, it can still be found numerous public facilities allocated randomly along the route.

These open spaces connect to the sidewalk and at the same time are bordering the streets and their traffic. They are the result of the front unbuilt urban lots.

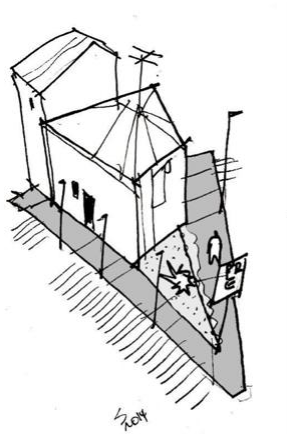


Figure 10. Square type 2 (Silvio Macedo 2014).



Figure 11. Square type 2 in Vila Mariana (Helena Degreas 2014).

Type 3: “Corner-squares”

Morphology: Outer corner of a block formed by the intersection of two sidewalks. They are open small areas that relate directly to the streets (20% freeways) and connect to lot or property boundaries. About 35% of surveys conducted, show public grounds located in areas with declivities varying between rugged and steep. When it makes a kind of relationship between the proportions of width and length, usability is almost impossible.

Its existence is due to: i) the residual areas allotments; ii) the residual area of the road system, resulting from the enlargement of streets and avenues process, demolition of old blocks to build a track, etc.; iii) projected neighbourhoods taking into account principles of garden city

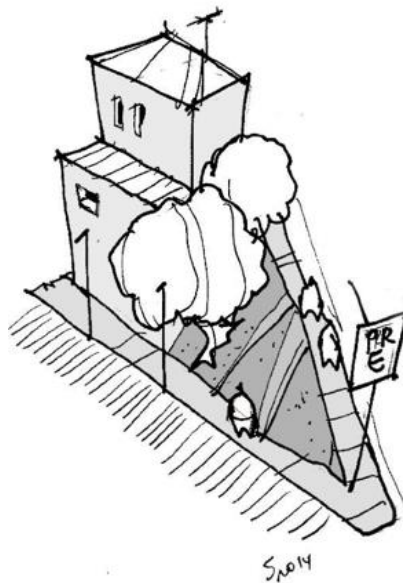


Figure 12. Square type 3. (Silvio Macedo 2014).

The surveys found many areas associated with four types of road: i) freeways; ii) arterial routes (usually controlled by traffic lights, with accessibility to property boundaries and secondary and accessibility to local routes, allowing transit between regions in the city.); iv) collecting roads (pathways connecting neighbourhoods that distribute local traffic, only intended for local access or restricted areas.); iv) local routes.

About 55% of these places are on the sides of roads with heavy traffic and no pedestrian crossing conditions.

Figure 13. (Silvio Macedo) “Corner-squares” varies between completely paved or totally vegetated with narrow walks predominate. They are implanted randomly all sorts of signs and equipment such as dumpsters, poles of traffic lights, lampposts, mailboxes and sporadically lowered guides warning signs for the visually impaired. The random placement of these devices makes walkability difficult and crossing streets almost impossible. When wider, “corner-square” are wooded and eventually beds with shrubs, lawns and ground covers, are eventually created, but public maintenance is poorly done. In the case of subdivisions that follow the design principles of the garden city, the corners have aesthetic value and are landscaped, wooded and flowerbeds are maintained by residents or firms whose lots are bordering to it and have a purely aesthetic function. Several of these free areas were “christened” by the municipality with the name of someone unknown to the local population, was designated square.

Type 4: “Midway and sideways Squares”

Morphology:

Open spaces with two forms: the first presents long lineal shape, narrow width and is vegetated and not connected physically with blocks. The second presents long lineal form, varying widths and is not bound by the court. Are predominantly vegetated areas, with narrow sidewalks, and do not have street furniture. We emphasize the fact that creating avenues for São Paulo took place on riverbeds, justifying the type of occupation as described above. These are physically connected between two-way vehicular and fast traffic. The squares located on the sides of freeways, maintains physical connectivity with two types of road: the express routes without possibility of crossing and the arterial route with traffic lights located in cases of vehicle crossings. Are fully vegetated areas and there complete absence of street furniture, urban equipment or facilities to citizens, there are sidewalks in their surroundings and sometimes it is rugged (30% of cases). The use for these cases is not feasible because it is a situation where the pedestrian usability should be provided in the project, with the forecast of stairways, terraces and ramps. The vegetation is the result of chance, clearly not having a formal planting project. In these areas the vegetation is planted in order to avoid, thanks to rooting, the collapse of green sidewalk beds or just to meet environmental compensation procedures for planting trees.



Figure 13. Squares type in Vila Mariana. Helena Degreas 2014.



Figure 14. Squares type in Vila Mariana. Helena Degreas 2014.

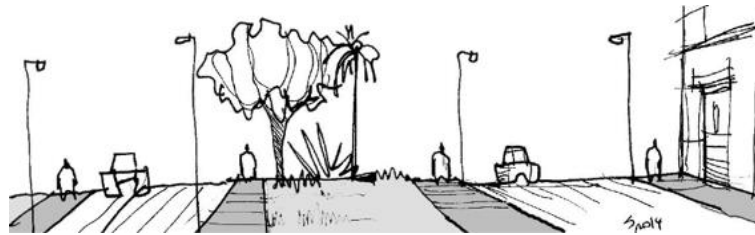


Figure 15. Type 4.(Silvio Macedo 2014).

Type 5: "Inside block squares" and entire block squares on entire

Morphology:

The public grounds are situated on flat or low-slope areas.

The survey , shows about 10% of the public grounds are located inside courts and are directly connected to lots and sidewalks, occupying at least one third of the total area (from 2 to 3000m²). In some stretches of the neighbourhood is observed squares occupying the entire area of the court with about 10000 m². They are found in predominantly residential neighbourhoods and are physically connected by sidewalks and streets for local traffic and low speed. Doors and windows have, in general, physical and visual access to the plazas. Generally all have furniture and appropriate urban equipment for the citizens in terms of recreational and leisure facilities. The vegetation is diversified, forming flowerbeds and is well maintained. Some have sculptures, fonts and are suitable to the pedestrians well arranged. They are fully utilized by local population because it was provided urban equipment for both sport fields, and areas of children's play - such as playgrounds, that enables social meeting.

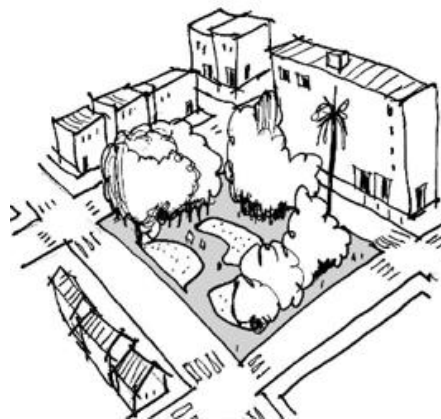


Figure 16. Squares type 5. (Silvio Macedo 2014).

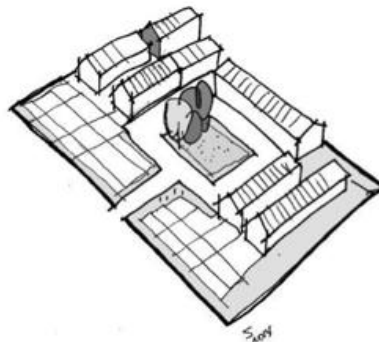


Figure 17. Squares type 5. (Silvio Macedo 2014).



Figure 18. Map including the five types of squares with approximated location (Helena Degreas , 2014)

Conclusion

This area of the city despite its shortcomings presented is still preferred over the other city, except for some of the richest neighbourhoods. Generally, the situation of this type of public place in the city attests to a total lack of foresight and design and the area in question generally occupied by segments until the upper middle class is in a stage of disability and poverty in relation to many of the cities of the country including some located in Greater São Paulo.

On the other hand the types found are recurrent in Brazilian city and denote the indifference of both the Government and the population regarding public squares attitude alone in the last two decades has undergone significant changes, with the recovery of public space occurred in some cities such as Curitiba, Campo Grande, Barueri, Palmas, Porto Alegre and Maceio.

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Urban form and multidisciplinary: contributions to the São Paulo Master Plan revision

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Abstract. *The Urban Planning applied in São Paulo City during the last 40 years is characterized by a functionalist approach, very few aware of the structuring open spaces system and the urban forms resulting from the zoning legislation. Since the end of 2013, the São Paulo Master Plan is under revision by the City Council and discussed by the society. As a contribution, Lab QUAPÁ, the landscape laboratory of FAUUSP, proposed guidelines and strategies for the open spaces system in order to improve its qualification. Among the main topics, it was suggested the more comprehensive concept of "Municipal Open Spaces System" instead of "Municipal Green Areas System", more restrictive. Besides, plans for open spaces system and more integrated management tools on the topic are proposed seeking the control of urban form and ensuring proper public appropriation. Among them are the increasing of necessary public open spaces correlated to the population and building densities growth and the requirement of previous urban projects for all new entrepreneurships in land areas larger than 12,000 m². Moreover, the multidisciplinary approach was the basis for the proposals formulation, bringing together the landscape design, the urban planning, the morphological studies and the real estate evaluation.*

Key Words: Open space, master plan, São Paulo, density, urban projects.

Introduction

The Urban Planning conducted in the past 40 years in the city of São Paulo was generally characterized by a functionalist approach, with little attention to the (de)structuring of open space systems and to the urban forms resulting from the land use and occupation laws. Subsequent to the 1971 and 2002 Master Plans, a revision was initiated in 2013, to which the QUAPÁ Laboratory of FAU-USP has elaborated the set of proposals herein introduced.

The Master Plan of Integrated Development (PDDI, acronym in Portuguese) was instituted in 1971, and was the base for the first zoning Law of São Paulo, back in 1972. The manifested main objective was to set the balance between uses, and it was developed from the design of a grid of expressways. The design has crystallized the general trends. The most densely populated zones and the centers and corridors of activities were outlined based on the possibilities of such expressways and of the mass transit system, although in general there was an attempt to keep them one block away from the main road system, along which corridors of activities generally creating little traffic were planned.

An exclusively residential zone was established for the elites, as well as the corresponding transition zones around them. Industrial zones and three levels of more densely populated zones were defined, with maximum floor area ratio of 4, intended to comprise diversified activities: central zone, regional centers and neighborhood centers. Several special zones were foreseen, including rural zones, reurbanization areas and institutional areas with airports, clubs, universities and parks. Areas not delimited, comprising 65% of the urban area, were defined as a predominantly residential zone, with maximum floor area ratio of 2, and control of non-residential activities.

An important instrument to encourage the formation of open spaces was the adoption of the so-called Adiron formula, which conditioned the obtainment of the maximum floor area ratio (CA, in the acronym in Portuguese) to the reduction of the land plot occupation rate (TO, in the

acronym in Portuguese), resulting in high and isolated buildings in plots of land, many times with large open spaces, usually isolated by long walls.



Figure 1. Partial view of São Paulo (Source: Lab-QUAPÁ, July 2013).



Figure 2. High and isolate buildings with large private open space (Source: Lab-QUAPÁ, October 2013).

This zoning has resisted for 30 years various frustrated proposals to review the Master Plan. In that period, the increasing population density was concentrated in certain southeastern zones of the city, a region of upscale residences. Few planned expressways were actually executed, and a reasonably efficient mass transit system was also not implemented. The car-centric functionalist approach gave no attention at all to structuring an open space system, which ended up being addressed separately in land plots, with no urban articulation. The city form structuring was essentially defined by the provisions of the zoning law, which has not taken into consideration at all the relief and the water base of the municipality, only providing for the control of floor area ratios in the areas occupied by the elites and in their immediate surroundings.

In 2002, the new Strategic Master Plan was approved, and in 2004 the new law organizing the land use and occupation was approved. The main objectives were to restrict the population exodus from central areas, preventing the peripheral growth in environmentally fragile areas with no infrastructure, promoting the creation of jobs near workers' residences, reducing the impact on the general traffic of people commuting from the outskirts to jobs downtown and backward (pendular mobility), and above all redirecting the population density increase to intermediary areas of the city, which have good infrastructure, and to old industrial areas that would be the object of urban operations. Population density increase would be restricted in the southwestern region, wealthier, regarded as saturated, and in the outskirts provided with insufficient infrastructure.

Despite the real estate boom of the following years, there was actually a partial restriction of the population density increase in the southwestern zone. The population density increase of the intermediary zone and of the old industrial zones did not take place as much as expected, because for the first one a stock of built area was created and then depleted, contradictorily having that guideline; on the other hand, in the old industrial zones, few urban operations were actually regulated, restricting the effectiveness of the guideline for the population density increase. The outskirts and cities around São Paulo ended up having their population density increased, opposed to the proposal³⁰⁶. At last, there was a huge expansion of club-condominiums, vertical condominiums comprised of various towers in large pieces of land with fenced open spaces.

Again, the functional objectives have relegated the open space system structuring to an isolated treatment in land plots, by the land use and occupation ordering legislation.

In 2014, the new Master Plan being discussed in the City Council partially reformulates those objectives: restrict the peripheral growth, reduce the impact of people's commuting from the outskirts to jobs downtown and backward through the promotion of jobs created near their residences, and production of residences in more central regions or near the structural mass transit system. It is proposed to increase the population density, with CA up to 4, in the surroundings of main mass transit corridors – subway, railway, monorails, bus corridors, and in old industrial areas. In the pockets formed in between corridors, the maximum CA would be 2, with buildings of at most 8 stories. In the environmental protection and recuperation areas, and in areas of urban vulnerability reduction, population density increase would be controlled.

Notes on the proposal of revision of São Paulo Master Plan

In 2013, the Municipal Secretariat of Urban Development – SMDU – of the Municipal Prefecture of São Paulo sent to São Paulo City Council a Bill (PL 688/13) stipulating provisions for the Revision of the Strategic Master Plan – PDE, of the Municipality of São Paulo.³⁰⁷ PL 688/13 more than merely revising the PDE in force, dated back to 2002, effectively proposes a new PDE for the municipality. It is a much broader proposal, with more than 170 articles, to a

³⁰⁶ Meyer et al 2013.

³⁰⁷ See Prefeitura Municipal de São Paulo (2013).

certain extent resulting from the attempt to observe countless contributions from the civil society given in the public hearings that, until the date of this paper completion (May 2014), were still in progress.

It is interesting to highlight the most structural issues of the PDE Revision proposal in regard to open spaces and urban form, which are the subject of this paper. As for the open space system, the 2002 PDE states the importance of the structural water network of the city as the main factor to be considered to propose new public open spaces for leisure and for the containment of rainfall water. In fact, the water network guided public management actions from 2002 to 2012, such as the goal to execute 100 parks in the city of São Paulo and the construction of “piscinões” (big water containment pools)³⁰⁸, although, in view of the flooding problems affecting the city during the rainy season and the demand for public open spaces for leisure, and even in view of the legal enforcement of permanent protection areas along water courses (Federal Forest Code), such initiatives were still too shy and modest.

Unfortunately, the PDE Revision proposal does not focus on the water network issue, although it mentions the need of executing linear parks along water courses. Concerning the macro-zones of environmental protection defined in the 2002 PDE, which protect significant remnants of the Rain Forest to the south and to the north of the municipality, the PL 699/13 does not make expressive amendments. On the other hand, such PL proposes the creation of a plan for the municipal green areas system – SMAV – and the plan for urban trees plantation, not mentioned in the current PDE.

As for the intentions regarding the urban form, the current PDE does not structurally address the subject, except as for the maintenance of the quality of exclusively residential neighborhoods – occupied by the elite – keeping a strict control on the land use and occupation. The PDE revision proposal, although unfortunately keeping such privileges for the elite neighborhoods, has a clear position regarding the structural aspects of the urban form of the other areas of the city: it creates regions for the increase of construction and dwelling density along mass transit corridors, as well as in old industrial areas through urban operations; it proposes that the other areas of the city do not have increase of density.

Such measures shall theoretically guide the revision of the zoning law scheduled to be conducted as soon as the PDE revision is approved. After over half a century, perhaps the administration of the biggest city of the South hemisphere will again pay attention to the urban form in a structural manner, not only being concerned with the scale of the land plot, with the indexes regulating its occupation just aiming to control the land utilization – construction density increase – and to ensure ventilation and lighting to the constructions. Guidelines for the urban landscape, for urban forms and typological standards should be proposed to contribute to the urbanity³⁰⁹.

Contributions of Lab QUAPÁ

In view of the public hearings process regarding the Bill providing for the Revision of the Strategic Master Plan of the Municipality of São Paulo, the professors and researchers of the Landscape Panorama Laboratory of São Paulo University School of Architecture and Urbanism – Lab QUAPÁ – FAUUSP, aiming to contribute to enhance such important piece of the municipal space planning, have proposed several suggestions to amend the plan presented in two subitems as follows.

³⁰⁸ Popular name of rainfall water containment reservoirs, which can be open or have a lid.

³⁰⁹ Briefly, “urbanity” is understood as the attributes – formal, functional and symbolic – of the city, or of any other portion of the urban space, capable of providing proper spaces for the life in public – general public sphere (Queiroga, 2012), thus contributing for the urban life quality. About the subject, see a rich debate in Aguiar, Netto (2012).

Lab QUAPÁ proposals comprise qualification guidelines and strategies fundamentally for the following topics: open space systems; increase of free public enjoyment spaces correlated to the increase of demographic and constructive densities; stricter control of the urban form in large scale undertakings aiming to ensure proper urbanity in the relation between private property spaces and public property spaces, and between spaces with controlled access and spaces with free access to the general public.

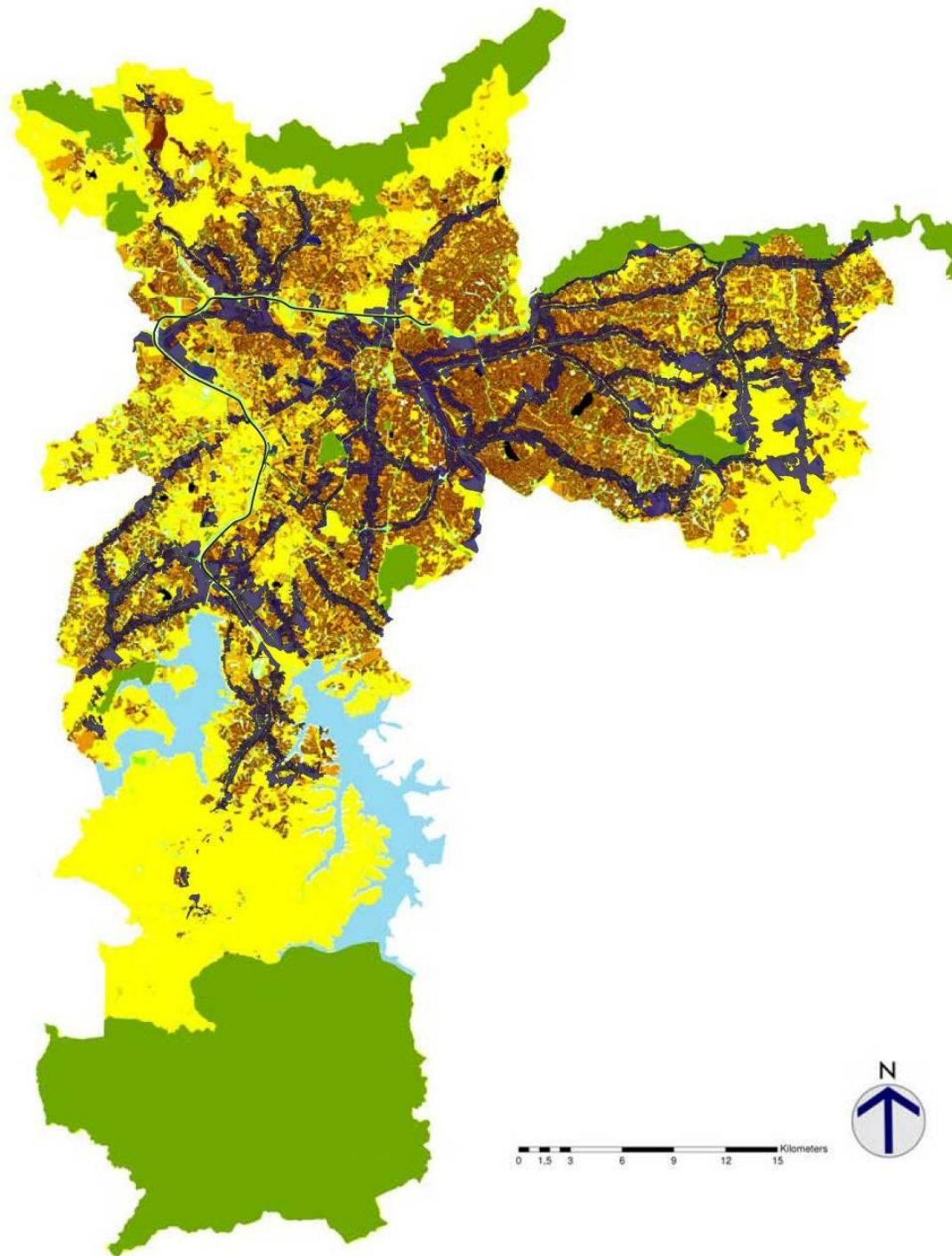


Figure 3. The dark areas correspond to areas of proposed high density, where there is little open space intra-block. The yellow areas correspond places with too much private open space (Source: Lab-QUAPÁ, November 2013).

Open space systems

Miranda Magnoli (1982) classified the open space as a space free from buildings. Open spaces are thus any spaces open to the zenith, such as streets, squares and parks, as well as backyards, open parking areas, rivers, dunes, woods, cultivated fields, etc. Upon defining the open space in such a way, Magnoli not only established an operational category, but also advocated the open space being the central object of the landscape work, considerably expanding the field of activities of landscaping in Brazil, beyond gardens, parks and green areas. With this expansion proposed by Magnoli, the city, the municipality and the region also become the object of landscaping, allowing new interfaces among landscapers, urbanists and urban and regional planners, although such dialogue between the above mentioned fields is still only a perspective, not an actual routine practice in Brazil.

Since 2006, Lab QUAPÁ³¹⁰ researches based on Magnoli's open space concept and on Morin's system (2008)³¹¹ considers that the whole city has a open space system, insofar as: every city has at least a road system, and the roads (streets, avenues, etc.) are mostly open spaces; the relations characterizing a open space system are not only environmental (open space system of environmental nature) or functional (open space system intended to social intercourse and leisure) in nature, they could be more complex, because open spaces can perform several roles, synchronically or diachronically; physical connections are not the only forms of relation between open spaces.

Therefore, the open space system of a city is not represented only by its (possible) green area system, the later is only a subsystem of the urban open space system. The open space system of a city comprises all its open spaces, either owned by a private entity or by the government, with or without vegetation, insofar every open space has attributes – environmental, functional and symbolic – which define, through human actions, a system of relations.

This theoretical reference picture, briefly summarized above, allow us to appraise and propose public policies of a broader character, less fragmented in subsectors, which is so characteristic in planning and managing big Brazilian cities. This is what was done in Lab QUAPÁ in 2013, as a contribution to the proposal of Revision of São Paulo Municipality PDE, as we describe as follows.

In the PL 688/13, the concept of municipal green area system – SMAV – is introduced as being a system encompassing all vegetated open spaces of public interest, either owned by private entities or by the government, therefore including parks, squares, forest remnants in private properties, among others. It is noteworthy that not all squares in São Paulo are vegetated, and strictly speaking they should not be considered as “green areas”, and should not be included in the SMAV. Such PL (Bill of Law) proposes the creation of a specific plan for the SMAV, aiming to preserve the environment and to qualify the above mentioned system.

Lab QUAPÁ has proposed to replace the concept of “municipal green area system – SMAV” by “municipal open space system – SMEL”, because it is clear that the SMAV is merely a subsystem of the SMEL. We understand that the term – SMAV – is limited, and is restricted to only a part of the open space system, and the later was not actually considered in its necessary coverage and complexity in the whole proposal of the PDE revision.

The Municipal Open Space System – SMEL is understood as the elements and relations that organize and structure the set of all open spaces of the municipality, both owned by private

³¹⁰ See, among others, Queiroga and Benfatti, 2007, Campos, et. al. 2012.

³¹¹ To Morin, a system is a complex object, is always a “system of systems” (Morin, 2008), is the relations of its elements, or of the attributes of its elements that define it as a system. A system has a organization given by the structural relations therein established, such relations characterize the system, so that if there are changes in those relations, the system destabilize, is extinct or a new system is created. The stability of a system structure is thus under the risk of the instability of the process that has constituted it. Such instability combines endogenous and exogenous factors to the system.

entities or by the government, including streets, squares, parks, promenades, sidewalks, bike routes, gardens, forested areas, reservoir beaches, backyards, open parking areas, agricultural use areas, soccer fields, etc., that is, all the other open spaces of the municipality of São Paulo.

Green areas are doubtless fundamental for the environmental and socio-cultural quality of the municipality, and should be understood and considered in the above mentioned systems, taking into consideration that the SMAV, for containing only part of the SMEL elements, should be replaced in the revision of the PDE by the concept of SMEL. SMAV items described in the PDE are though all fundamental, and should be incorporated to the several PDE items, in special to the SMEL.

The organization of open spaces as a system is configured as a strategy of creation, qualification and conservation of such spaces, aiming to improve the urbanistic and environmental quality of the municipality in a broader way, overcoming the sectorial view that unnecessarily fragments the actions of open space qualification in the municipality.

The following open space categories (followed by examples of corresponding types of open spaces) are part of the SMEL: environmental conservation spaces: conservation units provided for in the National System of Conservation Units – SNUC – (Municipal Natural Parks, State Parks, Environmental Protection Areas, Private Reserves of Natural Heritage, Ecological Stations, etc.) and Permanent Preservation Areas – APPs, all of them provided for and described in federal legislation; open spaces intended to social practices, such as belvederes, squares, public gardens, urban parks, promenades along waterfronts, municipal sports centers, formal or informal soccer fields, beaches at water reservoirs, open spaces in public schools, university campuses, among others; open spaces integrating vehicles and pedestrians circulation systems: streets, avenues, bike routes, pedestrian routes, flights of stairs, railways, waterways, airports, among others; open spaces associated to circulation spaces: central and lateral strips in avenues and streets, slopes besides expressways, roundabouts, gardened spaces besides cloverleaf intersections, etc.; open spaces associated to infrastructure systems: water treatment plants, waste water treatment plants, right-of-way stripe of high voltage lines, right-of-way stripes of ducts (water mains, trunk collectors, gas and oil pipelines), sanitary landfills, among others; private open spaces of collective use: parks and gardens of private foundations, clubs, corporate squares, open spaces of commercial centers, of private schools, etc.; private open spaces of residential use, single family or condominium use: backyards, gardens, recreation spaces, sports practices, etc.; other open spaces of productive or non-productive use: mineral areas, reforestation areas, agricultural and livestock husbandry production areas, fisheries, non-consolidated urban open spaces – not allotted glebes, unoccupied plots, etc.

The categories and types of open spaces of the above table are, at times, multifunctional, and form subsystems of inter-relatable open spaces. Therefore open spaces intended to social intercourse frequently also perform an important environmental role, as well as circulation spaces that can be used for social intercourse, agricultural production areas provide environmental services, etc. Such complexity requires the whole SMEL to be planned, and not only the SMAV.

For the qualification of the SMEL, the following is proposed:

A. Creation of the Municipal Plan of Parks that ensures: the creation of parks in all the city districts in a scale compatible to the population of such districts³¹²; the connectivity, when possible, through Fluvial Linear Parks and densely vegetated open spaces between Urban Nuclear Parks, Municipal Natural Parks and/or State Parks and other Environmental Conservation Units of the Municipality.

B. Creation of Regional Plans of Open Space Systems for each Sub-prefecture, harmonized with the Municipal Plan of Parks, with focus on: creation of squares and parks system intended to leisure and social intercourse, also considering their environmental contribution, ensuring the

³¹² The Municipality of São Paulo has 96 districts, with population varying between 40 thousand and 360 thousand residents, distributed in 32 sub-prefectures, and the latter have population between 200 thousand to 600 thousand residents, approximately.

distribution of such public spaces throughout the sub-prefecture territory, allowing access to all residents by foot, bike or in small routes using motor vehicles; tree planting in the urban area, in the road system, in public spaces of social intercourse and leisure, in private open spaces (big parking areas, areas with significant tree coverage, etc.) and, whenever possible, in other categories and types of open spaces above mentioned; creation of the sidewalk qualification system – expansions, accessibility, tree planting – as the main element of connection to other public open spaces; creation of open space system adequate to the mobility through bikes (bike friendly routes, bike stripes, and exclusive bike routes); articulate and potentiate the public enjoyment of the above mentioned open space categories and types whenever the urban-environmental circumstances are appropriate (except for the open spaces of restricted access – private use – and the public properties of special use incompatible with social intercourse activities).

C. In each sub-prefecture, a Department of Open Spaces Management and Maintenance shall be created, being responsible for designs, management and maintenance of all public open spaces of social intercourse and leisure (except for parks managed and maintained by the Department of Parks and Green Areas or state parks), and for the urban tree planting. The maintenance of such spaces might be object of Public-Private Partnerships – PPP.

D. Integrated structures to manage and maintain the SMEL shall be created, coordinating the actions of sub-prefectures and of the Municipal Environment Secretariat.

The SMEL shall be the object of a special regulation, associated to the land use and construction regulations, and to other urbanistic indexes and rates provided for in the PDE revision. Thus, the following sub-item of the proposal regarding the destination of public enjoyment open spaces in urban density increase areas is presented.

Urban form and public sphere

Other important contributions of the Lab QUAPÁ for São Paulo Master Plan revision address the control and induction of the private space production, aiming to define a stricter control of the urban form, and to ensure appropriate spaces for public use.

The predominant model, adopted by private undertakers, is of the building at the back part of the plot, with fenced open area and separated from the city. Therefore, the advance of high-rise buildings has been a process of cloistering private spaces, which are heavily fenced, in regard to the public ways. Thus, Lab QUAPÁ has proposed the requirement of sharing part of the open spaces for public enjoyment, for the approval of vertical projects. It is about encouraging the provision to the general public of urbanized, vegetated and equipped open spaces for public enjoyment in private land, with possibility of occupying even the spaces above underground garage floors. Therefore, the advance of high-rise buildings would be followed by the production of a network of private open spaces for public enjoyment. The treatment of such open spaces for public enjoyment should be compatible to the treatment of a square, promenade or small park, with large tree planting, leisure equipment and urban furniture appropriate for social intercourse and for the urban context in which they are included.

This proposal is particularly important for the axles of expected population density increase, along the medium and high capacity mass transit network: “Urban Transformation Structuring Axle”. This increase of high-rise buildings would be occurring exactly in the areas of the city with smaller availability of parks and squares.

For such axles, it is proposed to increase the maximum CA to 4.5 (four and a half), provided that the undertaker provides open space of public enjoyment for social intercourse and leisure with a minimum area of 900m², for plots with up to 3,000m², or 30% of the plot area, for plots with areas in excess of 3,000m². Should the undertaker not provide open space of public enjoyment, then the maximum CA would be reduced to 3.5.

In the pockets formed in between axles, as well as in the segments where the axles cross the “Urban Vulnerability Reduction” areas, of areas with environmental restrictions, where the CA is expected to be 2, the CA could be increased in 0.5 provided that

the undertaker provides open space of public enjoyment, in the same proportions and areas above defined.

Undertaking intended to social dwelling would be dismissed from such measures, aiming to optimize costs that actually allow their execution in areas well served with urban infrastructure, in particular with regard to the existence of high capacity mass transit lines.

It was also proposed the requirement of prior urbanistic designs for all undertakings in land in excess of 12,000 m², aiming to ensure a stricter control of the urban form, and proper spaces for public use. Such measures are necessary to fight the excessive cloistering of private spaces, with the fragile relation between private and public spaces, like in club-condominiums, strongly fenced and separated from the urban tissue surrounding them.

Final considerations

To formulate the Lab QUAPÁ proposals above described, the multidisciplinary treatment was fundamental, aiming to approximate the urban planning area to morphological studies, to landscaping and to real estate market studies. The internal debate about the subject, in the Lab QUAPÁ, was intense. Fortunately, we have senior researchers in the above mentioned areas. The divergence of opinions could be overcome through the common understanding that in the social production of space, the urban form, both of their constructed spaces and open spaces, either public or private, is important to qualify the city, its urbanity, its public sphere. Such contributions of the Lab QUAPÁ to the São Paulo Municipality PDE revision, although privileging the qualification of spaces for the public sphere, were always alert to the issues of biophysical support conservation in the capital city of São Paulo, also aiming to qualify environmental, or better saying, socio-environmental aspects.

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Public policies towards river and streams restoration: perception and appropriation

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Abstract. *Since the final decades of the 20th century, São Paulo's municipal government has focused its actions on treating areas adjacent to bodies of water and promoting their use through the creation of conservation parks and the reconstitution of native forests, furnishing them in order to foster urban leisure activities and sporting activities for its 11 million inhabitants. This change from a historical policy of channeling rivers and streams has occurred due to the requirements of more rigorous environmental legislation, the provision of diverse recreational and leisure areas, and, even more so, in order to fight the increasingly frequent and damaging floods that are caused by the heavy occupation of the floodplains and the indiscriminate sealing of urban soil. Policies for the implementation of linear parks along the banks of rivers, streams and reservoirs are then adopted, both for housing projects, whose priority is to relocate the populations living in geotechnical risk areas, and for projects that focus on providing leisure and recreational facilities for the population, contributing, in this way, to the recovery and conservation of the bodies of water in the urban environment.*

Key Words: *permanent conservation areas, public management, São Paulo, linear parks, bodies of water*

Introduction

The relationship between the municipality of São Paulo and its water network, including waterways, springs and reservoirs, throughout the 20th century, basically adhered to the precepts of the sanitary engineers, giving priority to the sewerage system to the detriment of any scenic and environmental potential. Usually associated with the roadway system, these works allowed for the implementation of roads along the valley floors.

In the late 1980s, there was a shift in terms of legislation, public actions and society's attitude. Of note was the implementation of the Guarapiranga Project, which later expanded into the Watersheds Program (Programa Mananciais) with the inclusion of the Billings Reservoir, reaching metropolitan coverage, and into municipal and state sphere. In the urban context, actions involving changes to the roadway system, drainage, basic sanitation, street lighting, restoration of hillsides, regularization of land ownership, and relocation of families and housing provisions, among others, initially led to the creation of public open spaces, though only incipient in the face of the needs of the resident population.

Started in 1987 and carried out by the Municipality of São Paulo, the Streams Channelization Program (Programa de Canalização de Córregos - PROCAV 1) is from that same period. In order to improve the urban drainage system, its actions involved the removal of 1590 families and the evacuation of buildings in at-risk areas in order to make the channelization of nine streams feasible and allow for the opening of avenues on the valley floors. PROCAV 2 spanned from 1994 to 2005, and despite the ongoing discussions that took place in society, it still followed these same guidelines, with the channelization of eleven streams and the creation of flood detention reservoirs, removing some 4500 families from the slums in order to proceed with the reurbanization and creation of several public squares. According to BROCANELI (2008), the second stage of the program "was an investment that did not consider urban environmental issues and/or ecosystem concepts allied to landscape ecology and environmental planning guidelines for the formation of sustainable cities, as contemplated in Agenda 21,

product of the United Nations Conference on Environment and Development (UNCED - ECO-92, Rio de Janeiro)."

The São Paulo Strategic Master Plan - PDE (Plano Diretor Estratégico de São Paulo, Municipal Law no. 13,430/ 2002), currently under review, establishes the concept of a linear park "as an element that structures urbanization, restoring the environmental logic of the Watersheds." It defines tracks of public utility throughout the waterways in order to implement green infrastructure for environmental recovery and leisure, guiding the activities of various municipal departments. Public administration focuses on drafting policies that increase the number of leisure and recreational areas for the population through the implementation of urban parks, putting emphasis on units that aim to recover areas adjacent to bodies of water, thus establishing the concept of the Linear Park.

The parks created during the 1980s and 1990s reflect a greater environmental concern because they focus not only on meeting the needs for leisure and recreation, but also on preservation and conservation – as seen in the Watersheds of the Serra da Cantareira and the Serra do Mar (BARTALINI, 1999). The parks produced in this century are more complex, since many of them are a result of urban works that sought to integrate these structures into the urban fabric, with multidisciplinary actions from various spheres of public management.

Legislation as a means of transformation

From the federal environmental legislation, the current Brazilian Forest Code (Código Florestal Brasileiro, Federal Law no. 12,727, 2012) considers Permanent Preservation Areas (Área de Preservação Permanente - APP), among others, to be the banks of any natural perennial and intermittent waterway, excluding temporary ones, from the edge of the bed's regular trough, varying according to the width of the stream or river in question, the surroundings of natural and artificial reservoirs, as well as areas surrounding springs and perennial waterholes, with a minimum radius of 50 meters (Chapter II, Section I, Article 4).

In Brazilian cities, especially in the municipality of São Paulo, we see the recurrent practice of low-income populations occupying these areas due to the absence of a comprehensive policy for the provision of housing, as well as a lack of interest in these areas from the real estate entrepreneurs.

Faced with this specific situation, there is a daily conflict between reconciling the primary destination of the APPs, that is "the environmental role of preserving water resources, landscapes, geological stability, biodiversity, gene flow of fauna and flora, soil protection, and ensuring the well-being of human populations" (CONAMA Resolution no. 369/ 2006) with much of the Brazilian urban population's basic need for housing. This initiative is considered a breakthrough in recognizing distinctions between APPs in urban and rural areas.

In this same resolution, the possibility of simultaneous preservation and human occupation was also determined (Section III, Articles 8 and 9) through the partial use of the total APP area through the public domain green areas system, permitting different percentages of impervious soil (5 %) and landscape intervention (15%), with flexibility in special zones of social interest as per specific regulations. This position will allow for appropriation and therefore the consolidation of these areas, thus producing a social and environmental gain.

From the effective occupation of these areas, the municipality's departments, mainly the Municipal Housing Department (Secretaria Municipal da Habitação -SEHAB) and the Municipal for Green and Environment Department (Secretaria do Verde e do Meio Ambiente -SVMA), formulate policies that address the APPs through actions and programs, either to create parks that are part of the public open spaces system or for the provision of housing, with the urbanization of significant sectors, thereby generating connections and environments typical of urban dynamics.

With regard to urban laws, the Strategic Master Plan of São Paulo (PDE) was developed in compliance with the City Statute (Estatuto da Cidade, Federal Law no. 10,257/2001). Therefore,

the municipalities were delegated their own land use planning by means of regulation over the usage, planning, division and occupation of urban land, thus ensuring the social functions of the city. The PDE (Art. 101) sets forth that the urbanization of municipal land is organized around nine elements, among them, the structural water network.

This "consists of streams and valley floors, the axes along which urban interventions for environmental restoration will be proposed – drainage, vegetation restoration and environmental sanitation – as laid out in the Environmental Recovery Plan for Waterways and Valley Floors (Plano de Recuperação Ambiental de Cursos d'Água e Fundos de Vale)," with the goal of developing linear parks as structuring elements of the urbanization, restoring the environmental logic of the Watersheds and defining tracks of public utility along the waterways. In Art. 106, linear parks are defined as "urban interventions that aim to give the citizens an awareness of the natural site in which they live, progressively expanding the green areas."

The Zoning Law (Lei de Zoneamento, Municipal Law no. 13,885 /2004), with supplementary regulations to the PDE, establishes categories of use under full protection, sustainable use, and special interest areas in which linear parks and greenways are located.

In the Strategic Master Plan and in the Zoning Law, the municipal planning law sets forth an improvement in the concept of linear parks as an important integrating element for urbanization, while restoring the environmental logic of the Watersheds, and defining utility tracks along different waterways.

Main public departments involved

Along with the new legislative positions, there were more partnerships between the different decision-making spheres over the economic and technical feasibility of the projects in the first decade of this century.

The Municipal Housing Department of São Paulo (SEHAB) is organized into three different Coordinating Committees: Social Service Management, Projects, Planning and Construction Program, and Land Regularization Management, and it also encompasses the Housing Company (Companhia Metropolitana de Habitação de São Paulo - COHAB) for the production of housing units through public and private agencies. SEHAB works in slums, tenements, urban settlements and housing projects, and in 2014 was responsible for the implementation of the following initiatives: Watersheds Program; the federal housing program MCMV (Minha Casa, Minha Vida); Land Regularization Program (in both the public and private spheres); Renovate SP Program (Renova SP) and Urbanization of Favelas Program (Urbanização de Favelas).

As a rule, these programs often involve the removal of residents when the homes are built in areas of geotechnical risk or where there is an inability to access the main urban public infrastructure networks such as the water supply, sewerage, lighting, etc. Secondly, housing units may also be removed in order to carry out an urban design project or for altering the roadways system. The issue of removing these populations is always controversial, often leading to the mobilization of the residents and intense discussions during the project's implementation.

The Watersheds Program aims to recover the water from the Guarapiranga and Billings reservoirs and maintain their quality, to improve the living conditions of the residents, and to ensure the social inclusion of the population and sustainability of the program's urban projects. It looks particularly into tackling broad urban issues, along with the construction of homes, which also often involves other municipalities. Additional actions include the implementation of water and sewerage networks, storm water and stream drainage, garbage collection, road improvements for vehicles and pedestrians, the paving and opening of streets and alleys, the elimination of risky areas, street lighting, the creation of recreational areas and community centers, resettlement of families, construction of housing units, social assistance to residents, and land ownership regularization, always complying with the specific laws for protection and recovery of the Guarapiranga and Billings Reservoirs.

In 2009, the Municipal Fund for Environmental Sanitation and Infrastructure (Fundo Municipal de Saneamento Ambiental e Infraestrutura - FMSAI) was created to support and fund basic environmental sanitation actions, as well as municipality infrastructure, with funds from transfers by the Basic Sanitation Company of the State of São Paulo (Companhia do Saneamento Básico do Estado de São Paulo - SABESP).

The Municipal for Green and Environment Department (SVMA) was created in 1993 through the transfer of the Department of Parks and Green Areas (Departamento de Parques e Áreas Verdes - DEPAVE), previously part of the Department of Services and Constructions. It is responsible for the implementation and management of parks. The projects planning is the responsibility of the Department of Planning (DEPLAN), and the actions for the implementation and management of the parks are the responsibility of DEPAVE, whose responsibilities also include project design, managing the construction works and services for both the construction and landscape implementation of urban parks, linear parks, nature parks, squares, gardens and other public places. Other duties include planting seedlings, surveying birds and proposing guidelines for their preservation, as well as the establishment of the Environmental Commitment Terms (Termos de Compromisso Ambiental - TCAs) for the maintenance and management of parks.

Carried out by SVMA, the 100 Parks Program (Programa 100 Parques) was implemented in 2008 and aimed at creating a set of types of open spaces that meet landscape, ecological-environmental, leisure and sociability needs, according to Arch. Luciana Takaesu. This included the Linear Parks Program. Some of the goals of the 100 Parks Program were providing a database of public land and starting a plan to adapt to the new climate change scenario. Top priority for parks implementation would be given to the edges of the Serra da Cantareira, Billings and Guarapiranga Reservoirs, and the headwaters of the Aricanduva River.

The process began by identifying strategic Linear Parks projects and water-producing areas; this was accomplished through the signing of an agreement with SABESP and through the creation of Green Areas Systems that would enable the consolidation of ecological corridors. Other areas for park implementation considered existing public vacant land and environmental significant structures such as water sources and valley floors, mainly concentrated on the north and south portions of the city.

The program was made financially feasible through private resources from TCAs used directly by entrepreneurs in park projects or works; through the Urban Development Fund (Fundurb) through the purchase of additional construction potential; through the Special Fund for the Environment and Sustainable Development (FEMA) through the auction of carbon credits; through the Municipal Treasury provided for in the budget; through cooperation with SABESP, which conducts the Clean Stream Program (Programa Córrego Limpo) in partnership with the municipality; and through company donations in exchange for the valuation of their surroundings (São Paulo, 2008).

The Clean Stream Program, a partnership between SABESP and the Municipality of São Paulo, started in 2007 and seeks to expand sewage collection and treatment in the municipality's river and stream basins. By 2012, there were 139 streams that had been depolluted throughout every region of the city. The depollution of waters is a prerequisite for appropriation of the linear parks, favoring the use along its banks.

São Paulo was characterized by heavy occupation of the floodplains during the industrialization of the city in the early 20th century, and many of its rivers and streams were channeled from this period forward. Even if they are not fully enclosed, at least the creation of troughs and the rectification of large parts of their beds are verified, and such practices were associated—until recently—with economic and urban development.

Different state regulatory agencies, such as the Department of Water and Sewerage of the State of São Paulo (Departamento de Águas e Esgotos do Estado de São Paulo - DAEE) and the Environmental Sanitation Technology Company (Companhia de Tecnologia de Saneamento Ambiental - CETESB), greatly contributed to this change in attitude toward the preservation and restoration of the waterways, allowing only for its partial channeling when strictly

necessary and strongly suggesting the "natural" use of the floodplains in order to enhance the population's perception and its access to this vital element of the urban landscape.

The linear park and its implementation processes

For the purposes of this article, we will consider a linear park to be a type of open space somehow associated with a water system, i.e., tracks adjacent to waterways and natural or artificial reservoirs. Its main goals include protecting or restoring the ecosystems along these bodies of water; connecting green areas and open spaces; controlling floods, and providing adequate open spaces for leisure, either in the entire area or just one part of it ³¹³.

A linear park is composed of the: Core Area: the Permanent Preservation Areas (APP); Buffer zone: transitional space between the Core Area and the Equipped Zone; Equipped Zone: areas created for social, entertainment and recreation purposes (LABHAB/SVMA, 2006).

Compliance with the APP legislation regarding conservation belts varies according to the degree of urban consolidation in the surrounding area, which creates conflicts between the segments involved.

Unlike the names provided in the Zoning Law, the SVMA (São Paulo, 2010) classifies municipal parks into: Traditional urban parks: parks with areas of biodiversity, leisure, culture; Linear parks: focus on sanitation, fighting floods, reurbanization and leisure; Natural parks: focus on protecting biodiversity.

The Urbanization of Slums, Clean Stream, and 100 Parks programs, all of which were implemented in an integrated and simultaneous manner as of 2008 – as well as the Watersheds Program – involve different municipal and state agencies, as already mentioned, and have resulted in the implementation of numerous linear parks, although not all of them are recognized as such ³¹⁴.

At the municipal level, there is some discrepancy in the classification of linear parks. Many are defined as such since their origin: this is the case of Linear Sapé (West Zone), Linear Aricanduva and Tiquatira (East Zone), Linear Fogo (North Zone), and Linear Parelheiros (South Zone). Others like Cantinho do Céu (South Zone) and Consciência Negra (East Zone) are not officially categorized as linear in the SVMA Guide (2014), but are recognized as such. On the other hand, the Praia São Paulo and Prainha (South Zone) parks, although located on the edge of the reservoir, are not considered linear.

We can also highlight that linear parks that originated from housing programs implemented by SEHAB were not even classified as parks until their transfer to the SVMA (Figure 1), though many of them had the necessary traits.

³¹³ We emphasize the frequent use of the term 'green areas' in urban and Brazilian environmental legislation in order to refer to urban public open spaces such as squares and parks. We understand that green areas could be a category contained in the open spaces in general. The 'green areas' term carries the connotation of vegetated and permeable spaces, while 'open space' considers all the 'non-built spaces', and conveys the broader idea of diversity of appropriations and forms of architectural and landscape treatment.

Other authors consider linear parks to be structures in which the determining factor is its length, regardless of any association with bodies of water; these include, for example, a park installed on an old railway, such as the High Line in New York, or Promenade Plantée in Paris; the Rose Kennedy Greenway in Boston; or the Parque Metropolitano de Manguinhos in Rio de Janeiro.

The Municipal Housing Plan (Plano Municipal de Habitação de São Paulo) created in the Serra-Kassab administrations, between 2006 and 2009, established long-term goals by the year 2024, and is considered a turning point for São Paulo's housing issues, as previously the sole function was to provide housing units with no broad urban intention. Enhancing the quality of technical projects (architecture, urbanism, engineering), the Plan started with a universal approach, with a key partnership between SEHAB and SVMA, and the decisive definition of sub-basins as the unit of intervention of the integrated program and project actions.

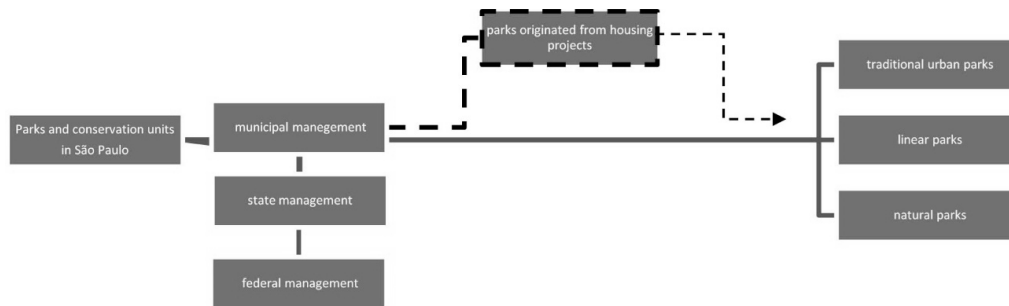


Figure 1. Diagram of parks and conservation units in the municipality of São Paulo, as found in the SVMA 2014 Guide.

Among all of the projects executed by the programs, one can verify the existence of linear parks along: waterways enclosed by avenues, with an emphasis on the roadways system; waterways in conjunction with large urbanistic interventions; reservoir banks.

For the purposes of this newly begun research project, we selected two emblematic projects as case studies due to their physical dimensions, complexity of biophysical support, number of residents, and precarious infrastructure in regards to social, cultural, economic and environmental aspects, which allowed for the development of differentiated proposals, both technically and in terms of landscape.

Vargem Grande design project

The project began in 2010 along with operations involving basic sanitation, energy and paving infrastructure. As an area permanently under the threat of occupations, the project turned as an integrated action that involved SEHAB and SVMA, still under construction. Included in the Watersheds Program due to its proximity to the Billings Reservoir, and within the limits of the Capivari-Monos Environmental Preservation Area (Área de Preservação Ambiental - APA) that, together with the APA Bororé-Colônia, it occupies a significant portion of protected land in the south end of the city. Another striking feature is its location on the Cratera de Colônia, a crater approximately 3.6 kilometers in diameter and that ranges in depth from 380 and 450 m, created by the impact of a falling meteor over 30 million years ago.

As for geomorphologic aspects, the crater has a relatively uneven topography surrounding the circular structure that stands out across hills and hillocks in the shape of a ring. The plain's dimensions vary from 820 m to 750 m tall (Figure 2).

It is characterized by the presence of some remnant springs and patches of natural drainage, and others altered by urbanization. The presence of significant fragments of the original vegetation can be seen in scattered parts of the region. Problems include flooding in lots and buildings, buildings with pathologies due to old infiltration, soil erosion, disruption of slopes, etc.

Located in the region of Colônia-Parelheiros, the place is home to 40,000 low-income residents, and it has been agreed upon, together with the Public Prosecutor's Office, that these residents will be allowed to remain there without increasing the settlement, in order to restore the environmental constitution of the watershed and facilitate the reconstitution of the local fauna and flora (Figures 3 to 6).

The loan for the project was made by The World Bank to SABESP, which is responsible for the management of reservoirs and other bodies of water in the State of São Paulo. This joint action between different agencies and spheres of government has allowed the development of large projects in São Paulo, with effective analyses of the complex environmental and social issues in a city where 3 million of its population live in precarious settlements.



Figure 2. Vargem Grande neighborhood, District of Parelheiros, São Paulo. (Source: Google).



Figure 3. Aerial View of Vargem Grande. (Source: Levisky Arquitetos Associated).



Figure 4. Aerial View of Vargem Grande. (Source: Levisky Arquitetos Associated).



Figure 5. Aerial View of Vargem Grande. (Source: Levisky Arquitetos Associated).



Figure 6. Aerial View of Vargem Grande. (Source: Levisky Arquitetos Associated).

The land regularization of Vargem Grande has not yet occurred since its purchase by the Union of Slums of Grajaú (União das Favelas do Grajaú - Unifag) in the early 1990s. This further complicates the area's urban evolution.

The intervention aimed to create urban and landscape projects in order to implement basic urban infrastructure networks (water supply and drainage, street lighting, sewage and road paving), plant trees along streets, create equipped and landscaped open spaces, and restore the vegetation in specific areas, especially those bordering the small streams that cross the region (Figure 7). With the street layout already pre-defined, the creation of interactive pedestrian pathways with environmental and cultural information regarding the site was proposed, with the idea of creating the Open Museum of the Cratera de Colônia, doing so simultaneously with the project's other multidisciplinary procedures.

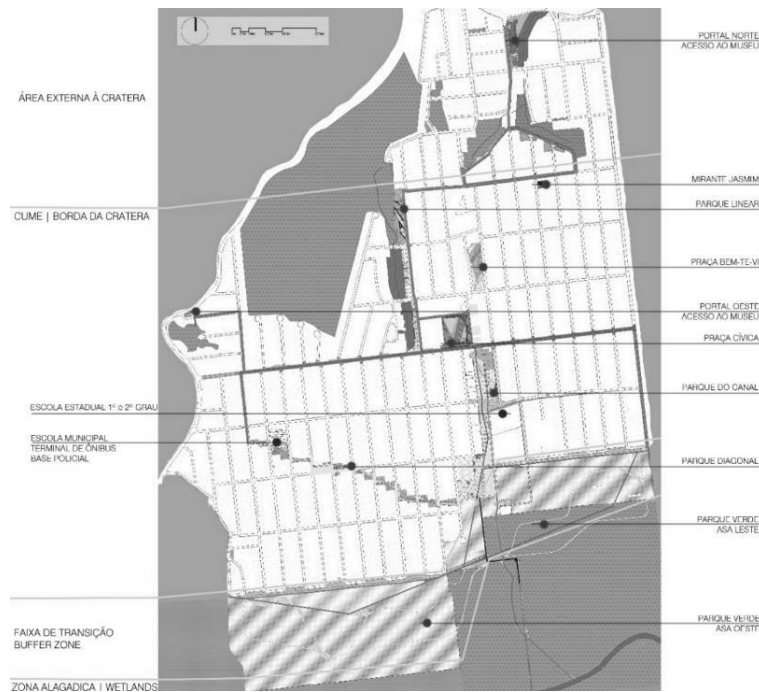


Figure 7. Open Spaces General Implementation Plan. (Source: Levisky Arquitetos Associated).

The existing roads were paved with interlocked concrete modular elements in four colors, thereby creating a directional transit system that is the same on both sidewalks and streets (Figure 8). Although the widening of some sidewalks was proposed, mainly along the roads with heavy pedestrian traffic and public transportation, the population was not receptive to that idea since it would hinder private vehicle parking. The residents' decision prevailed.



Figure 8. Treatment given to sidewalks and streets. (Source: Levisky Arquitetos Associated).

The open spaces were created after analyzing the opportunities the site provided. Vacant lots or partially occupied ones, which existed due to the presence of small intermittent streams, were connected, crossing minor roads and thus generating small and successive pocket parks within the block. In these areas were implemented playgrounds, street arborization and sitting places.

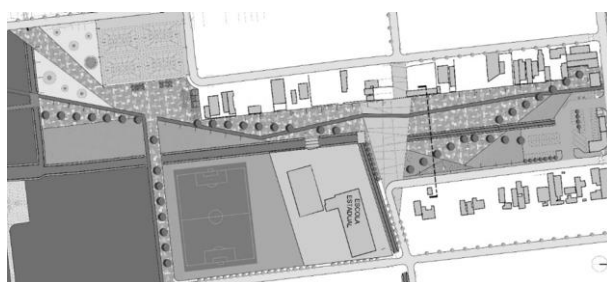


Figure 9. Canal Park General Plan. (Source: Levisky Arquitetos Associated).

The Civic Plaza was designed as a meeting place for residents; its chosen location was at a main street for walking and businesses, the Avenue of Palmeiras. It is an area crossed by two streams and endowed with many trees, native species of different sizes; a wooden high rise structure was designed to facilitate the natural drainage of the existing waters. With fitness equipment, playground and benches, and with the implementation of shrubby understory species, the area turned into the site's geographic and emotional core.

Four linear parks were able to be created. The Canal Park, of a more anthropogenic nature, is an effort to recover the area's most expressive body of water (Figures 9 to 11). Located beside the state school and already near the existing Atlantic Forest's area of conservation, it had its bed channeled, but left open, and its sides lined with concrete plates with openings for planting aquatic species. There are sports courts, skating rink, pergolas and benches for leisure, a playground, and more sophisticated plantings.

The other parks, established due to the need to ensure the integrity of the bodies of water located therein, have a more contemplative character with partially equipped transition areas (buffer-zones) and bush tracks, creating the connection between lots and the preserved area

itself. Regarding the preserved areas, a concept of ecological succession was adopted to ensure biodiversity and to attract fauna. Therefore, it was implemented bicycle paths and two observations decks to contemplate the scenic views (Figure 12).



Figure 10. Canal Park General View and Channelization Details. (Source: Levisky Arquitetos Associados).



.Figure 11. Canal Park General View and Channelization Details. (Source: Levisky Arquitetos Associados).



Figure 12. Observation Deck General View, at Jasmim Street. (Source: Levisky Arquitetos Associados).

Cantinho do Céu Design Project

Located on the shores of the Billings Reservoir which, together with the Guarapiranga Reservoir, holds a third of São Paulo's water supply, the Cantinho do Céu district is characterized by the extremely poor conditions of its urban infrastructure, not presenting a reasonable urban setting (Figure 13).

Part of the Watersheds Program, the Cantinho do Céu design project was developed with the participation of the Public Prosecutor's office, setting parameters that allowed keeping the majority of the population on-site, only relocating residents who were in areas of geotechnical risk. An urban project was then prepared that endows the area with a complete basic

infrastructure and a system of open spaces that meets the needs of the different segments of the population, contributing to urban drainage and protecting the area's bodies of water. New strategies were also considered that would harmonize the area's significant occupancy (more than 10,000 families) with the environmental legislation.



Figure 13. Cantinho do Céu General View. (Source: projotomehor.blogspot.com).

The intervention is the result of changes in the positions of government agencies at the municipal and state levels in an effort to face the current reality of occupation in the Watersheds regions as from the late 1990s. New indexes of vegetation and population density for social interest works were determined, fostering the development of urban and landscape projects with an emphasis on the creation of parks and other public open spaces. Integration with neighboring municipalities, such as Diadema and São Bernardo, led to the discussion of similar problems and a search for parameters for action, later carried out for the benefit of the communities involved.

The urban proposal is based on the concept of integrating new interventions with the pre-existing urban tissue, respecting the specificities of the settlement, working to improve accessibility and mobility conditions with ramps, stairs and new routes, and improving their connection to the existing roads and surroundings. Drainage solutions and the use of different paving materials according to road type were adopted, and resident removal occurred mainly in areas of proven risk, as well as in areas that prohibited access to sanitation and energy networks.

Concurrently with the implementation of basic urban infrastructure in the neighborhood, open public spaces were given great prominence, seeking to take advantage of the clear attributes of an exceptional landscape, one that is very different from the physical and spatial characteristics usually found in the city of São Paulo (Figure 14).

Despite the fragility of the environment and the large dimensions of the settlement, the proximity to such a large body of water makes Cantinho do Céu a naturally conducive environment for the creation of plazas, decks, pathways, and for generating local living and an enjoyment of nature, leading to socializing, recreation and leisure activities for different age groups with varied interests. The contrast between the rugged landscape, almost completely occupied with precarious, similar buildings, and the surroundings that have such a strong presence of vegetation and water, proves to be the trump card of this site, providing it with the resources for its own requalification.

Different sized spaces, equipped with street furniture, bleachers, stages, partially covered areas for holding meetings and discussions, open areas for small cultural fairs, fitness equipment, playgrounds, skating rinks, and courts provide areas for the different activities that are offered to the users for the development not only of everyday activities, but also for events that require larger areas (Figure 15).

The proposed Linear Park is about 7 km long (not yet implemented in its entirety) and borders the Billings Reservoir; on the other side it features an alignment of the walls and buildings that remained after the at-risk units had been removed. In the streets perpendicular to the track, subtle barriers preventing the entry of vehicles were implemented, allowing pedestrian access through small squares. The park is designed as a transitional region between the reservoir and the living area, and has its playful characteristics strengthened by the strong visual impact

of the chromatic panel applied on the buildings' gables and walls, which helped integrate the park with the built area.



Figure 14. Cantinho do Céu Leisure and Recreational Areas. (Source: Fany Galender).



Figure 15. Cantinho do Céu Leisure and Recreational Areas. (Source: Fany Galender).

The suppression of vegetation, native or not, in squatter settlements and slums, along with their extremely dense occupation and soil sealing is recurrent, and generally prevents significant afforestation. This is also the case for Cantinho do Céu. However, thanks to the possibility of gaining some ground on the edges of the already implemented urban project, it was possible the planting of native species and the conservation of the existing ones.

The local population contributed significantly by defining the program and the occupation of the area through workshops and the work of management councils, which helped to meet local demands and contributed to the success of the project and its implementation.

Credits:

Urban, Landscape and Architecture Design: Marcos Boldarini Arquitetura e Urbanismo Ltda

Chromatic Design of Gables and Walls: Maurício Adinolfi

Conclusion

Linear parks have proven to be effective for conservation, contribute to the drainage system, provide leisure, living and recreational areas, bring rivers back into urban life, and reintegrate previously removed portions of the urban fabric.

Typically having a high urban, environmental and landscape impact, linear parks have been promoting significant changes in São Paulo's urban landscape, mainly in deprived areas that are in need of open spaces. The installation of recreational and leisure facilities and establishing them as sports areas is intended to strengthen the community aspect of many of these

interventions, and to assure the maintenance of these areas as open spaces, thus ensuring their stability and environmental restoration. In these interventions, there is also a requirement to reintroduce native Atlantic Forest species, as this is an effort to regenerate and restore forests and protect bodies of water, but to do so harmoniously with the urbanized context.

The new governmental management parameters brought about meaningful urban design projects and implementation of linear parks that have a significant role in the urban public open space system and cover a broad spectrum of functions.

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Morphologic transformations of the public spaces in the surroundings of Nova Lima's churches

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Abstract. *The present work aims at evaluating the transformations of central open public spaces in the city of Nova Lima originating from the Portuguese (1700-1884) and English (1884-1939) occupation periods focusing on morphology in different historical contexts until current times. The excessive number of improvised housings, gatherings and the reduced number of plazas and public parks necessary for public leisure were the motivation to this study, which also observes the environmental benefits within the urban perimeter of Nova Lima. This analysis will focus on open public and private spaces modifications in the central area of the municipality since the occupation started there and it also suffered Portuguese interventions and received English villages destined to mining. New landscapes appeared and triggered the search for reasons that could have contributed to the site's morphologic analysis. The places subject of investigation are located in the surroundings of Nosso Senhor do Bonfim, Nossa Senhora do Pilar and Nossa Senhora do Rosário churches including traffic lanes and existing public and private buildings. Also, occupied spaces (public and private), traffic lanes, citizens and existing natural remainings will be included in the analysis for belonging to the urban landscape. These are the elements which allow to evaluate the city's current configuration as well as its environmental quality, and that will certainly contribute to the improvement of the city's landscape and, especially, for the well-being of the population.*

Key Words: Urban morphology, open public spaces, landscape, environment quality.

Introduction

Urban forms are due to environmental changes of the place, in other words, the physical, biological and anthropogenic conditions, the latter as the main inducer of transformations. The cities and landscapes change when these conditions change and Nova Lima (Minas Gerais) is no exception to the rule. It expands increasing the conurbation process with Belo Horizonte.

The occurrence of major human concentrations and serious and constant biophysical environment degradation observed in contemporary times impose new conducts of public management and effective participation of city dwellers.

This problem is then addressed here because of its importance in the urban landscape and its morphology, as both are considered as systems and due to the complexity of its components, require specific analysis methods. Currently there is a need to introduce this issue in the city of Nova Lima, since improvised dwellings, settlements and the negligible amount of public open spaces damaged its environmental quality.

Objective

Thus, study aims to analyze the open public spaces (squares, parks, gardens and streets), surrounding the Nossa Senhora do Rosário, Nossa Senhora do Pilar and Nosso Senhor do Bonfim churches. These spaces must contribute to the urban environmental improvement with the benefits brought by permeability, urban landscape, existence of animal life and flora, microclimate maintenance, social gatherings and preservation of historic and symbolic memory.



Figure 1. Nossa Senhora do Rosário, Nossa Senhora do Pilar and Nosso Senhor do Bonfim churches.

History

The history of Nova Lima dates back to the late 17th century. The first name given to the site was Campos de Congonhas and marked the start of the spiritual life of the newborn village. With the small mining sites expansion, it became known as Congonhas Gold Mines (for the amount of gold found in the city), housing the working population.

The Nosso Senhor do Bonfim Church was practically built with the city. Its construction, in 1720, coincided with the start of mining activities, when Nova Lima was still Campos de Congonhas, and marked the beginning of the spiritual life of the rising town. Built of stone like the first houses, its altar was originally an oratory, where the image of Senhor do Bonfim was placed. Today there is a beautiful Baroque item transferred from the Nossa Senhora do Pilar church in one of its renovations. It is currently listed as a heritage building by the Nova Lima's Municipal Advisory Council of Historic Heritage and also marks the beginning of the area's occupation.

In 1748 the camp is elevated to the status of parish, and in 1836 the district is created and named Congonhas de Sabará, under the city of Sabará.

One example of the “mineiro” Baroque, the Nossa Senhora do Rosário Church was built atop one of the hills of Nova Lima, with its façade facing the sunrise. Built by slaves brought to work in mining, the works began in the first half of the 18th century and completed in about a hundred years. It is listed by Nova Lima Municipal Advisory Council of Historical and Artistic Heritage.

The Nossa Senhora do Pilar Church was built in the 18th century. It underwent some renovations, the largest of which in the early 20th century. This church stands out among the cultural and artistic values of the city for its examples of the great work of Aleijadinho. The entire set was listed by the National Historical and Artistic Heritage.

February 5, 1891 marks the city's emancipation, then called Villa Nova de Lima. Only in 1923 it was named Nova Lima and that remains today.

Methodology

The cities and their open and built areas once impacted by the dynamics of life are subject to constant morphological transformations, as stated by Alfonso Muñoz Cosme (sd): “Las ciudades y su arquitectura constituyen la memoria construida de una sociedad. En las calles y en los muros de las urbes se van acumulando los estratos del pasado, creando la obra colectiva más elocuente para expresar la historia y las transformaciones de la civilización. Pero la arquitectura

y los espacios urbanos son también el escenario del presente, que utilizamos para desarrollar nuestra vida y el espacio futuro que queremos crear, para disfrutarlo nosotros y legarlo a las generaciones venideras. Una ciudad que intente ser sólo una expresión del pasado dejará de ser una realidad urbana viva y se convertirá en un museo o en un parque temático. De esta forma una ciudad viva, una arquitectura viva, son las que reutilizan los elementos del pasado y a la vez construyen el presente e innovan el futuro. Toda ciudad y toda arquitectura han de transformarse para poder acoger las funciones actuales, para servir a la vida de hoy y así seguir siendo útil y conservarse adecuadamente.”

The urban morphology in Brazil started through studies with emphasis on economics, sociology and history. Later, the technical and formal aspects were added under Portuguese influence in the form of cities and their surroundings, and the buildings. The urban form is the result of various socioeconomic, biological, cultural and political processes occurring in time and space, which allow studies on diverse scales from buildings, neighborhoods, public parks and towns to the metropolitan area (Pereira Costa, 2004).

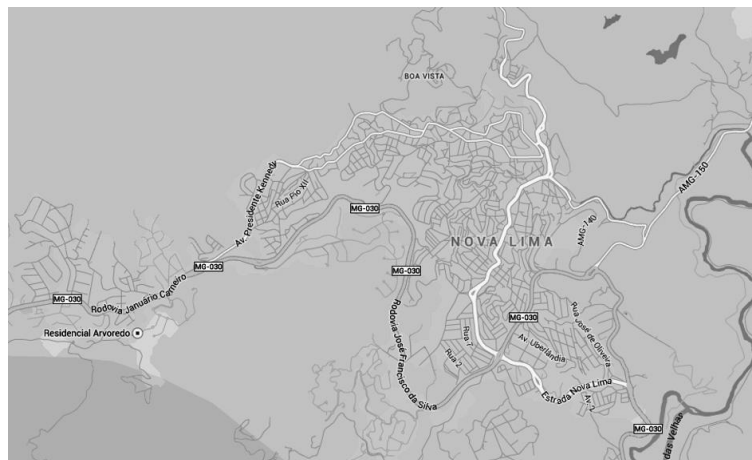


Figure 2. Map of Nova Lima.

In these new villages, "the streets were adapted to the more favorable topographical conditions, and tended to organize themselves as links between the points of greatest importance in the lives of these nuclei, with no intention of geometric ordering" (Reis Filho, 1968). According to Vasconcellos (1981), this is one of the features that distinguish the resulting occupations of mining activity falling on areas of improper topography and microclimate and sterile soil, motivated by the proximity of the mines - the case of Nova Lima.

Morphological analysis by Moudon (1997) is based on three principles: i) urban form is defined by three fundamental physical elements: buildings and their related open spaces, plots or lots, and streets; ii) urban form can be understood at different levels of resolution. Commonly, four are recognized, corresponding to the building/lot, the street/block, the city, and the region; iii) urban form can only be understood historically since the elements of which it is comprised undergo continuous transformation and replacement.

The public open spaces in the historic center of Nova Lima originate from the period of Portuguese (1700-1884) and later English (1884-1939) occupations.

The morphological changes occurring in the surrounding of the Churches of Nosso Senhor do Bonfim, Nossa Senhora do Pilar and Nossa Senhora do Rosário will be verified. Morphological analysis of the urban form will be based on the principles by Moudon (1997) of historical understanding, region scale and, as fundamental elements, buildings and their related open public spaces.

This means that open public spaces around these churches will be considered as the occupation began in the regions in which they are located and they also endured transformations, substitutions and interventions.

Analysis and results

Historical Understanding

Churches and religious orders played an important part in structuring Brazilian colonial towns, sometimes being the deployment of chapels in the origin of villages and towns, usually constituting the focus of polarizing urban growth.

In Brazilian culture, catholic churches are considered public spaces. “The correspondence between religious architecture and social organization in Minas is important for the understanding of this architecture, as well as of fundamental importance for the reconstruction of social development outlined by it.” (Vasconcellos, 1960)

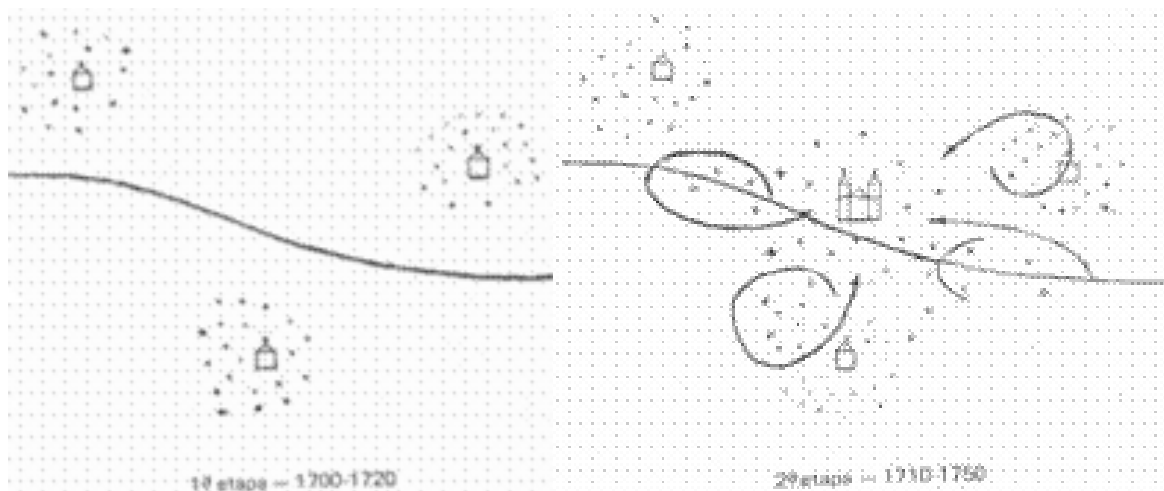


Figure 3. Draft of urban development from churches. Source: Vasconcellos (1960).

Thus, the square appears as a central element in the urban area, located in the center of the village and being the operative element of the city plan. The layout of the streets and the urban structure were defined by it.

In the case of Nova Lima, the Legislative Palace, "Dr. Sebastião Dias Fabiano", functioned as a public jail until the emancipation of the municipality in 1891. From that date on it was divided into two parts: one for the City Council and one for the jail. In 1916 the City Council passed through its first major renovation. At the same time the municipal park was built besides church Nossa Senhora do Pilar, today named Piazza Bernardino de Lima. This park was then known as the Garden Square, housing major public events.

In 1948, with the first democratic elections held in the country, the City Council went to the headquarters of Villa Nova, where the Water Park is located today. In 1980, the City Council returned to its old facilities. In 1981, it underwent another renovation, something that disfigured its façade's characteristics.

In 1998, the City Council building was fully restored and enlarged with the support of the City Hall, being officially named Dr. Sebastian Fabiano Dias.



Figure 4. City Council building in 1981 and 1998.

Understanding the scale: region

The area of the territorial unit of Nova Lima is 429.164 km². The 2010 Census assessed a population of 80,998 inhabitants and an estimated 2013 population of 87,391 inhabitants.

The city borders Sabará and Belo Horizonte up North; Itabirito down South; Raposos to the East; Brumadinho to the West; Rio Acima to the Southeast.



Figure 5. Map of Nova Lima's neighbour cities.

The city's population density is 188.73 inhabitants/km² and the Municipal Human Development Index (IDH) – longevity, education and income – calculated in 1991 was 0.523 and in 2010, 0.813.

The featured biome is Mata Atlântica and Cerrado. The Calçada Mountain, which frames the city, is one of the most beautiful postcards of the metropolitan region of Belo Horizonte, but it is threatened by the housing boom and mining activities.

Belo Horizonte has expanded towards Nova Lima (conurbation), forming several new occupation points, morphologically differentiated from its historic headquarters.



Figure 6. Conurbation of Belo Horizonte towards Nova Lima.



Figure 7. Belo Horizonte's occupation advance in Northwest Nova Lima.

Interestingly, the great fragmentation in the occupation of the studied subject city is due to the implementation of dozens of private real states along the major access roads (BR 040, MG 30, Inconfidentes Highway).

The topographical characteristics of the municipality also hindered greater cohesion between occupations and hence the historic core became isolated.

It should be remembered that the mining activity persists, leading the host city to host the mining workers, becoming essentially a "dormitory town".

Moreover, the increase in middle and high class residences in private real state properties substantially increased the demand for workers in the services sector. These events resulted in a disordered population growth in the host city with visible contrast in the urban setting and consequent socio-economic and cultural problems.

Understanding the form: buildings and their relationship to public spaces

In terms of public open spaces of the urban core of the city, specifically those of colonial origin, the focus of this study, some analysis must be made.

In the colonial period the public open spaces of Nova Lima were basically the piazzas and patios alongside the three churches built at that time.



Figure 13. Nossa Senhora do Rosário Church.

Among them, the Nossa Senhora do Pilar Church is the most imposing. It is located in the Bernardino de Lima Square, the center of the first area occupied in the municipality between 1700-1884. The Piazza Bernardino de Lima is the most important square of the city, if not the only one. It lies before the church's main façade and features the classic French style with its area spreading for almost twice the area occupied by the church.

The Bernardino de Lima Square is the most important square of the city. It lies before the church's main façade and features the classic French style with its area spreading for almost twice the area occupied by the church.

There are some commercial spots, services, residences, the Municipal Theatre, the City Hall and the City Council in the square surroundings. It is intensively used by inhabitants.



Figure 14. Piazza Bernardino de Lima.



Figure 15. Nossa Senhora do Pilar Church.



Figure 16. Nossa Senhora do Pilar Church and Bernardino de Lima Square.

The Nossa Senhor do Bonfim Church is the smallest between the three churches. The only existing open public space is a paved road that surrounds it, turning the church into its own roundabout. There is little vegetation and mostly in large pots within the space inside the railings that surround it. The space found on the left of the church also serves the State School Deniz Vale.



Figure 17. Nossô Senhor do Bonfim Church.



Figure 18. Nossa Senhor do Bonfim Church.

Day by day, cities are losing their public open spaces, their meeting places where people share their everyday life. The lack of investment in the creation and maintenance of public open spaces contributes thus to the decrease in public life. “Free spaces are the spaces of greater accessibility, greater capacity to receive diversity, plurality and the unexpected, features of a richer public sphere.” (Queiroga, 2011).

These changes take place because of the very dynamics of society when facing city growth, and the consequent increase in new buildings and vehicles, for which there is also growing demand for space. The decrease of open public space in the city or the change in their use is thus understandable.

Such characteristic allows us to assume that these open spaces were not designed with the goal of social agglomeration, in other words, they do not present the attributes of places intended for public interaction; they are places of transit or short stay, near commercial and services centers.

Thus, regardless of the physical or social changes of the currently existing public open spaces in Nova Lima, what can be said is that their occurrence is due more to the Portuguese influences, whereas the British had no significant interference to the local population in these terms. The development of the city as well as the emergence of these open spaces for social interaction occurred spontaneously.

Conclusion

Urban guidelines in mid 1750 advocated the existence of a large square in the camp, regular in form, where the City Council and Jail would be built and also the main church, usually devoted to the local patron saint, so that it could be raised to a village. The main square of Nova Lima was then implemented in the late 18th century, according to the formalization of Portuguese resolutions of the period.

With the end of alluvial gold, in the middle of the 18th century, the extractive activities went to the mines. Nova Lima went through changes in its urban conformation due to the development of new ways of occupying space and the first perimeter of the metropolitan area of Belo Horizonte was delimited in 1973, with the inclusion of the municipality. The conurbation with neighbour cities to the capital started.

It is believed that the process that occurred over time throughout the city of Nova Lima set the current conditions of these open public spaces, having acquired its own characteristics such as discontinuities, reduced dimensions and ambiances. Informally generated or not, these spaces followed the dynamics of biophysical and socio-cultural transformations of the city itself.

By analyzing the existing spaces around the churches, the conclusion is that there is no contribution of these spaces in urban environmental improvement because they are rare and impermeabilized, rendering biodiversity impossible to occur. However socialization and preservation of historic and symbolic memory still remains at Nossa Senhora do Pilar Church.

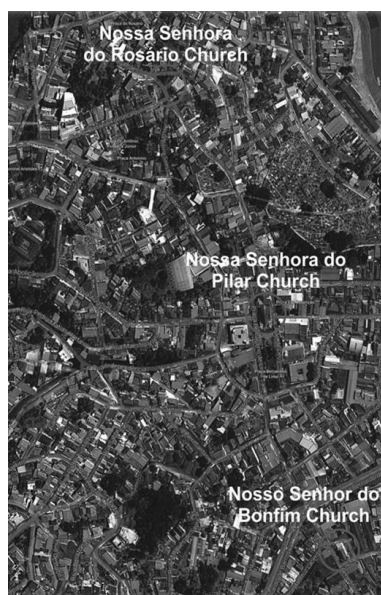


Figure 19. Map of the city's central agglomeration with the location of the three churches.

The decay of gold extraction began already in 1987, with today's prevalence of iron ore exploration, and the metropolitan expansion with the occupation of the edges of cities with private real estate properties and commercial and services areas.

It is believed that the process that occurred over time throughout the municipality of Nova Lima set the current conditions of these free spaces in the public realm, having acquired its own characteristics such as discontinuities, reduced dimensions and ambiances. Informally generated or not, these spaces followed the dynamics of biophysical and socio-cultural transformations of the city itself.

By analyzing open free spaces of public property (squares, parks, gardens and patios existing in the historical city perimeter the municipality of Nova Lima, it was found that there is no contribution of these spaces in urban environmental improvement because they are rare and

impermeabilized, rendering biodiversity impossible to occur. However socialization and preservation of historic and symbolic memory still remains at Church Nossa Senhora do Pilar.

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ISBN: 978-972-99101-6-6

Oliveira V, Pinho P, Batista L, Patatas T and Monteiro C (eds.) (2014)
Our common future in Urban Morphology, FEUP, Porto.