Ain Shams University

Faculty of Engineering

Department of Urban Planning

Spatial and Socio-economic Factors: Mutual Implications in informal Areas

A Thesis submitted in partial fulfillment of the requirements of the degree of

Doctor of Philosophy in Architectural Engineering (Urban Planning)

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Statement

This thesis is submitted as a partial fulfillment of Doctor of Philosophy in Architectural Engineering Engineering, Faculty of Engineering, Ain shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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Thesis Summary

This thesis seeks to prove how socio-economic factors are very dependent on spatial variables. Cairo, a fragmented city where rich and poor people live side by side, is chosen as a case study to test out various interdisciplinary approaches and theories.

Guided by literature on relationships of societal and spatial factors the research develops a 'comprehensive approach' derived from *Space Syntax* theory, to investigate the mutual relations of the spatial layout of built environment and socio-economic aspects at both a city and a settlement levels. Four methodological procedures (space syntax, observation, questionnaire, document analysis) are employed to fill in the items of the developed framework. After reviewing different insights on physical and social issues, a methodology chapter is introduced to elaborate the elected research methods.

The empirical part of this thesis consists of three chapters, first of which investigates the implications of the spatial configuration of the street network on the socio-economic profile in various neighborhoods in Cairo metropolitan area. Second of which extends the findings of the previous chapter through investigating the correlation between spatial factors and the distribution of internal and edge commercial land use. Furthermore, the relationship between spatial parameters and pedestrian movement pattern is examined in this chapter. Third of which incorporates the results of the previous chapters in the interpretation phase, questionnaire. That is to understand issues related to demographic profile, belongingness, places of interaction and safety, as well as revealing the correspondence between physical and social segregation. The cases used here are three informal areas in Cairo: Ezbet Bekhit, Ezbet Al-Nasr and Abu Qatada. The first two areas are located on State owned desert land close to the city center, while the third area is located on private agricultural land illegally built on the fringe

of the city. Informal settlements are chosen because they are self-grown and not influenced by plans or land use regulations.

The findings at a city level showed that social factors are significantly correlated with the spatial structure of the street network on city-wide scales. Zooming in, disadvantaged areas display a strong internal spatial structure, while at the same time lacking external links to the surrounding areas and the whole city. On the other hand, the findings at a settlement level showed that the distribution of commercial activities takes place on plots that are located along the spatially most integrated parts of the neighborhoods in relation to the whole city. Furthermore, syntactic variables were related significantly to pedestrian movement flow. Besides, the results of questionnaires demonstrated that informal settlements have territorial preference, and are generally socially excluded. Seemingly, this complements the results of previous chapters.

Taken all together, urban and social segregation are closely related. Seemingly, spatial segregation makes the framework for aggravating social segregation. Therefore, improving the spatial integration should also stimulate social as well as economic integration.

The current planning practice in Cairo, however, contributes to create the spatial conditions for aggravating the social segregation processes between various social groups. Studying the forces which produce these poor spatial conditions would invariably help reverse the vicious cycle of urban decline apparent in the city. There is also a challenge to implement the use of space syntax analyses in strategic urban planning in Cairo. Nonetheless, improving connectivity is likely to generate new movement patterns that will draw in new economies, stimulate investment and so stimulate the "virtuous cycle" of regeneration.

Keywords: social segregation, spatial segregation, space syntax, informal areas

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TABLE OF CONTENTS

Chapter Six: **Measuring Social Ties inside Local Areas**

PART THREE Conclusions and Directions for Future Research

Chapter Seven: **Discussion and Conclusions**

APPEDNICES

List of Figures

VI

VIII

List of Tables

1 INTRODUCTION

Chapter One

Introduction

1.1 INTRODUCTION

Cairo, one of the most densely populated cities in both Africa and Middle East, is a primary example of a polycentric urban region with shortcomings in socioeconomic aspects. The rapid urbanization of this metropolitan region resulted in a fragmented urban structure that can be seen as a series of small islands isolated from one another by strong physical barriers. Walls, highways, flyovers, military sites, abandoned waterfronts, parking lots and vacant lands all contribute to a city that is characterized by a fundamental lack of cohesion. What is more, there is no public realm that accommodates different communities. Rather, each social group is confined to a separate enclave.

The chronic lack of affordable housing has forced rural immigrants and newcomers to cluster in less desirable locations. Informal settlements dominate mode of urbanization in the Greater Cairo Region (GCR). It occurs usually on the outskirts of the urban mass, on privately-owned ex-agriculture land, rather than on desert land. It is estimated that more than 65% of the region's population inhabits these areas. So far, the encroachment on agriculture lands around Cairo increases in spite of the government efforts to limit this unplanned growth (GTZ, 2009).

The phenomenon of informal settlements began in GCR after the Second World War as a result of migration from rural areas in the Delta and Upper Egypt to Cairo. Migrants were looking for better job opportunities, where salaries were higher than in other Egyptian cities, after the launch of Industrialization Policy by the president, Gamal Abdel Nasser. Most of the migrants were young men with simple needs which helped them to share

rented flats or rooms in the historic districts. After saving some money, some migrants were able to buy and build upon lands located in the outskirts of the city where land prices were cheaper than the central districts. In parallel, the phenomenon of scattering state-owned land began to emerge in the peripheral eastern part of Cairo— such as Mansheit Nasser (GTZ, 2009).

The first phase of urban expansion on agriculture lands began during the 1960s in the western (Boulaq El Dakrour, Munira, Waraq al-Arab) and northern (Shubra al-kheima, Matariya) parts of the city. Farmers were persuaded to sell their lands, as investment in building projects was more lucrative than the revenues from farming. Rapidly, the villages surrounding Cairo were engulfed by the urban fabric of the city as a result of increased urbanization from the villages and the city itself (GTZ, 2009).

Problems of social segregation, weak transportation network, and lack of mixed uses emerge vividly in old inner region's locations and need to be the focus of an intensified research effort.
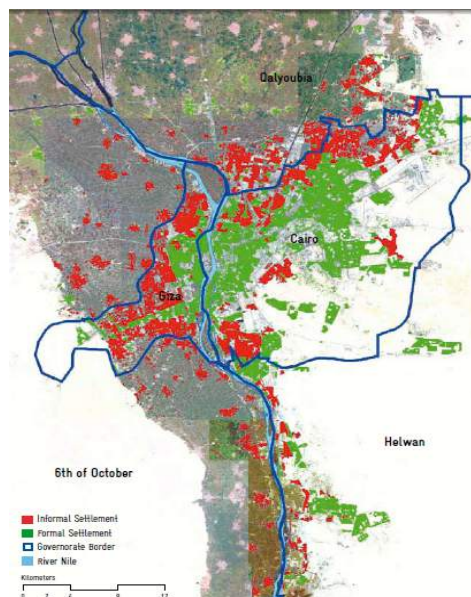
Figure1.1. Informal settlements in GRC: they look like a belt of poverty surrounding GCR (source: GTZ, 2009).

1.2 THE PROBLEM

Cairo, a megacity, has experienced rapid urbanization with a fragmented[1] development process in the last century producing a mosaic like structure of smaller sub-cities. Such sub-cities are significantly different in socioeconomic and cultural aspects and of course in urban patterns (Mekawy& Yousry, 2012; Elisa & Michele, 2013). For instance, several dichotomies can be recorded: formal and informal (planned and unplanned), legal and illegal, rural and urban, affluent and deprived, and segregated and integrated. Even there is a great deal of diversity within each category of the previous. For example, formal parts include developments planned in contemporary and colonial epochs and in previous periods. Similarly, the informal city includes settlements built on former agricultural land and those established on state-owned desert land. Furthermore, a third type of informality can be observed in the so-called City of the Dead, which is illegally populated. Likewise, segregated clusters could be gated communities on one side, or ghettoized settlements on the other side (Mekawy& Yousry, 2012). This kind of patchy and divided metropolis is, generally, inharmonic, rather than a collage of a meaningful work (Ibid). It only reflects inequalities and segmentation, and imposes a challenge upon future urban development policies and strategies.

The problem is as follows: <u>Although located in strategic and key economic locations, in terms of land value and proximity to the urban core as well as transportation hub, many informal areas in Cairo show signs of social pathologies and slum like conditions. The people living there have poor socioeconomic conditions and did not get a significant benefit from their</u>

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[1] Urban fragmentation here refers to the haphazard or disordered process of development that detaches different pieces of the city producing a mosaic without a remarkable centrality (Deffner and Hoerning, 2011).

vital locations in the long run (see figure 1.2). This of course needs a closer look in order to investigate the way in which the spatial variables are affecting the process. The main premises of this research is that there is a linear relationship between the socioeconomic segregation of a settlement, as a dependent variable, and its overall spatial configuration, as an independent factor. To investigate that relationship, this thesis combines GIS socio-economic data with the latest measures of the Space Syntax method. Within the context of this research, socioeconomic segregation is defined as the Deprivation Index that is composed of five socioeconomic attributes (life expectancy rate, illiteracy rate, unemployment rate, % of people beneath the poverty line, and gap in living standards) (see UNDP Egypt, 2005). Segregation here also refers to the process in which certain social groups are isolated from social systems with regard to rights, resources, relationships and capabilities (Popay et al, 2008).

Figure 1.2: The Deprivation Index[2] in Cairo showing that many deprived areas are located in strategic locations within the city (according to UNDP Egypt, 2008).

The informal settlements of GCR offer a good example to study the physical and socioeconomic implications of the urban fabric of neighborhoods. Over the past 5 decades, the rapid urbanization on the outskirts around the urban mass of GCR engulfed adjacent villages and produced a vast urban periphery of informal areas where remarkable differences in physical and social conditions can be easily observed between planned and unplanned parts.

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[2] This indicator was built as follows (UNDP Egypt, 2005; 2008; UNDP, 2010):

DI = [1/5 (P1^3 + P2^3 + P3^3 + P4^3 + P5^3)]$^{1/3}$

Where:

P1 = Probability at birth of no surviving to age 60

P2 = Adults lacking functional literacy skills

P3 = Rate of long-term unemployment

P4 = Population below income poverty line

P5 = Gap in living standards

The Egyptian government has attempted to discourage informal housing by denying infrastructure to those who do not have building permits or otherwise cannot demonstrate a building's legality. Meanwhile, there have been several proposals designed with donor support to solve the issue of informal settlements. Nevertheless, such efforts were disappointing (Sims, 2009). Finally, the state decided to formalize a number of informal settlements like Manshiet Nasser adopting participatory approach. This initiative officially started in July 1998 and was encouraged and financed by the German Federal Ministry of Economic Cooperation and Development (BMZ). In effect, the Participatory Development Program (PDP) was undertaken on behalf of the German government and the Egyptian Ministry of Economic Development (MoED), KfW Entwicklungsbank (German Development Bank) and the German Technical Cooperation (GTZ) in cooperation with the Arab Republic of Egypt. GTZ aimed to improve living conditions of the inhabitants, and to foster networking among project partners, whereas KFW was appointed to finance the provision and extension of infrastructure (GTZ-PDP website). In fact the positive results of the project were a consequence of the infrastructure investment of KFW and not because of the participatory approach promoted by GTZ (Piffero, 2009). Lastly, PDP has been oriented to the identification of social, economic and some physical conditions of the pilot areas, without taking the influence of spatial and locational aspects into consideration.

There are copious studies on the quality of life in informal areas, specifically on the Egyptian PDP. Several evaluative studies on the participatory approaches in development (Botes and Van Rensburg 2000; Cooke and Kothari 2001; Cornwall 2002) and even more precisely on the PDP Program (Tag-Eldeen 2003; Piffero 2009) have identified the shortcomings of the

participatory approach. In her studies on informal settlements, Elkadi (1987) has identified several factors in provoking or impeding development process: security tenure, income, immigration, education and others. However, it seems that social variables are not all the story, as they cannot give a sufficient interpretation for the immense differences in the degree of deprivation. To illustrate, non-physical poverty factors such as insecurity of tenure might be thought to impede urban consolidation (socioeconomic and physical improvement), at least in the early stages, in poor areas due to higher chances of eviction that in turn discourage further investment (Shafiei, 2013). Nevertheless, a large size of an urban poor area contributes to high resistance against eviction through its population and turns tenure into a spatial matter (Ibid). On the other hand, not all poor areas lack secure tenure as informal areas located on private agricultural land in Greater Cairo do not host only middle class families, but low income residents as well (Piffero, 2009). This, also, left a room for postulating that spatial variables could be a key element affecting urban consolidation, which refers to the process of physical and socioeconomic self-improvement (Pacione, 2005). Put it in a nutshell, physical and spatial dimensions seem to be involved and the magnitude of their implication needs to be measured. In this sense, urban segregation is supposed to impede achieving equalities in cities. Nevertheless, physical segregation in itself does not mean good or bad, but it can be safely said that disadvantaged people are more dependent on the space than advantaged[3] and this of course emphasizes the need for well-connected locations for disadvantaged people. In other words, we need to differentiate between voluntary and involuntary segregation. Alan Penn writes:

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[3] Professor Hillier calls this the 'central paradox' of space: what is good for some groups is bad for others.

"Segregation has both positive and negative affordances. It gives privacy, however it also removes one from the 'passing trade'. This means that for the rich person who maintains their social network transpatially the affordance of privacy can be very attractive. It means that for the poor person they can afford segregated space because they will not be competing in the market for land with land uses that require passing trade and accessibility and which tend to drive land markets." [4]

This could mean (for those who depend on the space) that the most integrated areas will be the most precious, while the most segregated settlements would be the poorest in the city. Various researches of European (Vaughan, 1999), South American (Hillier et al, 2000; Greene, 2002; Rodriguez et al, 2012), and Middle Eastern cities (Karimi and Parham, 2012) prove that physical segregation could result in socioeconomic isolation. As pervious research has shown, the city's most highly spatially accessible parts will then be the most affluent quarters and the most isolated areas at a city scale will then be the most deprived ones. However, it is not clear whether the findings of previous studies can be generalized on a fragmented metropolitan city like Cairo.

1.3 RESEARCH QUESTIONS

One key question that is examined in this thesis:

• What is the relationship between the socio-economic segregation of a settlement and its overall spatial configuration?

And sub questions are:

• What are the forces that influenced the spatial development of Cairo through history? And to what extent did such forces contribute to Cairo's spatial division?

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[4] From a discussion via SPACESYNTAX@JISCMAIL.AC.UK.

- To what extent are deprived areas spatially integrated at a neighborhood as well as city level?
- Is there a link between spatial segregation and economic and social segregation?
- Is the distribution and rates of commercial activities within informal settlements mainly driven by the spatial composition of the area itself? Or is it more related to the overall structure of the city?
- To what extent do the locals assimilate into their neighborhood and the city as a whole?

1.4. HYPOTHESIS

There are two hypothesis in this research. They are as follow:

1. On a metropolitan scale, spatial segregation of the urban grid aggregates socioeconomic segregation. In other words, the socio-economic differences could be related to the spatial configuration of the built environment, especially to the settlement's assimilation in the global street and road network of the city.

2. On a neighborhood scale, high local integration on street network generates micro-economic activities for the poorest in informal areas.

1.5. OBJETIVES

The main objective of this thesis is:

- To Prove that socio-economic variables are dependent on spatial factors. Earlier scholarship and researches (Vaughan, 1999; Hillier et al, 2000; Greene, 2002) have already demonstrated strong relations between spatial variables and socioeconomic aspects using topological axial measures of Space Syntax. Differently, the research work presented here focuses on spontaneous settlements in Cairo to examine whether the

findings of previous researches can be generalized in a fragmented city such as Cairo. Additionally, this research combines GIS data with the latest development of the Space Syntax method. This seems to achieve better results than previous research. The goal is to improve the understanding of the deferential socio-economic aspects undergone by the informal settlements in Cairo by incorporating spatial variables into the socio-economic analysis. The research aims at building up a comprehensive approach through combining various approaches and theories from various disciplines.

1.6. SCOPE and LIMITATIONS

In order to achieve an understanding of the socio-spatial process, socio-spatial relationships should be examined at various scale levels from macro (city-wide) to micro (dwelling) scales (van Nes and Lopez, 2007). That is to understand part-whole relations or how the main road network (foreground network) interact with the local small streets and alleyways (the background network). The expected results will reveal how space and society function against each other and whether spatial segregation could lead to economic marginalization and social exclusion. Expressed differently, the idea is not just to study the spatial location (distribution in an urban system) of impoverished areas, but rather to analyze their spatial relationships. That is to focus on distribution *of space* (spatial configuration) and *through* space (people and activities) (Legeby, 2010).

In order to understand the socio-spatial differences between places (at a city level), the spatial configuration and the social variables of the Cairo metropolitan area will be analyzed. Furthermore, three Egyptian informal settlements, Ezbet Bekhit and Ezbet Al-Nasr in Cairo and Abu Qatada in

Giza, will be studied in detail in order to reveal socio-spatial differences within places. The selected cases represent two main typologies of informal housing in the Greater Cairo Region (GCR) - informal settlements on agriculture land (Abu Qatada) and informal ones on desert land (Ezbet Bekhit and Ezbet Al-Nasr). Scaling down the micro level to only three neighborhoods will be manageable and will shed light on the embedded strength of spatial accessibility. The pattern and ratio of commercial activities will be compared to a planned neighborhood, Al-Sharekat, in Cairo. Furthermore, the results from questionnaires conducted on planned districts in Cairo would be used as benchmarks or control variables to be compared with the three settlements.

Importantly, the concept "space" used in this thesis is the real physical urban space rather than a virtual environment. This physical space of the built environment can be represented as a set of axial lines. The Space Syntax method is able to analyse the spatial configuration between the axial lines. The recent versions of the Space Syntax software makes it possible to aggregate the spatial configuration of whole large metropolitan areas. On the other hand, financial limitation was a major challenge in this research. This limitation constrained employing a whole team for conducting the field reconnaissance work. This relatively influenced the research, but not the significance and reliability, in terms of the number of observed street segments (in chapter five) as well as a number of participants interviewed (in chapter six). The researcher had to undertake all field surveys (gate counts, urban land use, and questionnaires) individually. Lastly, snapshot analysis of human activities in the case study areas was excluded due to financial constraints and limitations on time.

1.7. WHAT IS NEW?

The international contributions of European (Vaughan, 1999) and South American (Hillier et al, 2000; Greene, 2002) researchers proved that physical segregation could lead to socioeconomic segregation. However, these researches used the old measurements of the Space Syntax method. Different from other researches, this research employs the latest measures of Space Syntax as well as GIS socioeconomic data. It also combines various interdisciplinary approaches and theories to investigate the relationship between the research variables at both a city and settlement levels. On the other hand, results of previous studies might not be generalized in a different urban context especially Cairo and the like where poor and rich people live side by side due to discontinuous urban development.

In the Egyptian realm, Amer (1990) investigated the relationship between the various dimensions of Cairo's physical environment and social aspects by tracing and analysing the urban transformations of Cairo through five decades (1947-1986). The findings revealed that the density of economic activities or "centrality component" in addition to the "socio-economic status" played a role in creating "the spatial differentiation pattern of different social groups" (Amer, 1990: 7). However, Amer's studies suffered from the lack of objective spatial descriptors that would help in drawing yet complex applicable recommendations. Moreover, Amer did not investigate how global and local structures facilitate or hinder functioning of an urban system. Specifically, Amer did not study the degree to which a slum is integrated with its surrounding urban areas.

Later, Anas et al. (2014) and Anas (2014) developed a new methodology to integrate slum areas with their surroundings. The methodology was based on urban restructuring of the street and road network using an algorithm applied on technical tools of GIS and Space Syntax. The strategy of intervention was

tested to a slum area in Fayoum city in Egypt. Yet little is known about neighborhoods' downward spiral into social malaise. So what are the primary reasons that create a slum? Also, what are the common spatial characteristics of slum areas at a metropolitan scale level? And to what extent socioeconomic and spatial variables are interlinked? All these questions are less addressed and should be the focus of an intensified research.

The research wok presented here draws together the Egyptian experience in the social study of informal settlements with the international theoretical and methodological approaches to the spatial aspect. That is to provide a holistic understanding on the relationship between urban consolidation, or self-improvement of socioeconomic aspects, and spatial dimension.

1.8. CASE STUDIES SELECTION

Greater Cairo Region (GCR) was selected for many reasons: it contains Cairo, the capital of Egypt, which reflects righteously the Egyptian life; a vivid example of a wide variety in spatial patterns; it exhibits a wide range of socioeconomic conditions; faces many challenges like rapid urbanization, dominance of private cars, underutilization of public transport and marginalization of pedestrian movement; the availability of information provided by the region comparing with other Egyptian regions.

In addition, informal settlements host about 63.6 percent of the Greater Cairo's population, which is a challenging dilemma (Sims, 2009). In order to use evidence from relatively comparable case studies, Ezbet Bekhit and Ezbet Al-Nasr in Cairo and Abu Qatada in Giza were singled out from other informal areas. The chosen examples tend to be the representative cases of the major typologies of informal housing in the GCR. Abu Qatada is built on private former agricultural land, whilst the other two cases are constructed

on desert state-owned land. Moreover, the three cases are all self-organized and relatively similar in terms of size and age. On the other hand, they are different in terms of urban pattern, location, and degree of spatial accessibility within GCR. The topography of Ezbet Bekhit is distinctive and sharp, especially at the borders (Tag-Eldeen, 2003). On the contrary, the other two areas are relatively flat. Furthermore, the relative small size of the case studies helped the research to reduce time consuming during field survey works. Finally, the two districts (Mansheit Nasser and Boulaq Al-Dkrour) in which the two neighborhoods of Ezbet Bekhit and Abu Qatada are situated have received more attention as pilot projects. So, the availability of information including sufficient cartographic and documentary resources will be more affordable than any other areas.

Al-Sharekat neighborhood in Nasr City would be use as a control variable to be compared with the three informal areas. The reasons for selecting Al-Sharekat as a reference case are the following: 1) it is a planned neighborhood with a defined urban center; 2) it is relatively comparable in size with the three informal areas; 3) its spatial and administrative boundaries overlap with each other; 4) it is syntactically integrated at a city wide scale, while the three informal areas are relatively segregated.
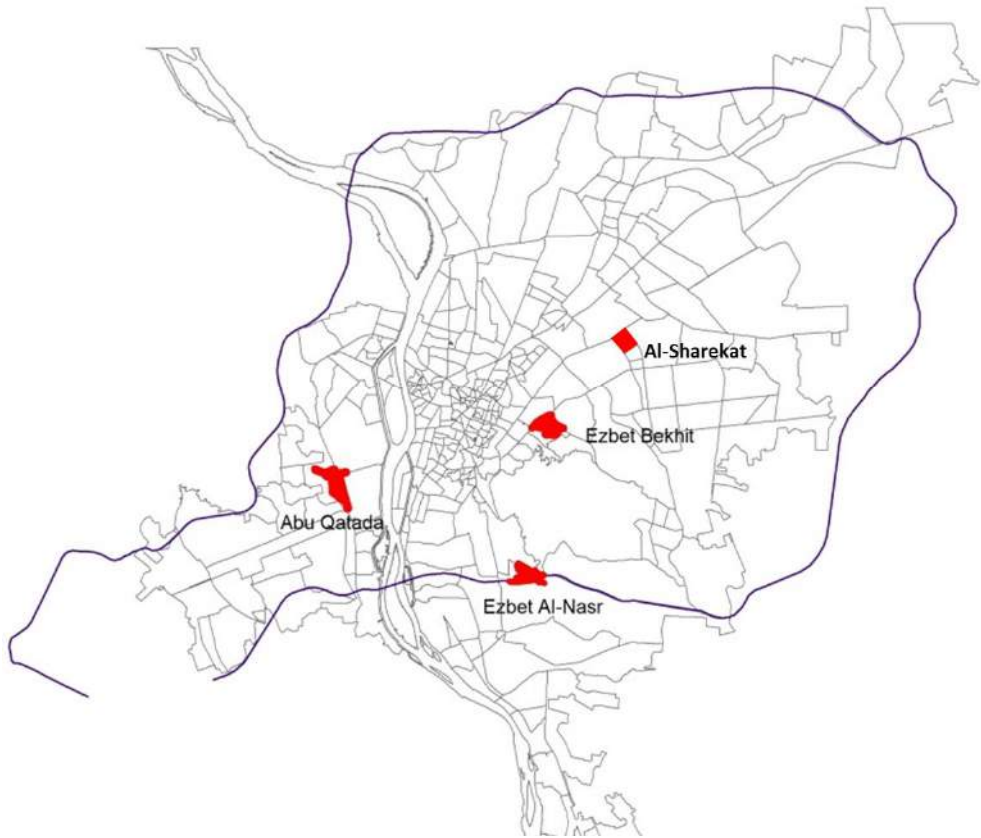
Figure1.3. the case study areas in the context of Cairo metropolitan area (source: author based on GOPP 2012).

1.9. RESEARCH SIGNIFICANCE

Social segregation is a widely debated issue and a complex phenomenon that is not easily interpreted. Despite some initiatives in addressing socio-spatial differences in contemporary Cairo, more still unknown about the role of urban form in mitigating or exacerbating social segregation. Actually, the daily practice of urban designers and planners is usually confined to issues related to housing policies and urban transformations with very limited discussions on segregation as an urban phenomenon (Legeby, 2010).

Accordingly, a genuine understanding of such urgent issue from an urban design perspective is still so far missing and underestimated. The magnitude of the problem in Cairo is manifested strongly in the goal of 'social justice' that was emphasized in the Egyptian 25 January 2011 revolution. On the other hand, the failure, or the marginal effects, of urban policies in stopping, or even mitigating, informal expansion assures the urgent need for outlining unconventional urban policy based on deeper understanding of the problem. Mekawy and Yousry (2012) state that

"…both deprived informal settlements and privileged gated communities need to be further studied on social and physical grounds for better comprehending and diagnosing, and subsequently for enhancing and refining policies and strategic interventions for each." (11)

From above, the findings of this thesis would be helpful in understanding the following:

1) Identification of the main causes of slum formation

2) Revealing the degree of urban fragmentation of Cairo's parts

3) Indicating how contemporary urban practices contribute to social segregation in Cairo. Therefore, lessons can be learned from these planning failures.

4) Identification of spatial characteristics of informal areas in Cairo.

Consequently, the conclusions of this research would be used to:

1) Provide better understanding of the "vicious circle" of urban decline than previous knowledge. This would be a first step in the process of urban restructuring and would invariably help stimulate the "virtuous cycle" of regeneration.

1.10. MEASURING THE INFLUENCE OF SPATIAL CONFIGURATION ON SOCIAL ASPECTS

The relationship of spatial morphology and social aspects has been reflected in several of research projects, for example, having secure and safe sidewalks (Jacobs, 1961; Sennett, 1977; Lennard and Lennard, 1995) and well utilized streets (Lennard and Lennard, 1984; Whyte, 1988), that tend to flourish livability of social life (Pongsmas, 2004). However, such works did not offer a strong proposal for interventions. For instance, Jane Jacobs in her book *The Death and Life of Great American Cities* in 1961 criticized the modernist city planning and rebuilding introducing new principles and objectives of city planning, and emphasized the influence of city streets and mixed uses on urban vitality; however, the central lesson of Jacob's book has been misinterpreted by new Urbanism planners (Greene, 2002). Meanwhile, Christopher Alexander (1966) realized the importance of urban spatial arrangements, but offered inflexible and weaker interventions (Alexander, 1966; Greene, 2002). Also, Maki (1965) assured the importance of offering multiple choices at the level of the urban layout to make livable places, but did not introduce actual proposals in this direction (Greene, 2002).

From above, we can note the complexity of the urban environment, and that a major obstacle for measuring the role of spatial variables has been the existence of poorly defined concepts to describe the complexities of the urban environments. This has negatively led to naïve descriptions of the city depending on simplified linguistic concepts such as, hierarchies and regularized geometries (Hillier, 2009a). In addition, it would be difficult to offer objective and clear proposals for intervention and therefore enormous errors and time-consuming at application level (Greene, 2002). Space Syntax has demonstrated its ability to cover these challenges. Space Syntax allows the resolution of spatial and physical data at the micro as well as the macro

urban scale. Therefore, the impact of spatial configuration can be measured independently from other variables affecting the space, as the spatial attributes can be plotted against socioeconomic aspects allowing for composite analysis.

1.11. METHODOLOGY

This thesis is based on the belief that urban movement pattern is the core of urban consolidation. From this point of view, the second chapter reviews the conceptual background about the relation between space and social network and whether the boundaries of communities are spatial or transpatial. Based on chapter two, the author paves the ground for the argument about physical segregation and social exclusion and how this hinders urban consolidation.

 After laying the theoretical background for this research and in order to test out the first hypothesis of the research work presented here, the researcher first reviewed the socioeconomic and political powers that shaped the metropolitan. Then, he measured social segregation, like many geographical studies, by mapping social variables such as income, unemployment and illiteracy rates in the Cairo metropolitan area at a neighborhood level depending on census data to indicate the magnitude of marginalization and social segregation. Then, the spatial configuration of Cairo has been analyzed using the latest angular measures of Space Syntax technique in order to reveal the degree of physical segregation and to what degree poor areas are spatially distinctive from the city. The relationship between both social and spatial maps of segregation was investigated at a city-wide level.

Measuring the influence of spatial variables on a social phenomenon should also be done a micro scale level, as depending on social parameters of census

aerial data produces inaccurate results due to "possible inaccurate boundary to the analysis" (Vaughan, 1999: 17). In order to overcome this defect and to test the second hypothesis of this research, a variety of measures are employed. Four Egyptian case studies are selected to give evidence on the implications of spatial configuration in the urban system in terms of people and activities. Quantitative analysis was conducted, and was complemented by quantitative questionnaire data for interpretation and for getting more reliable conclusions. Finally, discussion is made in the light of findings to draw conclusions and recommendations.
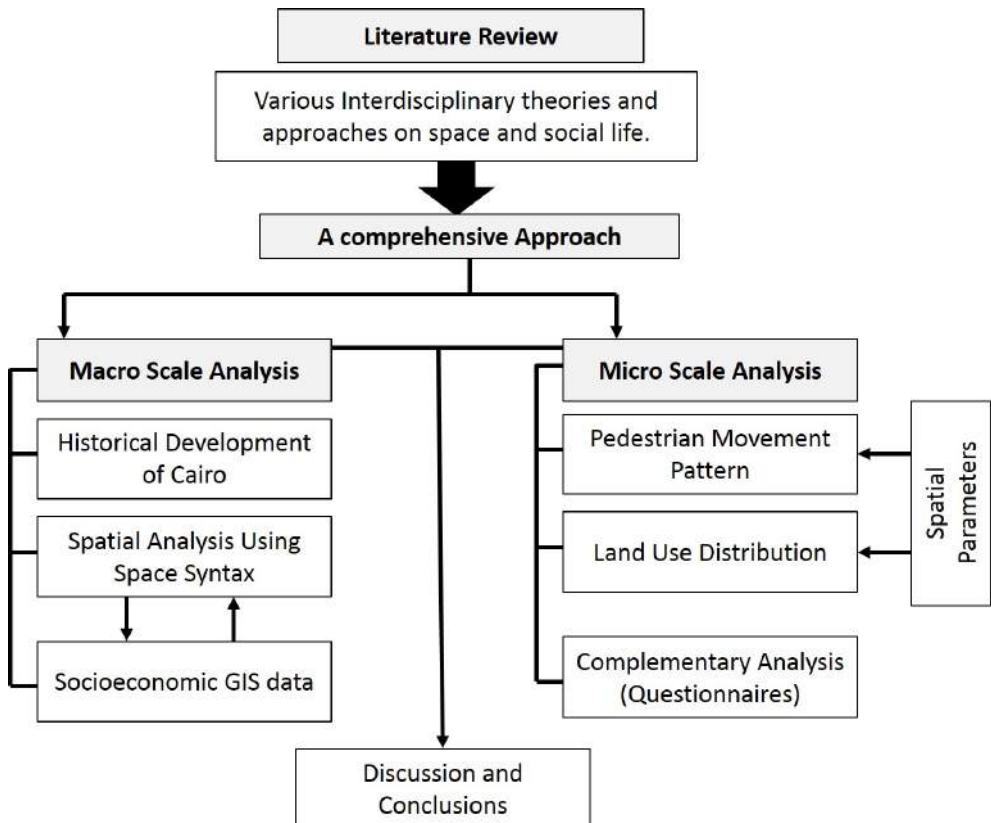
Figure 1.4. The Methodology Model.

1.12. THESIS STRUCTURE

Part one: Literature Review

This part reveals the theories and the methods of this thesis. It includes three chapters one of which is the synopsis presented here. The other two chapters are as follows:

Chapter two

Literature Review on space and social life

The purpose of this chapter is to ground this research in theories of space and society. It is divided into two sections. First, it reviews some paradigmatic theories which reflect the relation between space and society. It highlights the body of knowledge on such classical approaches to grasp various concepts with regard to socioeconomic development process such as income, class, social cohesion, and community and its value. It also discusses how communities work. Second, it lays the ground for thesis's argument discussing the concept of urban segregation, its patterns, impacts, and how it could be measured. It also reviews the relation between the formation of slum areas and urban segregation, and whether clustering could lead to segregation and poverty.

Chapter three

Research Methodology

This chapter reveals the research methods used in this thesis. First, it explains how Space Syntax technique could be applied in this thesis. After that, micro scale surveys methods are presented. Finally, this chapter discusses different attributes of the questionnaire including appropriate sample size and the questions of the questionnaire itself.

Part two: Empirical part

This part contains three chapter within which the researcher is concerned with socio-spatial relations between urban spaces at both macro and micro scale levels. It uses evidence from case study areas.

Chapter four

Greater Cairo Region

Before analyzing the spatial configuration of the case study areas, it is necessary to understand the global structure of the region; the wider socioeconomic context; and the factors or the drivers of change that produced the current spatial structure. That is to reveal how society shapes urban space at macro level. Accordingly, the major interventions on GCR will be reviewed. After that, configurational models of historical development will be constructed, analyzed in order to explore the role of spatial laws in mirroring and directing development process. The model of contemporary Cairo will be overlapped with existing social data to investigate the degree of association between syntactic and social variables. This, of course, will be very helpful for understanding the mutual relationships at macro scale. In other words, socio-spatial difference between places can be revealed.

Chapter five

Spatial Analyses of Local Settlement areas inside Cairo

This chapter reveals the interrelations of morphological attributes and activities of society— movement pattern and urban land use. The chapter is divided into three sections: first it gives a historical background about the case study areas, their consolidation process through time, and their land use pattern. Secondly, the measurements of the efficiency of their spatial

configuration using Space Syntax technique. After that, the results of the research on the relationship between spatial parameters and movement pattern are presented and discussed. Finally, the results where the spatial analyses are linked to the physical factors are revealed.

Chapter six

Measuring Social Ties inside Local Areas

This chapter presents the results from the quantitative analyses to interpret findings from the previous analytical chapters. Depending on the questionnaire results, the case study areas are described in terms of different attributes of socioeconomic aspects such as social structure, occupations, workplaces, social network and sense of community. This chapter also overlaps the plates of spatial configuration analysis with those of socioeconomic aspects in order to provide an evidence on the correlation between spatial configuration and successful neighborhoods. In parallel, this chapter compares and discusses the results of planned districts in Cairo with those of the three informal areas to address the conflicts and the similarities between them. After that, the road is paved for drawing main findings and conclusion of this research.

Part three: Conclusions and Directions for Future Research

Chapter seven

Discussion and Conclusions

This chapter draws conclusions on the findings of the previous analytical chapters and attempts to answer the questions raised in chapter one. Put differently, it tries to incorporate the findings of the previous chapters into one set of findings. Further, this chapter expands the discussion on the relationship between space and society into more general issues, such as

urban segregation and the relationship between urban form and deprivation. It revisits problematic issues that have been raised in chapter2. Lastly, this chapter ends up with policy implications for enhancing the social life in the Cairo metropolitan area, and in the urban environment in general.

Five appendices follow the conclusion and recommendations. Appendix 1 shows historical maps of Cairo; appendix 2 reveals the spatial and socioeconomic analyses at district level; appendix 3 is a gallery of case study areas; appendix 4 contains a survey form of movement observation. Lastly, appendix five includes a questionnaire survey form and reliability and factor analysis for sense of community scale.
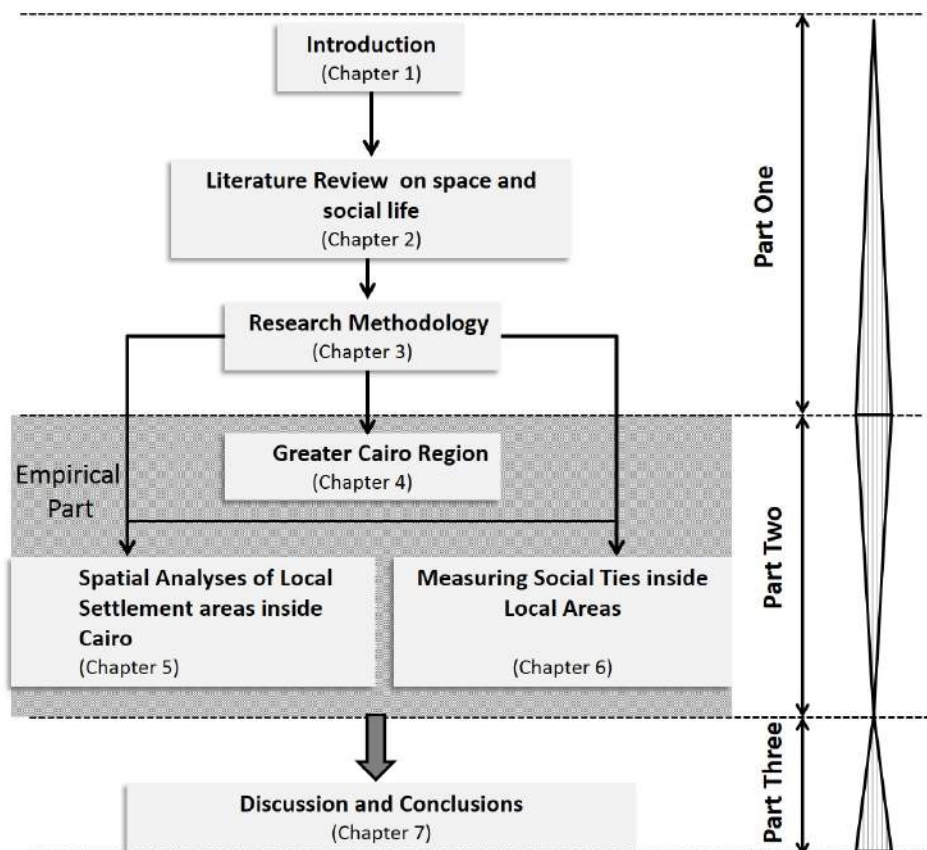
Figure 1.5. Diagram showing thesis structure.

2 LITERATURE REVIEW ON SPAE and SOCIAL LIFE

Chapter Two

Literature Review on Space and Social Life

This chapter sets out to provide a detailed description of the relationship between space and society. The chapter begins by discussing how people co-live in spaces and how such spaces co-live as communities. Understanding the relationship between space and society requires shedding light on the way in which communities emerge and work, and how people build their social network. In other words, one should review paradigmatic theories that discuss how space and society influence each other. This can help to understand sociality and spatiality.

2.1. INTRODUCTION

"Space was treated as the dead, the fixed, the undialectical, the immobile. Time, on the contrary was richness, fecundity, life, dialectic".

(Foucault,1980: 70 in Massey, 2005: 49)

"The great obsession of the nineteenth century was, as we know, history: with its themes of development and of suspension, of crisis and cycle, themes of the ever-accumulating past, with its great preponderance of dead men and the menacing glaciation of the world …The present epoch will perhaps be above all the epoch of space. We are in the epoch of simultaneity: we are in the epoch of juxtaposition, the epoch of the near and the far, of the side-by-side, of the dispersed. We are at the moment, I believe, when our experience of the world is less that of a long life developing through time than that of a network that connects points and intersects with its own skein."

(Foucault, 1986 :22 in Soja, 1989:10)

The literature on social theory shows that historical changes have received more attention over space and geography; importantly, space was virtually absent in social affairs (Netto, 2007). As will be explained, differentiation between traditional society and modern society of the nineteenth century was the core on which many paradigmatic approaches to social aspects were built. Near the end of the twentieth century, the role of space as a key element in (re)producing a society with its various socioeconomic conditions has been asserted by many experts in sociology, geography, anthropology, architecture, urban planning and so on. The following section thus discusses theories on space and society, starting with theories from sociologists like Marx and Weber, and ending with those from Architects like Hillier and Hanson. The next section discusses theories on migration and segregation and whether migration could lead to the formation of informal settlements. Then, the notion of urban segregation, its patterns, and impacts, are discussed.

2.2. THE IMPCAT OF SOCIETY ON SPACE

This section reviews paradigmatic approaches that discuss the issue of social cohesion, the conceptualization of community. Reviewing approaches from classic to more recent works will show that writers are different in their understanding of society-space interrelations.

2.2.1. Solidarity, Conflict and Space

Whilst a great deal of attention ...There is much talk of windows being eyes onto the streets. This is however is of no value if the people behind those windows feel no connection with their neighbours and have no incentive to intervene.

(Rudlin and Falk, 1999:116)

Abd El-Rahman Ibn Khaldun (1332-1406), a Muslim scholar, contrived a theory of social conflict based on his studies on nomadic and sedentary societies. The core of this theory is the concept of 'group feeling' or solidarity (asabiyyah) (Giddens, 2009: 22). According to Ibn Khaldun, groups with strong social bonds, Nomadic Bedouin tribes, dominate and rule those with weaker internal ties, sedentary town-dwellers. Accordingly, the Bedouin's lifestyles turn more urbanized with weaker solidarity leaving them vulnerable to attack from external enemies. This circular system of rise and decline explains states-formation (Giddens, 2009). Another earlier initiative for explaining how societies work was introduced by Auguste Comte (1798- 1875) who was concerned with social changes after the French revolution. Comte tried to reconstruct the French society arguing that sociology like physics and chemistry can use scientific techniques to explain the social world. He postulated that inequalities and social fragmentation caused by industrialization could be overcome by producing a new moral consensus that would enhance bonding society (Giddens, 2009).

Progressively, Herbert Spencer (1872) conceptualized the theory of organic analogy which states that society is analogous to an organism. In this model, the various organs in the body integrate together to keep the whole system functioning and regulated. Likewise, "the various parts of society (the economy, the polity, health care, education, etc.) work together to keep the entire society functioning and regulated" (Stolley, 2005: 23).

Emile Durkheim (1858- 1917) was influenced by Spencer's work on social evolution and the organic analogy, and by Comte's ideas. Nevertheless, he described Comte's work as vague and speculative and argued that Comte failed to establish sociology scientifically (Giddens, 2009). In his book *The*

Division of Labour in Society, Durkheim (1893) differentiates between two types of solidarity, mechanical and organic solidarities, according to societal changes through the growing division of labor (Durkheim, 1893; Vaughan, 1999; Magda, 2003; Stolley, 2005; Netto, 2007). This approach is known as **functionalism**. In it, Durkheim suggested that the type of solidarity in pre-industrial society, traditional society, was mechanical, where societies share the same identity, values and beliefs. In this model, strong bonds emerge vividly within clearly recognizable boundaries where society is small and organized around kinship affiliations. Here, solidarity is derived from the collective conscience. The other model of social bonds, based on specialization, is organic solidarity, shifted from mechanical solidarity, which arises from the process of trade demands (Vaughan, 1999). This is a natural result of transition from traditional society, rural, to modern society, cities, where the social network is transpatial (independent of the space). Here, then, the society gets complex, and social bonds based on conscience collective is no longer possible because people are more individuated, Durkheim postulates that cities are collections of non-indigenous groups — individual immigrants (Vaughan, 1999). Craib provides a good description of this solidarity:

> *In contemporary society I am dependent on other people- many of whom live on the other side of the world- to grow my food, make my clothes, supply me with warmth and light, print the books I read, service the word processor I write on, and so on. I could have or do none of these things without society.*

> (Craib,1997: 67)

In this sense, it is common to see different occupations interdependent within the societal system. Nevertheless, this organic solidarity can result in

anomie, a period of chaos, which implies a lack of moral guidance due to social changes caused by individuals' specialized roles (Stolley, 2005). In other words, anomie is an intervening period between an old society, where values breakdown, and a new society, where new values need to emerge. So, anomie implies individualism which is destructive. This individualism should be evaded through reassuring moral order within social entities such as the education system (Dingley, 2008). Another problem which could prevent organic solidarity is **forced division of labour** where jobs are not distributed based on occupants' skills, but on their social class. This inequality should be removed to reintegrate individuals into society.

Talcott Parsons, U.S. sociologist (1902-1972) was influenced by Durkheim's functionalist approach. Parson reshaped Durkheim's scheme of social solidarity. According to him, the fundamental function of solidarity is to integrate 'norms and values in the social system' (Palacios, 2007). While mechanical, traditional, solidarity derives from the common values of the society, organic, modern, solidarity is expressed through norms of economy −property, market relations, etc. In other words, both mechanical and organic solidarity are drawn upon common values. Furthermore, mechanical solidarity, normative integration seems to precede organic solidarity, functional integration. However, organic solidarity is not subordinated to mechanical solidarity, as they are both at the same level of institutionalization. This differentiation of Parson's understanding of solidarity led him to identify another type of solidarity, 'diffuse solidarity' that mediates mechanical and chemical solidarity. Diffuse solidarity refers to "the common matrix out of which *both* the others have emerged by a process of differentiation" (Parsons and Mayhew,1985: 209; Palacios, 2007: 42).

Diffuse solidarity is "based on common belongingness" (Cohen and Arato, 1994: 131).

Another contemporary of Durkheim who gave attention to social ties is the German Sociologist Ferdinand Toennies (1855–1936). Toennies differentiated between two types of communities: *Gemeinschaft*, Community, and *Gesellschaft,* association. The former refers to traditional society, rural community, which reflects the importance of kinship and religion, while the latter refers to urban life where individuality and impersonality are at the core. Alongside Toennies is Georg Simmel (1858–1918) who was interested in studying the influence of the size of groups. According to him, people tend to create certain Reponses in larger cities to accommodate the various demands of urban life. This makes individuals cope with situations intellectually. For example, people could guide a wayfarer but ignore a beggar (Stolley, 2005).

Unlike Durkheim who was concerned with social harmony, solidarity, Karl Marx (1818- 1883) and Max Weber (1864-1920) were interested in social conflicts. According to Marx, social conflict is a result of the growing capitalism, which reflects inequality in society. Marx observed the escalating tension between the factory owners and workers where differences in social classes are highlighted. Marx defines a social class as "a group of people who stand in a common relationship to the means of production −the means by which they gain a livelihood." (Giddens, 2009: 439). Followers of Marxism shifted the focus from class and economic relations into wider areas such as inequality in gender. This was the foundation for **feminist theory** (Stolley, 2005). As for Max Weber, the focus of his studies was the correlation between individuals and society. In this sense, his concern was

totally different, again, from Durkheim who dealt with society as a whole. According to Weber, social action is a result of rationality of human behavior. This trend of *rationalization of society* stems from the rise of capitalism and modern bureaucracy. In other words, Weber argued that the distinctiveness of modern society was a result of transformations in the way of thinking (Netto, 2007; Giddens, 2009). He, also, asserted that we should understand the meanings behind the actions. While, Durkheim and Marx see that social structure exists out of individuals, Weber argues that it is social action which counts. In his view, Weber thinks that cultural ideas and values alongside with economic factors have a direct impact on social changes. Accordingly, Weber proposes that stratification is shaped by three aspects: class which refers to differences in economic conditions; status which refers to differences in 'the social honor or prestige'; and party which refers to a defined group of people who work together due to the common features they have (Giddens, 2009). In this sense, he, again, is different from Marx, who confines the causes of stratification on economic factors (Ibid.). So, according to Weber, people from aristocratic families continue to enjoy the prestige and honor even when their wealth has been lost (ibid.). Eventually, Weber's theory, in spite of its significance in interpreting human action, failed to grasp both the levels of the social life and of society (Magda, 2003: 9).

2.2.2. Boundaries of Society

Theories regarding social boundaries of space tend to have two modes: spatial boundaries where social ties are drawn upon recognizable boundaries of space, and transpatial where the concept of community has no specific geographical boundary.

Robert Park, a sociologist, et al (1925) concur with a theory that defines social relations by urban space. Park also suggests the concept of encapsulation where individual's social ties are interconnected and tied to his territory (Vaughan, 1999).

In the field of social anthropology, Levi-Strauss (1953) proposes that primitive and modern societies are relatively similar (Vaughan, 1999). Whilst primitive society is about similar sizes of kinship groups, modern society is also comprised of the same, but with additional social ties, economic and political, in order to link between the kinship groups. However, cross-marriage between these groups, according to Strauss, is relatively limited. On the other hand, economic and political ties between kinship groups allow for a membership of multiple communities (Vaughan, 1999).

Another proponent of the notion of multiple memberships of social groups is Sack (1980) who proposes that an individual becomes a part of several communities as a result of living in a place (Ibid.).

The social anthropologist Hannerz (1980) concurs with such theories and identifies four modes of social ties in everyday life that characterize urban existence. These modes are: *encapsulation, segregativity, integrativity*, and *solitude*. Encapsulation stands for an individual having 'one dense network sector, connected to one or more of his roles, in which he invests a very high proportion of his time and interest' (Hannerz, 1980: 256; van Eijk, 2010: 200). Encapsulation network is strongly interconnected. A high degree of encapsulation can be reached if individuals are tied together due to multiplex relations of work, kinship, religion, etc. This maximal encapsulation is frequently observed in ethnic groups where people usually live, work, and

play together (Hannerz, 1980). In his view, Hannerz suggests that encapsulation is an urban phenomenon that is not confined to ethnic groups, but also involves 'occupational communities' like architects, lawyers, musicians, railway workers, etc. Encapsulation relationships have a limited number of settings since encapsulated urbanite tends to reduce contact with strangers (Hannerz, 1980; van Eijk, 2010). Hannerz agree with Robert Park's description of the city as "a mosaic of little worlds which touch but do not interpenetrate" (Hannerz, 1980: 257). Segregativity means keeping the different networks, two or more segments, separated. Contrary to segregativity, in integrativity, 'the most common way of life in city', the network of an individual is dissipated over different domains, without strong tendencies of concentration on one domain (Ibid.). In this sense, Hannerz differs from Park since a person, in integrative network, can inhabit several little worlds simultaneously to fulfill his social needs. Solitude finally means living in isolation from others where relationships are not significant (ibid.). Hannerz summaries the four patterns of networks in this:

> *"…solitude is a mode of existence by … encapsulation one with a single set of them; segregativity one with more sets, kept apart; integrativity one with more sets, brought together… the life of an individual may encompass all of them. Childhood [as] encapsulation…adolescence tendencies toward segregalivity arc often strong. Adulthood … a phase of integrativity. Solitude may come with old age."*

<div align="right">(Hannerz, 1980: 260)</div>

From a geographical point of view, Schofield and Wrigley (1989) perceive the community as a collection of family groups within recognizable spatial boundaries. Likewise, Mills (1994) differentiate between the boundaries of society in pre-twentieth century and those in the 19th and 20th century. In pre-twentieth century, networks of home,

work… are related to one territory. Contrary to this, in the modern society, the boundaries of society and space are not congruent since an individual might belong to several communities (Vaughan, 1999).

The notion of territoriality, the control of a defined geographic area by one group through the feeling of ownership and belonging (Gold, 1982; Barclay, 1983; Sack, 1986; Kintrea et al, 2008; Sohn et al, 2013), is embedded in many of above reviewed theories. Its origins back to Robert Ardrey's work on territoriality and animals, and how it extrapolated to human behavior. The concept of territoriality is proposed by many architects and urban planning theorists such as Oscar Newman (1972) who postulates that sense of community will be created once a territory's boundaries are defined by inhabitants who will seek, therefore, to guard it from 'anti-social behavior' (Newman, 1996). Here Newman argued that urban crime and other social problems can be alleviated through design factors that help creating territorial zones within which surveillance opportunities over urban spaces can be increased (Gold, 1982). Criticisms have been directed to Newman's theory of 'defensible spaces' due to ignoring social factors (Hillier, 1973). This point led Newman to adjust his thoughts through giving weight to social variables (Gold, 1982).

Contrary to territoriality, Hillier and Hanson (1984) propose the concept of *intelligibility* as an indicator of 'sense of place'. The intelligibility is defined 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 efforts" (Hillier, 1996b: 171). In this sense, the degree of intelligibility is defined by the degree of permeability, accessibility, in a street system rather than by a sense of belonging to a territory. This means that the possible social networks are shaped through the morphology of urban space that is the

'virtual community' of the potential co-presence of people. Moreover, an intelligible system is one in which well-connected spaces also tend to be well-integrated ones and vice versa. Put differently, in an intelligible world the correlation between local and global properties of space is perfect, so the whole can be read from the part.

2.3. THE IMPACT OF SPACE ON SOCIETY

> *"Whether taking space as a virtual abstraction, as Soja does, or as a reality, as it is Lefebvre's standpoint, the common thread is that there is a strong relationship between space and social relations."*

(Hernando-Real, 2011: 12)

Theorists differ in their views about the notion of the implications of space on society. Erving Goffman, for example, recognizes the space as the background of activities with no relation to society. Nevertheless, the space, according to him, plays an important role in understanding the face to face situations (Magda, 2003). Likewise, Levitas (1978) states that social structures cannot be explained by urban form, since many streets are very similar looking but the activities occurring on such streets are very different. In contrast with Goffman and Levitas, some theorists believe that space influences society. Whyte (1943) stated that the street space enhances social interaction between residents (Whyte, 1943). He found that certain spatial and societal patterns emanated spontaneously in a certain urban order (Whyte, 1980). Whyte's view can also be seen in the review of *The Death and Life of Great American Cities* by Jane Jacobs (1961) who points out the importance of sidewalks on human social behavior. According to Jacobs, secure and safe sidewalks can be created by separating public and private spaces from each other and by creating a constant flow of people on streets (Jacobs 1961; Pongsmas, 2004). In other words, she encourages open and

accessible public spaces, in which strangers and inhabitants are the source of safety (Hillier, 2004). If a city fails to create safe sidewalks, problems like social segregation will emerge because people will avoid walking which in turn will impede positive interaction. Jacob demonstrated that *primary mixed uses, small blocks,* and *aged blocks* are all generators of *diversity* that is the key element of a successful city (Jacob, 1961; Pongsmas, 2004).

In *The Image of The City*, Kevin Lynch (1960) reveals the influence of urban environment on people's orientation. According to him, building the image of an environment is a two way process, it is the result of an interaction between the observer and the environment in which he lives. The process is not just how we see things and others, but also how others see us as a part of the environment. Consequently, such process reflects the influence of the observer and environment on each other. Lynch says "nothing is experienced by itself, but in relation to its surroundings, the sequences of events leading up to it" (Lynch, 1960: 1).

In *A City Is Not A Tree*, Christopher Alexander (1966) postulates that city is a complex object, abstract structure which is not a tree but rather a semi-lattice. A semi-lattice structure of a city is overlapped with a semi-lattice social structure. In other words, social relations, in modern society, are transpatial in order to be congruent with the spatial arrangement of the city. Alexander, also, differentiates between cities arisen spontaneously, natural cities, and those created by architects and planners, artificial cities (Alexander, 1966). All these thoughts by Alexander highlight the impact of space on society. Another proponent of space implication on society is Michelson (1970) who suggests that social solidarity is promoted by the pattern of streets. Similar to Michelson, the social anthropologist Bourdieu suggests that social solidarity is strengthened by close proximity which is likely to create encounters (Michelson, 1970).

In his book *'Life Between Buildings'* Gehl (1971) studied the relationship between physical environment and social activities. He categorized outdoor activities into three types: necessary (e.g. going to school or work), optional (i.e. activities reckoning on outdoor physical conditions. For instance, activities like sitting around and enjoying sunbathing only take place when conditions of place and weather are optimal), and social or resultant (i.e. communal activities such as conversations, greetings, and barbeque). Gehl (1971) found that poor physical environments impede the occurrence of optional and social activities, hence the diminishing of opportunities for social interaction. Nevertheless, Gehl's findings to be verified mathematically using an objective tool.

Oscar Newman, an architect and a city planner, (1972) claims that there is a direct relation between crime and space. In his book *Defensible Space* in 1972, he states that defensible space is a socio-physical phenomenon where space and society are both parts of a successful space. He asserts the role of physical features in this quotation:

> *"Regardless of the social characteristics of inhabitants, the physical form of housing was shown to play an important role in reducing crime and in assisting residents in controlling behavior in their housing environments."*
>
> (Newman, 1996: 25)

According to the theory of defensible space, safer places will be achieved if the residents of an area feel belonging to and responsible for their territory. The number of people living in a territory is influenced by the physical form of housing since crime rates for buildings with few families having their own individual entry will be lower than those with large number families sharing a common entry. This is based on the principle of natural surveillance where the residents' ability of monitoring what is happening is closely linked to the

physical characteristics of an area (Newman, 1996). Newman encourages closed and inaccessible spaces such as cul-de-sac for safer environment, in which residents are the primary source of natural surveillance while outsiders are the source of the threat (Hillier, 2004). This seems contradictory to Jacobs's views. Nevertheless, the differences between the two schools of thoughts should not be despised, while the presence of a stranger in a public street is ordinary and vital for natural policy, it would be unexpected and hence the danger in semi-private spaces (Hillier, 2004).

Bill Hillier and Simon Shu (1999) questioned the theory of defensible space and gave an evidence for that from a study of crime vulnerability in several housing types, in order to 'cover a wide range of social classes', in England:

> *"The findings from this research provide empirical evidence for scepticism about the idea of "territoriality" and "defensible space" put forward by Oscar Newman (Newman, 1972), and suggest that, other things being equal, property crimes tend to cluster in those globally or locally segregated areas, particularly in cul-de-sac footpaths and rear dead end alleys, but also in those segregated short cul-de-sac carriageways which Newman considered to be the key to increase local surveillance and hence to exclude casual intrusion by non-residents. Positive features which make spaces safer are integrated through roads with front entrances on both sides, exactly those anonymous spaces Newman considers more prone to crime".*

> (Shu, 2000, abstract of journal paper)

Besides, Hillier and Hanson (1984) contradict Newman's Thoughts by suggesting that crime is prevented through the co-presence of people on the streets:

> *"Unlike Oscar Newman's 'defensible space' theory, which emphasises inhabitants policing space and excluding strangers, our research has led*

us to conclude that strangers police space and inhabitants police strangers, thus generating 'automatic' control in the area... and so reducing certain street crimes. The interaction and accessibility for strangers and inhabitants are profoundly influenced by the convex and axial organization of an urban area and its interface with the buildings."

(Hillier et al, 1983: 52)

In this sense, Hillier and Hanson deal with the space not as an object with a passive role, but as (re)producer of society. Both Hillier and Hanson founded the theory of *space syntax* where the relationship between the morphological structure of man-made environments and social structures or events is investigated. Space syntax will be reviewed in detail in this chapter because it is the core on which this thesis is built.

In another pioneering study, Arnis Siksna (1997) compared centers of twelve North American and Australian cities in terms of block size and form. He found that particular block forms perform better than others for making city center more livable because of the effect they have on movement rates, frontages potentiality, and the degree of continuity of urban fabrics (Siksna, 1997). On the other hand, Hernandez et al. (2007) argue that mobility is one of the key indicators of place attachment —people usually conform to the constraints of the spatial settings.

From above, it is clear that there are various theories and approaches reflect on the notion of space and society. For the scope of this work, the following section will just review, with more detail, four selected theories for a better understanding of the correlation of space and society.

2.3.1 Harvey's Space of Capital

"[the city is] man's most consistent and on the whole, his most successful attempt to remake the world he lives in more after his heart's desire. But, if the city is the world which man created, it is the world in which he is henceforth condemned to live. Thus, indirectly, and without any clear sense of the nature of his task, in making the city man has remade himself."

(Park, 1967: 3 in Harvey 2012: 3-4)

David Harvey makes a relation between sociality and spatiality. According to him, people shape their cities according to social relations they seek. He states that economic aspects play an important role in shaping the physical form of the city. Capitalism has led to rapid urbanization with a massive movement of populations to produce the so-called planet of slums where huge numbers of people live in deprivation. Harvey argues that the investment produces profits, which are considered capital surpluses, coupled with unemployment resulted from migration and revolutions in technology. Unemployed populations can be viewed either as *a threat to organized labour* or as a labor surplus to be drawn upon in times of expansion and relinquished in times of contraction (Harvey, 1973: 272; Vaughan, 1999). Surpluses of capital and labor should be absorbed without devaluations. The disposal of surpluses could be achieved through reinvestment in urbanization to make new surpluses. If capital surpluses cannot be absorbed through urbanization, we would see vast unemployment (Harvey, 2012). This means that dynamic capital surplus absorption problem is closely linked with what is happening in this urbanizing world (Harvey, 1973; Harvey, 2001; Harvey, 2012). In other words, changes in the spatial structure of a city will be accompanied with changes in individuals' income (Netto, 2007).

Summing up Harvey's theory, it could be said that he divides cities into two types: capitalist cities, which allocate people within particular areas of the

city according to their income, and redistributive cities, which allow relocation of poor people out of the segregated areas of the city. Expressed differently, a distributive city exhibits more flexibility in the labor market drawing upon public planning policy (Vaughan, 1999). In this sense, we can see that economic and physical segregation are closely linked since poor groups will have little choice, due to their income (Vaughan, 1999). Accordingly, attempts to eliminate physical segregation in the capitalist city are 'structurally determined' by 'self-regulating market' (Harvey, 1973; Vaughan, 1999).

2.3.2. Giddens's Structuration Theory

In this theory, Anthony Giddens argues that both individual and social forces shape our society (Giddens, 1984; Magda, 2003; Craib, 1992; Netto, 2007). In his view, individuals' actions, though not completely free, are the agency that (re)produces the social structure. Individuals reflexively monitor their actions across either discursive, verbal capacity about social conditions, or practical consciousness, ability of expressing by actions. As a matter of fact, the core of the paradigm of Structuration is the duality of structure. Structure is the rules and resources that are the means and the outcome of individual action (Giddens, 1984; Magda, 2003; Craib, 1992). While the rules impede the actions, the resources enable them. For example, the language contains the rules of syntax and the means which individuals use to interact with each other, but at the same time individuals reproduce these rules throughout making use of them (Giddens, 1984; Magda, 2003; Craib, 1992). Another example for a better understanding of structuration theory is a company where its rules and resources help the owner to format and reproduce its structural properties, the routinized character, according to the power he has. Although some individuals could have the power to make changes in the

structural properties of this company, the owner— according to rules and resources— is the most powerful in this system. In this sense, Giddens acknowledges the importance of individual action, practices of social life, but at the same time assures the role of structural elements of social institutions. In other words, human agents and structures are not separated from each other, dualism— rather they are dependent, duality. Structure (traditions, institutions, moral codes, etc.) is out of space and time; it exists virtually as memory traces and as an instantiated in social practices, except in the moment of the constitution of a system. In other words, patterns of relations in a structure exist independent of the context in which they are created (Giddens, 1984; Magda, 2003; Craib, 1992). For example, the hierarchy between an employer and an employee is preserved, even when they come across each other in another context, say on the street. Structure, then, is internal to individuals and is marked by an absence of the subject. System, on the contrary, is the reproduced relationships (social practices) between human agents (actors) across time and space (Giddens, 1984; Magda, 2003; Craib, 1992; Netto, 2007).

Giddens differentiates between two types of integration that is the distinction between social integration and system integration. Social integration involves reciprocity of practices between face-to-face, co-presence, connections (Giddens, 1984; Magda, 2003; Craib, 1992). On the other hand, system integration refers to reciprocity between actors or collectivities through time-space distanciation —the stretching of social relations across time and space to overcome the physical absence of actors. Throughout these two notions of social and system integration, Giddens assures the importance of the notion of space. He says "space is not an empty dimension along which social groupings become structured, but has to be considered in terms of its involvement in the constitution of systems of interaction" (Giddens,

1984:368). He uses the concept of *locale* instead of *place* in social integration to include the physical and non-physical features of interaction. In this sense, physical features are part of the setting of interaction and in turn the mode of utilization of the space is of great importance in such interaction. Locales are typically regionalized based on the zoning time-space in relation to routinized social practices (Giddens, 1984: 118-119).

2.3.3. Lefebvre's Space

"(Social) space is not a thing among other things, nor a product among other products: rather it subsumes things produced, and encompasses their interrelationships in their coexistence and simultaneity ... It is the outcome of sequence and set of operations, and thus cannot be reduced to the rank of a simple object."

(Lefebvre, 1991: 73)

Henri Lefebvre, in his definitive book *The Production of Space*, stated that social space, a material space of people, is a social product and that every society has its own peculiar space. Although space is a product of society, it is a tool to exercise power and control (Magda, 2003). In his view, Lefebvre divides the city into two different systems: the social or *the urban* and material form of *the city*. According to him there is a cause to differentiate between social and material morphologies' (Westin, 2010: 254). Lefebvre warns from separating the two systems as there is a complicated relationship between *the urban* and *the city* systems. Furthermore, he warns from dealing with *the urban* or the social system as a purely immaterial phenomenon, since it is entirely dependent on the physical city (Westin, 2011). In this sense, space and society are mutually related like 'gin and tonic' rather than 'cat-and-mouse' (Legeby, 2010). Expressed differently, the physical

morphology of the city and the human city should be seen as one entity as they are strongly connected.

From above, it can be noticed that space according to Lefebvre is the social practices. In his view, Lefebvre sees that the space is active, alive, organic and fluid because of its embedded meaning. The core of Lefebvre's dialects is what he calls spatial trait. This trait includes three elements— the physical, the mental and the social— with triple interactions, three moments, to keep social relations united. The three moments of social space are the perceived or the physical space (*spatial practice*s which produce society's space slowly), the conceived or the mental (the *representations of space*—the dominant space in any society— which are conceived by scientists, planners, architects, urbanists and social engineers) and the lived (*Representational spaces* which are lived and experienced in everyday life by inhabitants and users through memories, dreams, images and symbols). Expressed more simply, space is viewed in three ways: 1) the perceived space that is the physical or the real space, space that is produced and used, and can be described; 2) the conceived or mental space that can be imagined and drawn on maps as everybody has a cognitive map about space that might differ from one to another; 3) the lived space as generated and modified through time and over its use, real-and-imagined space. So, space is implicated in everyday life (the micro) and in the system (politico-economic system), the macro (Lefebvre, 1999; Magda, 2003; Netto, 2007). The macro needs space for exchange and the micro needs space for use. The macro and the micro are two different entities with the macro exercising control over the micro. It is worth mentioning that the micro, according to Lefebvre, is not seen as a collection of individuals but rather as a whole entity. As such space 'is not a thing, but rather a set of relations between things'. Consequently, space is a

'thing/not-thing' - neither a substantial reality nor a mental reality (Lefebvre, 1991, p.402 in Westin, 2010: 255). Lefebvre is pessimistic about the space conceived by urbanists and architects because it does not carry any meaning and does not belong or express individuals. Consequently, a revolution is needed for appropriating the space (Magda, 2003).

Lefebvre was influenced by Marx's ideas. He classifies modes of space production into four categories according to the historian periods of the production process:

1- Absolute space which is made up of fragmented sites in nature based on their strategic qualities. This space is symbolic and characterized as religious and political. Absolute space remains natural until occupied or colonized by socio-political forces.

2- Abstract space: as absolute space evolved as a result of accumulation of money, knowledge, works of arts and symbols, and commodities. Natural rhythms, then, are modified and governed by this new space (Magda, 2003; Netto, 2007).

3- Contradictory space: this results from conflicts arising within abstract space, the contradiction between exchange and use.

4- Differential space: the contradictions constitute the seed for the differential space which forms a mosaic of different spaces (Magda, 2003; Netto, 2007).

2.3.4. Space Syntax Theory and Methodology

"Society must be described in terms of its intrinsic spatiality; space must be described in terms of its intrinsic sociality".

(Hillier and Hanson, 1984: 26)

Before explaining space syntax theory, I would like to give a very brief summary of the initiatives in which the spatial dimension is analyzed in order to interpret social pattern. One of these initiatives is Lionel Martin's study (1975) in which he claims that street network is the container of activities, and the way we construct our cities influences our social life. In his view, the urban environment should be analyzed mathematically. In line with March insights, Bullock and Dickens (1975) suggest using urban models in order to evaluate and predict future urban policies. Further, Krüger (1979) suggest splitting the urban layout into a pattern of linkages in a way similar to planets and stars (Vaughan, 1999).

Space syntax, originated and developed in the 1970s at the Bartlett Unit for Architectural studies, University College, London (; Hillier et al., 1983; Hillier & Hanson1984; Space Syntax Ltd., 2004), aims at analyzing space configuration in order to reveal social patterns. The purpose is to make the configuration, which is seen by people as a non-discursive as a thing is used intuitively in everyday life, a discursive thing (Westin, 2011: 229). Space syntax attempts to define society, different social solidarities identified by Durkheim, through space. In other words, it tries to define people's relations through relations between street segments in an urban grid, so it is a graph-based theory. The virtual community is produced based on the spatial configuration, the relation between two spaces taking into account at least third space and at most all other spaces in the system, of space (Hillier & Hanson, 1984). Expressed more simply, space syntax found a consistency between the pattern of social relations and the pattern of relations created by the spatial formations (Netto, 2007). In their book *the social logic of space*, Hillier and Hanson (1984) argue:

"why should these patterns [of space] be different in different societies? Here we found the general sociology of Durkheim... profoundly suggestive. Durkheim had distinguished between two fundamentally different principles of social solidarity or cohesion: an 'organic' solidarity based on interdependence through differences, such as those resulting from the division of labour; and a 'mechanical' solidarity based on integration through similarities of belief and group structure. This theory was profoundly spatial: organic solidarity required an integrated and dense space, whereas mechanical solidarity preferred a segregated and dispersed space... In the work of Durkheim, we found the missing component of a theory of space..."

(Hillier and Hanson 1984:18)

As can be seen from above, space syntax expands beyond the Durkeimian approach, since idea is that social information is embedded in the configuration. Importantly, the arrangement of social networks in space can take three potential patterns according to the degree of socio-spatial correspondence. When aspects of social structure are projected into space, then the produced society is called 'correspondence society', where local identities tend to be strengthened. On the other hand, when the 'social fabric' crosses space, then we get what is known as 'non-correspondence society' where global solidarity tends to construct local transpatial identities. Another kind of society, which is not just created according to spatial or transpatial forms, is that model of 'differential solidarities' where the social fabric is projected in different configurations based on class or gender differences (Hillier and Hanson, 1984; Hanson and Hillier, 1987; Hillier, 2009c; Al Ghatam, 2012). It is worth mentioning that these three kinds of society are developed from Durkheim's ideas about societal solidarities.

a

b

Figure 2.1 (a) a 'Correspondence society' (all pinks in one location and all blues in the other). (b) a 'non-correspondence society' (a mixture of blues and pinks in each spatial group with mutual relations between blues and pinks. (c) a 'differential solidarities' (blues only have relations with blues in the other spatial group, and pinks only have relations with pinks in the same spatial group) (source: Hillier, 2009c)

c

From above, it is clear that, Hillier and Hanson concerned with the implications of the physical dimension of space. In this sense, they are different from Lefebvre, who refers to social space. They criticized the naïve descriptions of the city depending on simplified linguistic concepts such as, hierarchies and regularized geometries (Hillier, 2009a). These naïve descriptions may be resulted from the lack of the means to describe the complexities of the urban environments. Accordingly, Hillier and Hanson, in their book *The Social Logic of Space*, (1984) developed three iconic ideas to represent space: axiality when people move in it, convexity (in which all points are visible from each other), when they interact within it; and isovist which refers to "the set of all points visible from a given vantage point in space and with respect to an environment" (Benedikt, 1979: 47).

people move in lines   interact in convex spaces   see changing visual fields as they
                                                                  move around built environments
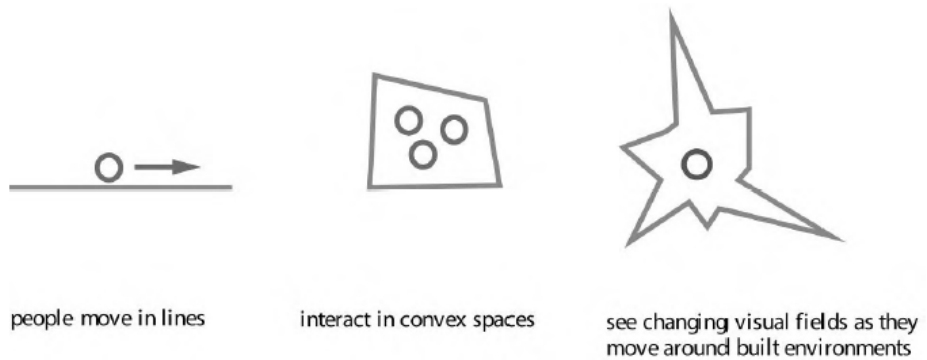
Figure 2.2. Relation between space and activity: Space is not a background of activity but an intrinsic aspect of it. (source: Vaughan, 2007)

According to Hillier and Hanson (1984) movement is generated naturally by the spatial configuration of the urban environment. In other words, 'natural movement' is generated automatically depending on the underlying degree of accessibility (Hillier et al 1993).

Natural movement –and so the spatial configuration itself– influences land use pattern since spaces with high movement rates will attract commercial uses, while non-movement seeking activities (e.g. residence and the like) will migrate to locations with low co-presence (Hillier, 1996a; Greene, 2002; Topçu et al, 2007). The attracted uses will produce 'Multiplier effect' on movement since they will increase the importance of the locations themselves and will in turn encourage further uses. In other words, the spatial configuration may influence both movement and attractors, but the latter two cannot change the configuration. Rather, movement and attractors can influence each other (see Figure 2.3). This dynamic process of configuration, movement, and attraction is what Hillier called 'movement economy' (Hillier et al, 1993).
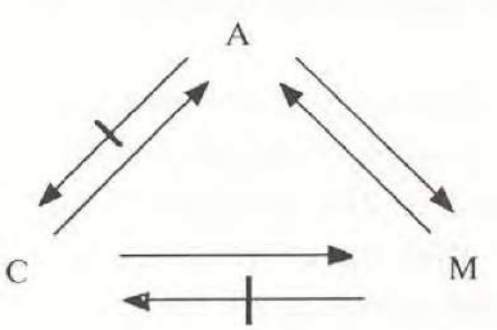
Figure 2.3 The spatial configuration (C) may influence both movement (M) and attraction (A) but the latter two cannot change configuration. Rather, movement and attractors can influence each other. (source: Hillier et al, 1993)

Representing Urban Space

Urban space can be represented either as a set of convex space or as a map of axial lines. A convex map consists of the largest and fattest convex spaces that cover the area (Hillier et al., 1983). Likewise, if the street network of an urban environment is covered with the fewest and longest axial lines, then we get what Hiller and Hanson called 'axial map' (figure 2.4).

Figure 2.4. Convex map (left), axial map (right) (source: Hillier et al., 1983).

A closer look to the urban grid of any city will show that it is made up of a dual network −the foreground network, made up of the few numbers of longer lines representing centers and sub-centers, and background network, made up of larger number of shorter lines representing residential space

(Hillier, 2009a; 2009b). Here the space either acts generatively, in foreground network, in order to maximize co-presence creating new relationships and giving a city a universal spatial structure or space acts conservatively, in background network, to reproduce cultural patterns through restraining and preserving existing movement pattern, which gives the city its spatial identity (Hillier 1999b; Wang, 2012; Psarra, 2009; 2010; Sailer et al, 2012). For example, figure 2.5 shows cities of Tokyo (left) and London (right) having a common universal spatial form of a 'deformed wheel' in foreground network in spite of having different dissimilar background networks as a result of cultural differences.

Figure 2.5. Cities of Tokyo (left) and London (right) have similar foreground networks of a 'deformed wheel' pattern while having two different background structures reflecting the spatial dimension of cultural differences(source: Hillier, 2009b).

As a matter of fact, axial lines reflect the degree of accessibility from each line to all other lines in the system. The axial map, progressively, was developed into a segment map where the street segment between junctions is the spatial element (Hillier and Stonor, 2010; van Nes, 2011). The structure of the urban grid, then, shows the potential movement of people since spaces with high syntactic values will generate co-presence and interaction higher

than spaces which are syntactically segregated. We should differentiate between two measures of potential movement: *to-movement* potential (closeness or syntactic integration), or the potential accessibility of a segment regarding to all others; and *through-movement* potential (betweenness or choice), or how likely a space will be crossed with respect to all other pairs of segments (Ibid.). The syntactic measures of each segment can be applied at different radii (radius is defined in terms of distance that will be illustrated later) from each segment to show potential movement for different scales from local to global. It is worth mentioning that there are three weights of distance: the metric distance which defines a street network by the shortest passes, the topological distance which calculates a street network in terms of fewest turns, and finally the geometrical distance which measures a street network regarding to least angle change (Ibid.). Once syntactic measures are obtained, we can get what Hillier and Hanson call 'natural movement' in which movement pattern is generated automatically depending on the underlying degree of accessibility (Hillier et al 1993).

Spatial Descriptors

- Integration

It is widely assumptive that city is the container of various activities such as eating, gathering, interacting, etc. If the longest and fewest axial lines of an urban system were drawn then the product is the axial map of that system. Once obtained, the relationships between the axial lines comprising the axial map can be examined and interpreted. In terms of topological distance (fewest turns), if the interest is to see the number of turns that must be crossed to get from an origin to a destination within the system, then the calculated value is called depth. It shows how a line relates to all other lines in the system. That is the degree of spatial accessibility or closeness where

maximum depth means the maximum number of turns, hence minimum integration.

The axial map can be converted into a segment map by splitting each axial line at the locations where it intersects with other lines. The element of analysis here is the segment between intersections rather than the whole axial line. So, topological segment connectivity is about counting the number of segments that are directly connected to a certain segment.

In terms of the geometric distance (i.e. least angle change), the total angular depth value is calculated by summing all angular turns from a segment to another via the lowest angular deviation cost (for more detail, see Turner, 2005).

The radius of analysis can be topological in terms of number of steps, as mentioned before, or metric where segments located within a particular metric distance are only considered. For example, radius n considers all segments within a certain system, while radius 2000 limit the syntactic calculations to only segments that are located at a distance up to 2000 meters from a particular segment, so all segments outside the distance of 2000 meters are excluded from the analysis. The higher the radius is, the more global the measure is. Radii of 400 (a 5 minutes walk), 800 (a 10 minutes walk) and 1200 meters (a 15 minutes walk) are proper for analyzing pedestrian movement rate at local scale, while radius 2000 meters and up are suitable at more global scale. As for vehicular movement, a 5 minutes car driving can be represented by the 1200m radius analysis and so on.

Put it in a nutshell, the syntactic measures of each segment can be applied in relation to all other segments in the system, on a global scale, or specified to local distance. In other words, the type of the syntactic attributes, whether global or local, will vary according to various radii, where a large radius indicates more of a global extent of the measures. If the correlation between

local and global properties of space is perfect, then the whole can be read from the part and vice versa. The relationship between spatial connectivity (one topological step) and global integration is what Hillier et al. (1983) called "Intelligibility".

- Integration Core

The integration core is the band of the most integrating spaces (top 25% integrating lines is recommended for small spatial systems of less than 100 lines while top 10% is suggested for the integration core of larger ones) that tend to cluster in a particular area within the system (Hillier et al., 1983; Space Syntax Ltd., 2004; Kalrqvist, 1993). The integration core usually overlaps with the planned centers (Space Syntax Ltd., 2004) and constitutes the main structure of the cognitive map (Mohamed, 2010). In a well-used urban areas, the integration core penetrates into the whole system reducing journey lengths between the live center and all other parts (Hillier et al., 1983).

- Choice or Betweenness

Choice or through-movement as mentioned before shows how likely a space will be crossed with respect to all other pairs of segments (Hillier et al., 1983; Klarqvist, 1993; Turner, 2005, 2007). Thus, if the shortest angle paths between each potential origin and destination pairs of segments in the system are constructed, then the total number of times each node or segment will be passed through as a part of journeys' routes is called choice (Turner, 2005; 2007). In other words, choice "calculates the number of shortest paths overlap between all nodes in the graph" (Varoudis et. al, 2013: 057:4). If the number of overlaps of a segment or a space is high, then it will get a strong choice value and vice versa. Cul-de-sacs and dead-end streets are assigned a

choice value of 0 because they are not crossed by the shortest passes joining all segments to all segments of a system.

2.4. MIGRATION, SEGREGATION AND DEPRIVATION

The following section reviews theories on migration and its spatial impact on informality. It also distinguishes between important terms such as slum and informal areas. Finally, the literature regarding urban segregation and the deprivation of an area is highlighted.

2.4.1 Migration and slum formation

The process of rural-urban migration is stressed by many scholars as a key factor underlying urban growth and urbanization (Pacione, 2005; Neekhra et al 2008 in Jenks et al, 2008). Several studies show that people move to cities for economic causes; whilst rural factors such as the surplus labor resulted from urban growth and usage of mechanical farming systems, and pressure on land through subdivision of plots, push people to out-migration, urban factors such as higher wages available in cities motivate people to rural-urban migration (Pacione, 2005). These causes of migration have a spatial impact which in turn affects socioeconomic aspects of migrant dwellers (Vaughan, 1999). In facts, rural migrants are usually illiterate, or with very little education, and unskilled, so they are absorbed into odd jobs provided by informal market, and are forced to settle in lower rent areas as they cannot afford to buy a house (Neekhra et al in Jenks et al, 2008). It is worth mentioning that migrants, upon their arrival, settle, at any price, near the city center to be closer to job opportunities; then, when their socioeconomic circumstances are improved, they tend to move to the periphery, where cheaper housing is available (Davis, 2006; Barros, 2004). Apparently, several studies show that the majority of slum populations are immigrants

with high density, poor housing, and with inadequate infrastructure. In other words, migration is associated with the formation of slums since the urbanization process is often poorly coordinated and leads to the formation of fragmented pattern of planned and spontaneous settlements (Sobreira, 2003).

2.4.2. What is an informal settlement?

There are abundant definitions of what counts as an informal or 'ashwa'i' (disordered or haphazard) (Sims, 2009; Khalifa, 2011). The purpose here is not to revisit all these definitions and classifications, which are already covered in countless works. Instead, I will give a brief overview about the classification of informal areas of Egypt according to Informal Settlement and Development Facility (ISDF), the latest classification of slums in Egypt. In 2009, ISDF replaced the term informal settlements or *Ashwa'iyyat'* with two discerning terms: 'unplanned areas' or '*Al-Manatiq al-gheir Mukhattata*' and 'unsafe areas'. According to ISDF, an informal area is identified as unsafe if and only if it is exposed to life threat (grade 1), or having unsuitable housing conditions (grade 2), or being subject to health risks (grade 3) and insecurity of tenure (grade 4) (Khalifa, 2011). On the other hand, unplanned areas are mainly described as being in contravention of planning and building laws and regulations (Sims, 2009; Khalifa, 2011: 2). Priority for interventions is given to unsafe areas (especially those of grade one), while unplanned areas call for medium or long term plan. According to ISDF estimates, only there are 404 unsafe areas within all urban centers of Egypt hosting roughly 1.1 million inhabitants. This is opposed to estimates by UN-Habitat in 2003, where about 39.9 percent of Egypt's urban population is characterized as slum inhabitants, approximately 11.8 million dwellers. That is because slums definition according to UN-

Habitat in 2003 did not distinguish between slums according to the magnitude of deprivation. Even after revisiting and changing the definition of slums by UN-Habitat in 2005, the figure of population living in urban slums in Egypt was still overestimated; about 17.5 percent with a total of 5.4 million inhabitants (see Khalifa, 2011). This reflects how helpful the approach adopted by ISDF in indicating the accurate size of the inhabitants of slums in Egypt, hence proprieties for intervention.

2.4.3. What is segregation?

The notion of segregation and integration is complex and hotly debated, since the concepts are dynamic and not consistent. In fact, there are different concepts of segregation that need to be defined. Spatial segregation 'is about where people live'; structural segregation is about isolation from the structures of society such as education and work; cultural segregation refers to isolation from the values and customs of the host society (Finney and Simpson, 2009). According to White (1983), segregation could be sociological where the focus is on the degree of interaction between different groups, or geographical which refers to the spatial separation between population groups (Feitosa, 2010). Expressed differently, segregation could be physical depending on the urban structure of a city, or social regarding socioeconomic aspects such as income, class, race, and migration. Both physical and social segregation can promote each other since physical segregation can lead to social inequality and vice versa. In this sense, the assimilation process, structural and cultural engagement, has various dimensions ranging from housing choice to economic integration (Finney and Simpson, 2009). Peach (1981) shows that segregation is a 'fuzzy

concept', since it can refer to singular social class areas[1]. It can also be categorized by economic isolation or by ethnic separation (Peach, 1981). On the other hand, Vaughan (1999) states that spatial segregation could lead to social exclusion, since spatial integration helps population to be connected to market-place; hence economic integration. It is noteworthy that the term social exclusion was originally used in France (Silver, 1994) to describe the process in which certain social categories are disconnected from social systems with regard to rights, resources, relationships and capabilities (Popay et al, 2008). Recently, social exclusion refers to dynamic, multi-dimensional processes operating along four main domains— economic, political, social and cultural— and at local (individual and group) and global (community and country) levels.

2.4.3.1. Spatial Patterns of urban segregation and human activities

Many scientists in different disciplines have attempted to develop an understating of urban land use patterns in cities. Economists and geographers have developed countless models to interpret the location of economic activities. Some theories are based on economic variables such as urban land rent mechanism (Alonso, 1964 in Adedokun, 2011), while others are mainly built on commuting models such as house-work distance (Olatubara, 1996).

Remarkably, many of urban land use models are a revival of von *Thünen* theory (1826) of agricultural location (Fales and Moses, 1972). The model of agricultural land use rests on studying the relationship between a particular agricultural product and the spatial distance from the market, and the impact of these two variables on profits. Obviously, this model pays the attention to

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[1] The case of informal areas in Cairo seems not to fit this definition, since self-evidence shows that informal settlements in Cairo host not only low income groups but also some of social class.

the spatial distance and its influence on transportation cost of goods; hence profits. However, discarding other variables produces an isolated state or a single city, an exclusive business central market area containing all products and employment.

Importantly, the classical approach for understanding patterns of urban segregation is proposed by the Chicago school, established in the 1920th, that depicted the city as a social laboratory. The school developed three classical models for interpreting patterns of residential segregation (Swanson, 2009; Feitosa, 2010). Burgess (1924) proposed a model, known as the concentric model, which assumes that cities evolve in rings around the CBD. The more the families are away from the CBD, the wealthier they are. According to that model, also known as a center-periphery model, CBD will contains commercial and administrative uses. Then, CBD will be surrounded by deteriorating housing that usually referred as a zone of transition, formerly occupied by high class families. Surrounding this zone of transition will be three rings of housing ranging from high density with poor quality for workers to lower density with high quality for the elite (Pacione, 2005; Kendall, 2013). The model shows how economic and political forces play an important role in the locations of people within the city. It also includes the invasion process in which a group 'of people or type of land use arrives in an area previously occupied by another group or land use', in zone2, for example, recent immigrants and poor individuals invade areas previously occupied by high-income families. The invasion process gradually is turned into a succession process when the invaders predominate an area (Kendall, 2013).

Despite the fact that concentric zone model is simple and easy to understand, it does not take physical characteristics into consideration. Moreover, Burgess could not have foreseen the development of transport that can commute more people. Another criticism on Burgess's model is that many settlements on the peripheries of contemporary megacities are now informal or slums, while the areas surrounding CBD are the most expensive. This pattern, then, does not follow Burgess's model. On the other hand, the observed clear-cut in this model is away from reality. Moreover, residential zones will, of course, contain mixed uses within them as cities are not monocentric but rather polycentric.

Another model, known as sector model, was proposed by Hoyt (1939). According to Hoyt, cities grow in sectors or wedges rather than rings. In this model we can observe that high class zone is located as far as possible from low class since like attracts like. Hyot's model, Like Burgess's, disregarded the impact of physical environment on the land use pattern; both Burgess and Hyot depended upon social structure in their models. Hyot, also, divides land uses sharply, the matter which is not related to reality. Nevertheless, the two models from Burgess and Hyot allow for recognizing the basic features that determine the land use distribution within the city (Swanson, 2009; Feitosa, 2010; Kendall, 2013).

Chauncey Harris and Edward Ullman (1945) created a model, known as a multiple nuclei model, which advocates the idea that development does not conditionally arise from the central business district but rather from many nuclei depending on various factors −economic, historical, cultural, etc. (Swanson, 2009; Feitosa, 2010). Accordingly, land uses cannot be predicted as growth occurs wherever there are opportunities for development. To say it

differently, cities could grow haphazardly depending on the nuclei that will lead the process. For example, airports, usually constructed on the edge of a city, will attract further uses such as restaurants and hotels. Likewise, universities will need more services such as bookshops and fast-food restaurants, and so forth, and then, more services will attract more development producing 'multiplier effect' (Swanson, 2009). Obviously, this model calls the attention to the dynamic process of urban centrality; however, the model is based on *location* and *microeconomic* theories, which rest only on pure economic perspective. Notably, research with an economic perspective aims to explain the relationship between the location and the type of economic activities based on the assumption that people choose — based on their own self-interest— locations that maximize their profits and utilities. Based on spatial distance, *location theory* focuses on the geographic location of human activities. Likewise, *microeconomic theory* is concerned with the behavior of agents in making decisions on the allocation of urban activities. Seemingly, location and micro-economic insights are less realistic due to obscuring the physical dimension of cities.
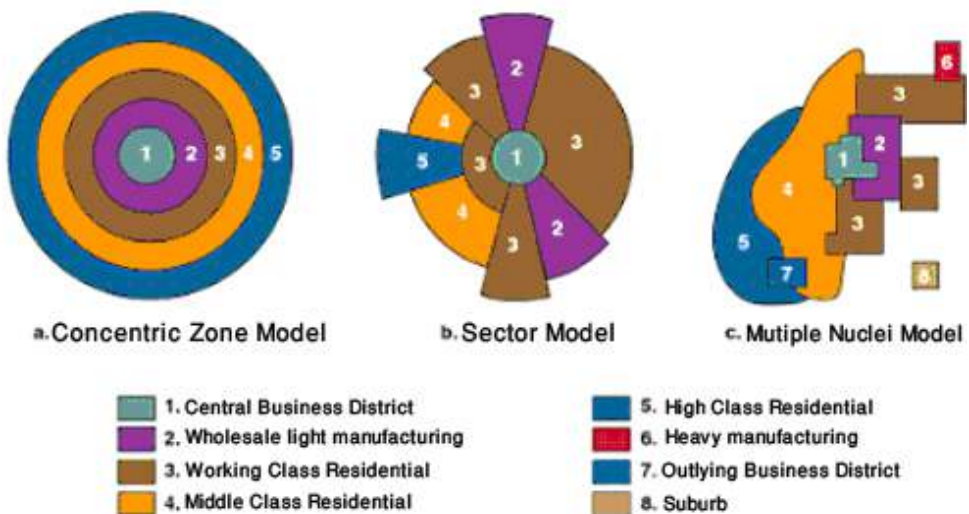
Figure 2.6. Three models of the city (source: Kendall, 2013)

Different from the three previous models that many cities of the developing world do not follow, Larry Ford (1996) (a professor of geography at San Diego University) developed a model exemplifying the characteristics of Latin American cities. In this model, the elite spine arises from the CBD, while squatter settlements, areas of extreme poverty that are called *favelas* in some cities and *barriadas* or *barrios* in others, are located on the outskirts of a city settlements (Pacione, 2005; Swanson, 2009; Blij et al, 2010). It is worth mentioning that high-income residential areas are about gated communities in order to protect dwellers from the crime arising from the favelas. It is also noticed that the model looks like a bicycle wheel with rims and spokes where all roads lead to the CBD. This 'centripetal' or centralizing tendency does not fit the 'newer centrifugal or decentralizing tendencies' (Jackiewicz and Bosco, 2012).
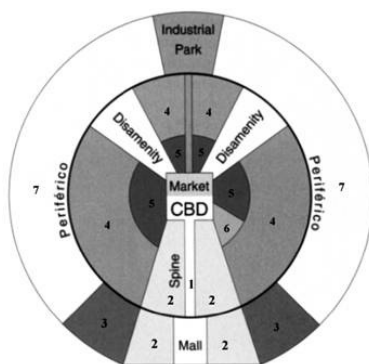
1. Commercial	5. Zone of maturity
2. Elite Residential Sector	6. Gentrification
3. Middle-class Residential	7. Zone of peripheral squatter settlements
4. Zone of situ accretion	

Figure2.7. Ford model of Latin American city structure (source: Brunn et al, 2003; Pacione, 2005).

Unlike Ford's model, Terry McGee (1967) developed a model for the Southeast Asian city. Most Asian cities are located on coasts and have been constructed for trade. Accordingly, the port zone is the most important among other zones that extend outward from it. Closer to the port are specific zones for Western companies to facilitate exporting goods. Surrounding the Western commercial zones are suburbs and squatter settlements as well as market-gardening zones (Swanson, 2009).
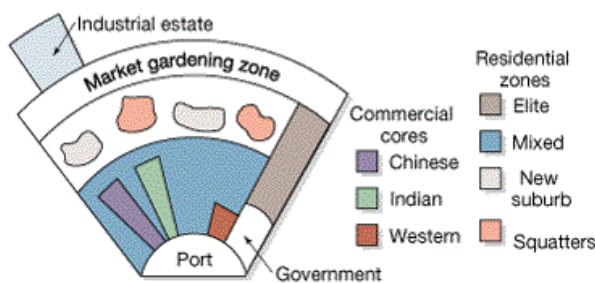
Figure2.8. Southeast Asian City model (source: Swanson, 2009)

As for African cities, colonial stamp is clear in their structure and functions. Accordingly, three CBDs can be identified: the colonial CBD within which the headquarters of the colonial governmental is established; the traditional CBD that contains the financial institutions and commercial uses; and the market CBD where goods 'from rugs to vegetables to animals' are sold. Beyond the three CBDs are the ethnic neighborhoods. Surrounding the ethnic neighborhoods will be the mining and manufacturing zones as well as informal settlements.

Many African cities lack transportation systems and infrastructure the matter that increases the isolation of low-income areas from their surroundings since low-class people cannot afford the commute into the center for meeting

their needs. Unlike many African cities, Cairo, Egypt, is on its way becoming a modern city. However, slums spread everywhere within its urban fabric constituting a challenge for further development.
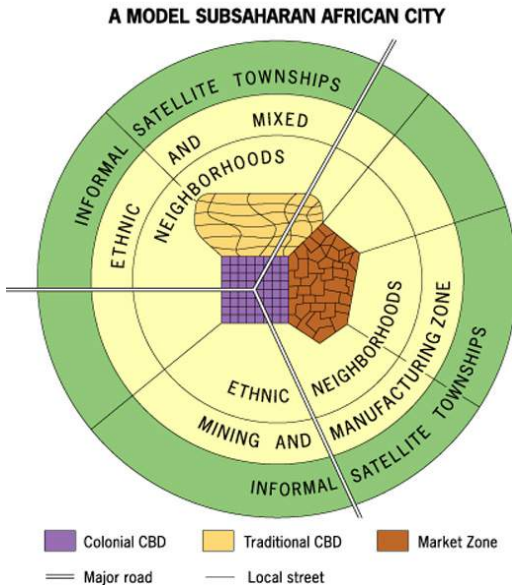
Figure2.9.   African   city   model   (source: Swanson,   2009;
http://lewishistoricalsociety com/wiki2011/ tiki-read_article. php?articleId=92) .

It could be inferred from previous models, except the concentric model, that areas of poverty are usually located on the peripheries of a city and in isolation from the elite zone. Additionally, in terms of land use distribution, it can be concluded that some approaches focus on market conditions and locational choices, whilst other approaches were interested in the pattern of spatial interaction between places for goods and services and the ease of movement of people between them on the basis of distance.

However, the spatial structure of the street grid and its influence on the pattern of urban poverty and human activities in a fragmented city— like Cairo— is less addressed. The question now is what is the logic behind the geographical concentration of poverty? And what are the socioeconomic

implications of the spatial configuration of informal settlements, on the periphery, that are engulfed in cities due to urban expansion? This is what we will try to answer in this thesis.

2.4.3.2 Spatial Segregation: good or bad?

Physical segregation of disadvantaged people may have positive or negative outcomes on different domains, however negative effects are overwhelming. Whilst good segregation is usually voluntary, bad segregation is involuntary in common (Finney and Simpson, 2009). Lupton (2003) states that disadvantaged people in segregated areas will differ in their social relations from those in integrated areas (Vaughan, 2007). Disadvantaged people in segregated areas will have less contact with others and this will result in low access to job opportunities, and to public utilities such as schools, and health services, and will in turn reinforce inequalities and social exclusion (Cutler and Glaeser, 1997; Feitosa, 2010). Moreover, cooperation between disadvantaged people from different backgrounds won't be established as a result of the absence of social capital in which informal values and norms are shared (Feitosa, 2010). In fact, if disadvantaged people are separated from others, they will learn a few skills, but will keep their values and norms that may be in conflict with the host society.

Unlike disadvantages of segregation, community in segregated areas tends to be comprised of homogenous people who tend to cluster adjacent to each other for reasons related to religion, self-help, etc. This kind of clustering has a positive impact since it can maintain cultural identity, and can increase solidarity, sense of community, and in turn reduces anti-social behavior. Another advantage of segregation is that it helps poor people by protecting their businesses from outsiders' competition (Cutler and Glaeser, 1997).

Moreover, informal areas, which are mainly places for disadvantaged, provide sustainable ways of life respecting walkability and self-sufficiency, since their urban forms tend to be compact (GTZ, 2009).

In summary, segregation is an urban phenomenon that despite its positive impacts, contributes strongly to aggravation of many social pathologies such as exclusion and deprivation. Accordingly, minimizing the magnitude of this phenomenon is of great importance for the gentrification of urban life in general.

2.4.3.3 Commercial Land Use and Socio-Economic Improvements

The rate and location pattern of commercial functions (shop, workshops and kiosks) within an urban environment influence the livability of a neighborhood (Hillier et al, 2000). When commercial activities are concentrated along highly accessible streets, they get the optimum benefit from the movement and this in turn facilitates urban consolidation. In their studies on 17 small-sized[2] informal settlements, Hillier et al (2000) and Green (2003) found that spatial factors can support or impede the existence of commercial uses and this in turn will improve inhabitants' socioeconomic conditions and hence physical consolidation, self-improvement. Seemingly, the degree of urban consolidation depends on the ratio of commercial buildings on the outward edges[3] of a settlement. This ratio of commercial

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[2] The average size of each settlement was approximately 4.83 hectares populated by a mean of about 962.9 persons. Actually, classifying the size of a settlement as small or large is somewhat subjective. While urban contexts of inhabitants between 140,000 and 400,000 are identified as large (UNCHS, 2003 in Shafiei, 2007), other cases fall the number of persons to 120,000 (Mora, 2003 in Shafiei, 2007).

[3] An edge street is usually a major planned street that traverses or passes by a settlement and if it runs through it, it should be rather straight "and extends beyond the settlement at least equal to the settlement length" (Shafiei, 2012: 242).

activity is called 'Edge Oriented Commercial Activity' or EOCA[4] (Hillier et al, 2000; Shafiei, 2007). However, it is not clear whether the findings of Hillier and his team can be generalized on large size settlements— where internal commercial streets are more likely to be found— or whether they are peculiar to small size areas, where internal markets are not expected to be existent.

Shafiei (2007) argued that it is not just the ratio of EOCA but the overall relation between commercial activities and spatial factors that might enhance consolidation. He demonstrated in his studies on large informal neighborhoods (average area of 172 hectares, with a mean population of about 40000 people) attributed to the city of Zahidan (southeast of Iran) where a significant correlation was found between shops and the global level of the road network. In other words, the key factor in fostering consolidation is the economic gain that shops get through their influential position along more accessible streets.

Apparently, the more the size of a settlement increases, the less the capacity of its outward edges to host commercial activities. To explain, assume that residents of a particular neighborhood will set their shops along the external plots and hold the internal ones for single residential use. Suppose a smaller neighborhood having a very simple square layout of 3 by 3 cells (9 plots in all), then 8 out of 9 plots are located along outward edges and hence the proportion of commercial to non-commercial use would be 8 to 1(fig.2.8. left). By enlarging the size of the square into 16 cells (4 by4) the proportion of shops would fall to 3 and so forth. As such, the capability of outward edges as the exclusive location to host shops falls when the size of the

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[4] The formula for calculating this ratio is as following: EOCA= 10(shops/plots) + 10(edge shops/ plots) + (edge shops/ shops) (Hillier et al, 2000)

neighborhood grows (fig.2.8 right) (Shafiei, 2013). Nevertheless, as mentioned before, the key issue is not just the capacity of a neighborhood to accommodate commercial use, but all in all it is the efficiency of shops' locations on more accessible streets (Ibid).
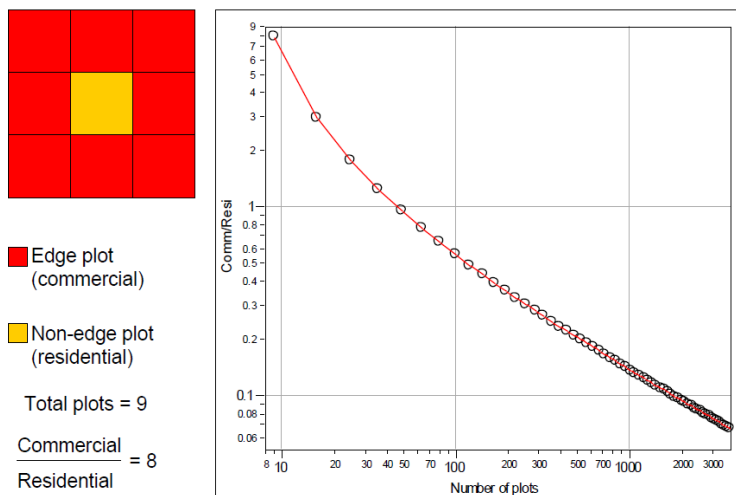
Figure2.10. A presumptive square neighborhood of 9 plots and the commercial to residential ratio calculation (left). A scatterplot of the commercial ration against the gross number of plots in a log-log scale (right) (source: Shafeie, 2013: 222)

Shafiei calculated the actual commercial rate in a way, banding method, similar to that developed by Hillier and Sahbaz (2005) when calculating the crime risk for a study on space and crime. In order to avoid the logarithmic function between the rate of commercial activities on a street segment and the number of dwellings on that segment, all segments that have the same count of dwellings are grouped in a certain band. The segments within each band are patronized as an imaginary one single line where the aggregated number of an event (e.g. shops) is divided by the aggregated number of dwellings for all street segments of that band (Hillier and Sahbaz, 2005; Shafiei, 2007). Shafiei found that the distribution of commercial activities

within large informal settlements is related to the street network at global scale analysis suggesting that internal routes can act as mediators between centers and sub-centers.

More recently, Al-Ghatam (2009) studied the spatial distribution of edge and internal shops within ten villages (average area of 65.6 hectares, with a mean population of about 5541 people)[5] engulfed by Manama and Muharraq cities in Bahrain. She found that in seven of these villages, the spatial structure of commercial activities is related to either global or local structures or sometimes both levels (Al-Ghatam, 2009). But is there always a relation between the syntactic attributes and the pattern of commercial activity? In other words, can these outcomes be found in urban environments of large-scale agglomeration such as Cairo? Seemingly, further research on different types of settlements in different urban contexts is needed to give a more meaningful interpretation of how space influences land use pattern. On the other hand, the reviewed studies have not considered micro-scale spatial relationships between private and public realm, such as the proportion of front doors that are directly connected to the street.

2.5. CONCLUSION

This chapter reviewed theories regarding space and society and theories on migration, segregation and slum formation. Following is a summary of the review mentioned in this chapter:

Theories on space and society have been grasped in different views. While some theorists suggest the notion of territoriality where boundaries of space

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[5] In this thesis, the case studies are neither large (over 100,000 Inhabitants) nor small (below 25,000 Inhabitants) but rather mid-sized. Ezbet Bekhit is inhabited by 37,000 persons living over 18.5 hectares, while Ezbet Al-Nasr hosts approximately 60,000 inhabitants occupying 30 hectares. Besides, Abu Qatada has 27,016 people livings in 28 hectares.

and community overlap with each other, others postulate that relations between communities are transpatial and, then, social groups have multiple memberships. A third type of community could have both spatial and transpatial links as a certain social group can maintain its solidarity and at the same time can integrate in employment and education with the hosting society; in this sense, concentration may not equal segregation. In fact, the notion of solidarity was the main paradigm on which many theorists built their thoughts about society constitution.

On the other hand, whilst some scholars depict the space as a background of activities, others —like Harvey, Lefebvre, and Hillier and Hanson— believe that social information is embedded in the spatial configuration of an urban area. Harvey explains the daily socio-spatial process through, the economic base of urban society, the spatial distribution of flows of capital. In other words, Harvey's theory addresses the struggle of urban space and quality of life/social injustice through the circulation of the capital. Simply, investment or production result in a surplus value, profit, that need to be absorbed through reinvestment that will of course requires more employment. Workers will struggle for higher wages and a better quality of live. They will pay extra money back or a surplus value to the elite in the form of higher rent dwellings, telephone charges, and so on. But what if the surplus value of production is not absorbed? According to Harvey, this will lead to unemployment that in turn will lead to the emergence of poor or slum areas. So, urbanization is helpful in understanding or realizing surplus value. This reveals the influence of space on people locational decisions in terms of residence and workplaces. From this discussion, it is now very clear that the notion of space and society in Harvey's theory is explained at macro geographical scale, long-term socio-spatial transformations. It reveals how

space affects peoples' decisions, where they live and work, in the light of their income; but, what about the role of space in individuals' behavior and their relations to each other at micro scale (dwelling) level, daily practices in urban space? This seems less addressed, or even absolutely neglected, in Harvey's approach. Furthermore, the exclusive focus on economic factors for explaining socio-spatial process in Harvey's approach and in Marxist theories in general, is questioned by Giddens (1990) and others (Held et al., 1999).

Unlike Harvey, Lefebvre argues that the social and the material systems are interlinked and separation between them should be avoided. Lefebvre asserts the need for examining the relation between the two systems, but he did not develop a theory for measuring this internal relation. This Dialectical insight is confusing and stops at the stage of philosophy as it cannot measure objectively how an urban environment influences social life and vice versa. Unlike Lefebvre, Hillier argues that space is 'an objective entity in itself' (Hillier, 1993, p. 15). In other words, space is a physical entity. So, although space and society are mutually related, they must be separated from each other (unlike Lefebvre) and then bridged through studying how they affect each other. From this discussion, we can see that Lefebvre's views and Hillier's ideas are in harmony with each other in some parts and in contrast in other ones. Both agree that space and society are connected. However, Lefebvre tried to explicate the 'cause' of space, while hillier tried to explain the 'cause' and 'effect' of space. To say differently, Lefebvre approach is a society-space, while space syntax is a society-space-society. It is noteworthy that space syntax is an objective method for studying Lefebvre theories. So, both Lefebvre theories and space syntax complement each other.

Giddens, like Hillier, proposes that space plays an important role in shaping society. However, the kind of space they are referring to is different. While Hillier is referring to space from a spatial point of view, Anthony Giddens approaches the matter from a social perspective— since Giddens uses the word *locale* instead of place to include the physical dimension or the place and the nonphysical one, 'behavior settings'. Both place and settings structure situations are embedded practices. Here Giddens depicts daily practices in *time-space* path (Dovey, 1996). Nevertheless, Giddens did not attempt to develop "a theory of society-space relations" (Netto, 2007: 18).

Altogether, there is a 'reciprocal adaptation of space and society' (Hidding, 2006: 101). Klaasen (2003) stated that the physical urban system and urban society are mutually related. The urban system allows societal processes to develop in conditional sense. Meanwhile, the urban system is a product of socio-cultural, economic, and administrative processes (figure 2.11). What is now needed is to unify insights from various theories into a comprehensive approach of space and society.
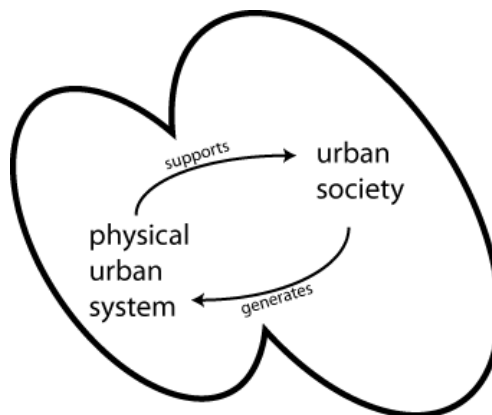
Figure 2.11: The relationship of space and society, according to Klaasen (2003).

This chapter also presented theories on migration and its spatial impact. Migration has an influential role in urban expansion. Earlier researches showed that differential zones are created within the city due to social, economic, political and cultural reasons. In the concentric model, areas of poverty are concentrated closer to the CBD in the first generation of migration, whilst high class residential areas are situated on the edge of the city. In sector model, people are distributed within the city based on their social structure. Therefore, the rich and the poor classes are located as far as possible from each other. Here, the high class of citizens voluntarily segregate themselves from the disadvantaged communities. In other models such as the multiple nuclei model, the city grows haphazardly depending on economic opportunities for development. This usually results in a fragmented urban pattern. All proposed models discuss the distribution of different classes at a macro scale (city-wide) level neglecting the role of spatial variables in shaping society. In other words, such models focus on the geographic scale rather than on urban space.

As for the distribution of economic activities, two approaches are addressed in this chapter:

1) Insights from geography and economy: economy theorists and geographers have developed several models to interpret the location of economic activities. According to location and micro-economic theories, an optimal allocation of activities is the product of market mechanism that involves three main categories: commodities, land and transport. Land itself is not scarce, but what generates its value is the cost of travel and accessibility (de la Barra, 1989). Although these thoughts from traditional economic theory provide insights on the influence of spatial conditions on

land use distribution in terms of spatial distance and movement cost, they cannot be facilely applied due to a lack of a method for analyzing the spatial parameters. In other words, 'location theories' miss "the connection with the real word" (Budiarto, 2007: 31). Optimal and equilibrium patterns of economic activities and human activities in general, cannot be understood only in terms of market mechanism. Moreover, spatial distance is not the only criterion for allocation and organization of economic functions. Therefore, there is a need to unify insights from various fields into a comprehensive theory of urban land use.

2) Insights   from a spatial configurative approach: space syntax shows that the spatial configuration (the arrangement of solids and voids of urban layout) generates both pedestrian and vehicular movement. On the basis of movement rate, movement-seeking activities (e.g. commercial uses) will be located along accessible routes, whilst less-movement activities will migrate to the rest parts of urban system. Commercial uses will attract more uses and so on. This dynamic process is called 'movement economy' (Hillier, 1996). In this sense, the configurative approach sees that urban space— unlike locational and microeconomic theories— plays a key role in shaping human actions.

Lastly, through the literature review presented in this chapter, we can get an overview about the relation between various socio-economic aspects and spatial forms, which has been always the core of interest for many sociologists, geographers, planners and architects. The inquiry undertaken in this thesis uses space syntax theory as well as insights from sociological and economic approaches to analyze the socio-spatial pattern in Cairo at both micro and macro scales.

3 RESEARCH METHODOLOGY

Chapter Three

Research Methodology

Chapter 2 sets out to provide an overview of the theories demarcating the relationship between space and society. A review of previous studies paved the way to building the approach of this thesis. Following the introduction section of chapter 3 is the research design that delineates the flow of the work. Then, the main concepts of space syntax theory and method are defined and elaborated. Next, field reconnaissance analyses including virtual gates and questionnaires are elucidated amply.

3.1 INTRODUCTION

It is difficult to conceive of 'space' as being without social content and, equally to conceive of society without a spatial milieu. The relationship is, therefore, best conceived as a continuous two-way process in which people create and modify spaces while at the same time being influenced in various ways by those spaces.

(Carmona, M. and Tiesdell, 2007: 141)

One day, Churchill said: "First we shape our buildings; thereafter they shape us." More precisely, it is the urban grid shaped by buildings that works to shape society. At the same time, the urban grid or the spatial configuration is apparently a social product (Sailer & Penn, 2010: 7). This thesis integrates insights from sociological, geographical and economic approaches and theories with those from a configurative approach, space syntax. Using sociological and economic theories is important to understand the behavior of people in terms of choosing where they live, and their land use decisions. In other words, these theories and approaches help in understanding how people shape their

cities and how their social network is constructed. On the other hand, the space syntax tool is used to measure the spatial characteristics of the case study areas and the spatial network, and to measure how this could influence human behavior and produces socioeconomic differences.
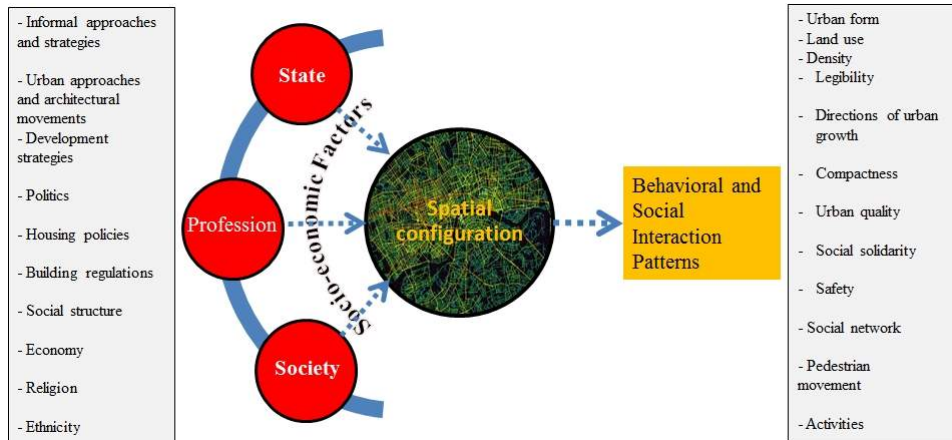
Figure 3.1 Research approach (source: author).

3.2. RESEARCH DESIGN

Research design is a set of steps by which data are collected, analyzed, interpreted and reported. Triangulation, also known as "mixed method" research, combines different kinds of data (qualitative and quantitative), methods, approaches, and concepts into one single study (Johnson and Onwuegbuzie, 2004: 17-18). Using mixed methods in exploring research problem helps compensating the weakness of a single approach. Further, it can be helpful in testing the agreement of results arisen from different measuring techniques. However, discrepancies between different kinds of data need to be resolved. In addition, using mixed methods is a challenging process and time-consuming.

This study uses a mixed method or a triangulation strategy along with a comparative approach. First, it reviews socioeconomic and political

forces that produced the physical structure of today's Cairo. Second, at a macro scale level, the research aims to understand the dynamics of urban growth as well as the spatial characteristics of Cairo metropolitan area. The spatial analysis provides a hypothetical interpretation regarding the socioeconomic segregation. The second step will verify the analytical base evidence of the socioeconomic segregation. Methods to conduct macro scale analysis are in the following order: establishing diachronic axial models; using space syntax technique for spatial analysis; lighting up the integrated and segregated parts of the city and finally; test out the relationship between spatial factors and socioeconomic census data at the neighborhood (Shyakha) level through JMP statistical package.

At a micro scale analysis, the study extends the research findings and explores in detail the real relationship between the social (real pedestrian movement patterns/ activities) and the spatial. To do so, three informal areas as well as a planned neighborhood, Al-Sharekat in Nasr City, are chosen for comparative analyses. Abu Qatada is an example of informal areas built on private agricultural land, while both Ezbet Bekhit and Ezbet Al-Nasr represent informal areas of state-owned desert land. The three selected informal areas are different in terms of age, urban pattern, topography and degree of spatial accessibility. Al-Sharekat would be used as control variable to be compared with the three informal settlements in terms of syntactic parameters and distribution of commercial activities. A gate system is used to get data on actual movement through selected routes. Moreover, field survey is used to get land use maps. GIS software is used to store and analyze computer models and the data collected on-site. Remarkably, spatial analysis at a

micro scale level facilitates testing the second hypothesis of this research work and gives credibility to the first.

The last step of this research is to understand issues related to real demographic data, belongingness, sense of community, places of interaction, and safety. That is to complement and consolidate spatial findings and to help in identifying non-physical variables that might influence sense of community and feeling of urban safety. This step is fulfilled by using questionnaires. SPSS statistical package is used to store and analyze the questionnaire's survey forms. The results of the questionnaires for the three informal areas would be compared with the average of planned districts in Cairo.

In this chapter and in the following analytical ones, the main data sources and the methods of generating these data will be revisited and more detail will be given about their application in this inquiry.
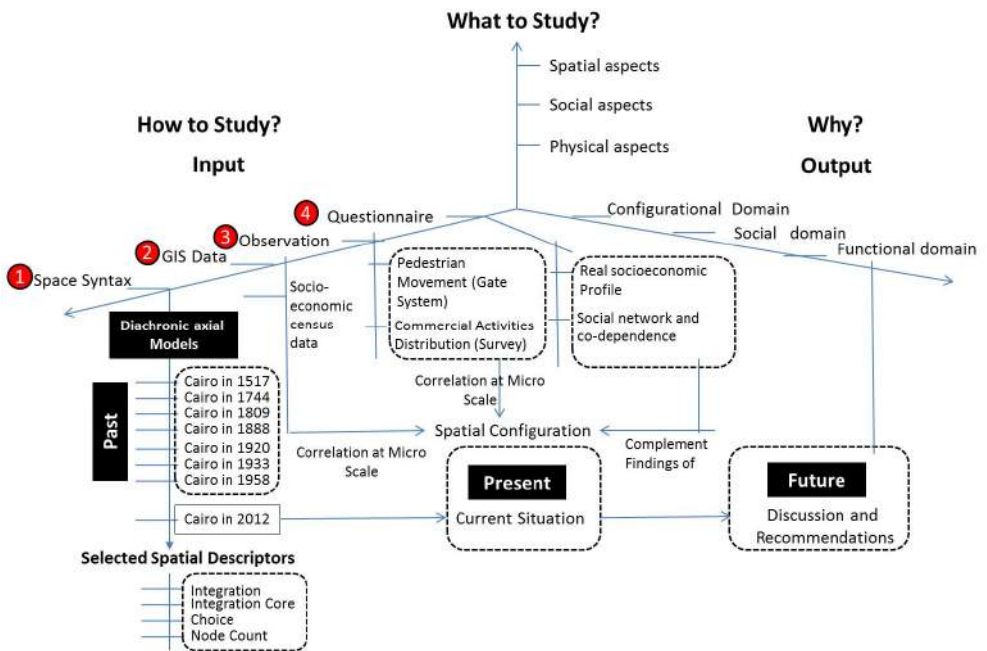
Figure 3.2 A detailed research framework (source: author).

3.3. SPACE SYNTAX MEASURES

The space syntax measures of angular integration and choice are employed in this thesis to understand how spatial variables affect social aspects at a metropolitan and street segment levels. Normalizing the measures enables comparing urban systems with different sizes with each other. Consequently, a neighborhood could be compared with the whole city and with smaller urban systems as well. Actually, it is more important to normalize on the local scale than it is on the global scale (radius n), that is because radius n is a constant. Normalization can be problematic in areas where there is huge variations between sparse and dense grid. Normalizing angular choice was introduced by Tao Yang in Hillier et al. (2012). The formula for normalizing angular choice (NACH) is as follows:

NACH = logCH+1/logTD+3

NACH is calculated in UCL Depthmap software as follows:

log(value("T1024 Choice RXXX metric")+1)/
log(value("T1024 Total Depth RXXX metric")+3)

Where XXX is the metric radius of interest

NACH has proven to be independent from the size of urban systems (

Normalized angular integration (NAIN) is measured as:

NAIN = NC^1.2/TD

In UCL Depthmap, NAIN can be calculated as follows:

value("T1024 Node Count RXXX metric")^ 1.2 /
(value("T1024 Total Depth RXXX metric")+2) (Al_Sayed et al, 2014)

3.4. URBAN BLOCK SIZE - GRANULARITY

A city block is defined by its surrounding street structure (Mahajan, 2006). Block sizes influence movement modes in urban areas. While larger blocks, less islands, support vehicular movement, smaller ones foster walkability by

virtue of minimizing trip lengths. Consequently, the block size can depict existing and potential land use. Commercial streets will have a number of smaller urban blocks larger than residential or industrial areas. In other words, the degree of intensification of urban grid will distinguish centers and sub-centers from surrounding activities (Siksna, 1997; Hillier, 1999; Kusumo, 2006; Space Syntax Ltd., 2004; Czerkauer-Yamu and Voigt, 2011). For example, the top row in figure 3.3 shows a thematic map of urban block size coloring up from red, for smaller blocks, to blue, for larger ones, for two different areas, Cairo CBD (left) and Nasr City (right), within Cairo metropolitan. Cairo CBD has a predominance of fine grain (red and orange), where retail, catering, administration, and leisure uses manifest. Conversely, Nasr city, mainly for residential use, has much larger blocks (green and light blue) than those found in Cairo CBD. The differentiation between Cairo CBD (center) and Nasr City (non-center) is also reflected in segment analysis where Cairo CBD has larger number of street segments (node counts) in short metric distance than Nasr City.
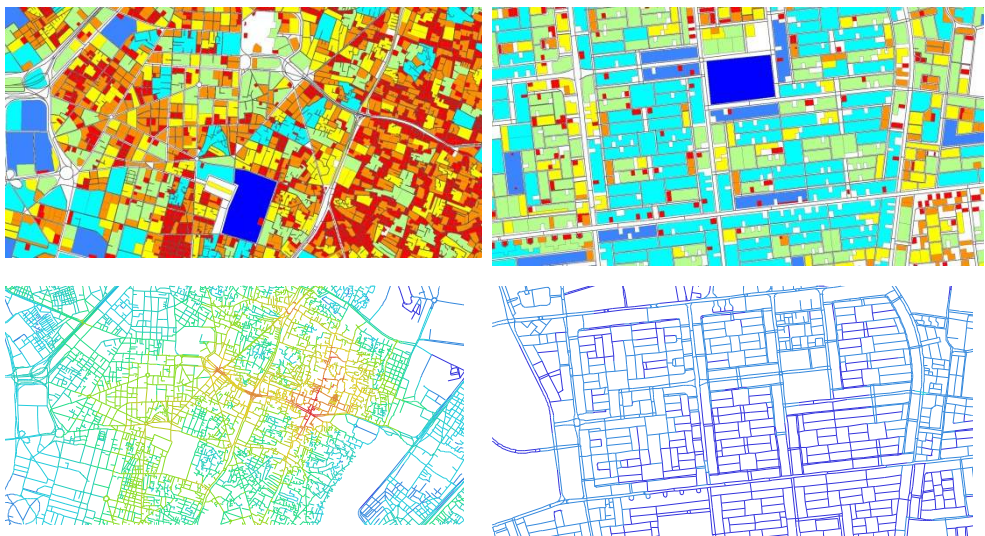
Figure 3.3. Urban block size and node count (R800) in Cairo CBD (left column) and Nasr City (right column)

3.5. STATISTICAL ANALYSIS

3.5.1 Banding Method

The rate of commercial activities per street segment is sensitive to the number of dwellings on that segment as the rate is obtained by dividing the number of commercial buildings by the number of dwellings on the segment. In order to compensate this distortion, commercial rate is normalized using the banding method. Simply, 'True Commercial Ratio'[1] (TCR) for a particular band is the total number of commercial buildings over the sum of dwellings in band's segments. Once this rate is calculated in each band, it can be plotted against the average of a syntactic attribute of each band of segments (e.g. integration) to reveal how they relate to each other. The strength of the correlation gives indication of the degree of commercial efficiency (Mohamed et al, 2015).

Table3.1. shows the banding range applied to the case study areas. Ezbet Bekhit has 13 bands, whilst both Ezbet Al-Nasr, Abu Qatada and Al-Sharekat have 18, 21 and 11 bands respectively.

Segment band	Building count on segment	Segment band	Building count on segment
1	1	12	13- 14
2	2	13	15- 16
3	3	14	17- 18
4	4	15	19- 20
5	5	16	21- 22
6	6	17	23- 25
7	7	18	26- 29
8	8	19	30-34

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[1] This term was suggested by Shafiei (2007) to describe the normalized commercial rate.

9	9	20	35- 38
10	10	21	39 and more
11	11-12		

Table3.1. The banding scheme of street segments according to the number of buildings on them.

As can be seen in figure3.4, the true commercial ratio (TCR) is plotted for each band of segments in the three case study areas, and it is obvious that commercial activity rates fall for the three areas while the band number increases.
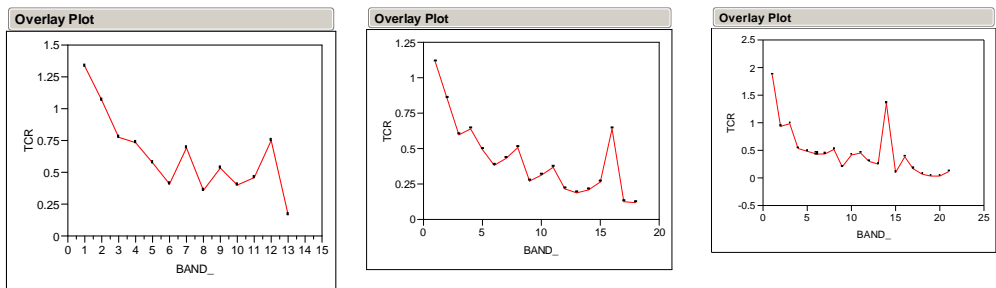
Figure 3.4. The true commercial ratio for each band of segments in Ezbet Bekhit (left), Ezbet Al-Nasr (Middle) and Abu Qatada (right).

3.5.2. The accessibility rank

Another prominent quantitative method for examining whether the distribution of commercial activities follows a spatial order (non-randomness) or placed randomly regardless of accessibility is through calculating the percentage of total commercial buildings in the top percentages of highly accessible buildings (those lying on highly integrated segments). The higher concentration of commercial activities in highly accessible buildings, the less haphazardly distributed the land use is. Put it differently, the idea here is to calculate the percentage of commercial

activities that would be captured by a particular class interval of accessibility rank. The higher the percentage of shops gets captured by the most accessible locations, the more the efficiency of such locations can be deduced and the less randomness of their distribution can be indicated (Shafiei, 2013).

3.5.3. The Gini Coefficient

The Lorenz curve, proposed by Lorenz (1905), is used in economy, ecology and in studies of biodiversity to describe the inequality distribution of a variable (e.g. wealth, income, proportion of species, individuals, etc.). It relates the accumulative proportion of a variable to the accumulative proportion of another (Duclos and Araar, 2006). 'Gini coefficient' (also known as Gini-index) is a mathematical summary of the 'Lorenz curve'. It is helpful in investigating whether the distribution of commercial activities follows a spatial order (non-randomness) or placed randomly regardless of accessibility (Mohamed et al, 2015).

Simply, if the percentage of commercial buildings in a settlement is plotted on the y axis against the percentage of accessibility on x axis, then we can get 'Lorenz curve'. The higher the percentage of shops gets captured by the most accessible locations, the more the efficiency of such locations can be deduced and the less randomness of their distribution can be indicated. For example, figure 3.5 (left) shows the distribution of commercial buildings based on their accessibility rank in Ezbet Bekhit, Mansheit Nasser. The figure shows that about 30 percent of commercial buildings are captured by the top 10 percent accessible routes (the considered spatial measure here is global choice). To say it differently, about 70 percent of shops are caught by the lowest 90 percent plots in terms of global choice. That is to be compared with two presumptive situations: 1) the minimum inequality in which all

commercial buildings are placed equally (the blue dotted line) regardless of accessibility. 2) The maximum inequality in which commercial plots are distributed through the most accessible locations (the red dotted line). The more the Lorenz curve is close to the maximum inequality, the more is the influence of spatial accessibility on the clustering of commercial use. Actually, the Gini coefficient of inequality (or Gini) has a value that ranges between 0, for the minimum inequality, and 1, for the maximum one. In order to calculate the Gini in the example of Ezbet Bekhit the surface area above the Lorenz curve (marked as A) is divided by the sum of the two areas of A and B (see figure 3.5 right) (Mohamed et al, 2015).
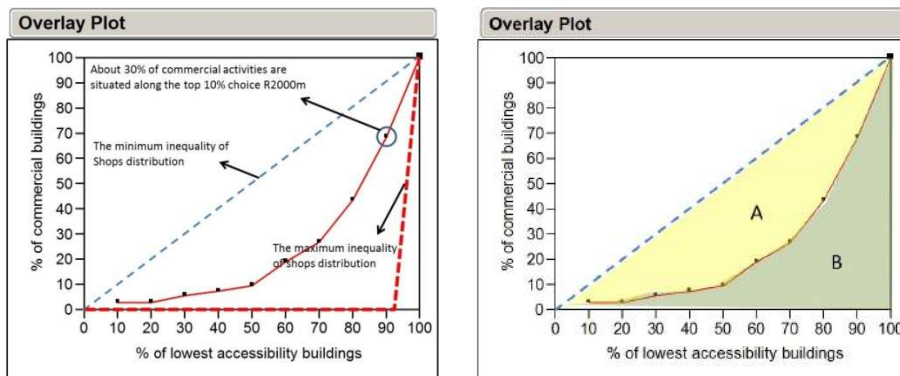
Figure3.5. The Lorenz curve of Ezbet Bekhit showing the percentage of commercial shops against the global accessibility rank (left). The Gini coefficient of Ezbet Bekhit curve calculated as A/(A+B) (right) (source: author).

3.6. OBSERVATIONS AND FIEDL RECONNAISSANCE ANALYSIS

Observations are conducted in order to see how a community use space and to investigate how pedestrian or vehicular movement distributions relate to syntactic measures. Definitely, this helps understand mutual relations between space and society. In fact, there are several ways for on-site observations (e.g. virtual gate, static snapshots, and movement traces).

Choosing a way rather than another depends upon the subject and the location of the study.

3.6.1 Virtual Gates Method

The virtual gate method is expedient for noting patterns of pedestrian and vehicular movement (Grajewski, 2001). Vehicular movement was hardly noticed in the case study areas. That is why it was excluded from this this thesis. Due to safety issues and time limitations, the researcher selected a total of 30 street locations, ranging from busy to lightly used routes to count people. The author stood at each location drawing a perpendicular imaginary line over the street space and counting everybody passing over this line for a while, 5 minutes. One working day with three observation periods (from 8-10 am morning rush-hour, 2-4 pm mid-afternoon period, and 6-8 pm early evening) and with two rounds in each time period were made for each case study.

In order to study people-space relations, movement rates were linked with syntactic analysis through the Geographical Information System (GIS), 'MapInfo' and then were analyzed through the JMP statistical package in order to check association between both variables.

3.7. QUESTIONNAIRES

The first step of this questionnaire is to determine the adequate size of the sample. With a precision (e) of ± 10% and from the population of 20,000-100,000, 100 was defined as an appropriate sample size, with a confidence level of 95%, p= 0.5 (see appendix 5, table 1). As for the respondents of the three informal areas, a total of 300 forms were filled out in the field. Using

Google Drive, one hundred more forms were filled in online to get data on planned districts in Cairo[2].

As inhabitants of informal areas are somewhat homogeneous[3], the participants of this study were selected randomly using a clustering sampling technique where the total population of each area is divided into clusters covering different locations to avoid a biased sample. For example, Ezbet Bekhit was divided into three zones comprising El-Gora, El-Ezba and the external part. Similarly, Ezbet Al-Nasr was split into Al-Arbeinat (Forties), the middle part, and Zarzara. Likewise, Abu Qatada was sectioned into Delawar and El-Ezba. Then each cluster or group in each part of each case is chosen and interviewed randomly. A snowball technique, or chain-referral sampling, is found to be helpful in reducing the time of the interviews through finding interested informants with no need for time consuming on persuading them, since the referral recruit future interviewees from among his relatives, friends and acquaintances (Babbie, 2007 in Marafi, 2011). When the referral asks his family members or friends to be interviewed, the sample of the group grows like a rolling snowball, hence the name. Further, the researcher found difficult access to interview people living in informal areas because of because of the probability of harassment by thugs or drug users. So, the referrals worked as facilitators or mediators between the researcher and the potential participants. Nevertheless, snowball technique was not fully used for all respondents in order to make unbiased estimates resulting, for example, from recruiting subjects who have many acquaintances in the sample.

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[2] Visit the following link to see the online survey form:
https://docs.google.com/forms/d/1g-c1etfp-1EVa6PC3SozKIMFcttKGRkxJhQ_sn-X37k/viewform
[3] Informal areas host not only low income people, but middle class residents as well. In other words, the population of informal settlements is diverse in terms of education, income level, occupation and origins.

Another useful method for gathering information and interviewing a larger sample is joining Facebook pages of the related case studies. The researcher used Google Drive service to create online survey form. He posted on the walls of the related pages a brief description of the background of the research and if the members would like to participate. In order to be trusted the researcher left his contact info, just in case. Unfortunately, in the case of informal areas, he did not receive any single byte response from the pages' members and it looked wasteful to use online questionnaire platform— face-to-face interview was inevitable. Conversely, online questionnaire was very helpful in the case of planned Cairo.

As a male researcher, stopping and questioning women[4], and people in general, in the street is a quite dangerous, especially in informal areas where outsiders are not welcome. As such, locations of shops, coffee shops, workshops, mosques and housing entrances were relatively appropriate for interviews. Furthermore, females were somewhat underrepresented relative to males in the samples due to safety issues. On the other hand, some residents refused to be interviewed since they were fed up with filling in survey forms by numerous researchers. Nevertheless, some other subjects welcomed the idea and invited the researcher to take tea in their homes to record their living conditions. Further, the researcher had to fill in the survey forms himself[5] for most of the respondents of the three informal areas as many of them are illiterate. It took at least 10 minutes for every respondent to be interviewed. Each area took an average of three days, 33 informants

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[4] Women fear men approaching them because of sexual harassment, which is quite common in Egypt (Marafi, 2011). Further people in general fear talking to strangers especially after the Revolution of 25th of January where security situation is unstable.

[5] Distributing survey forms among the interviewees is much easier; however the researcher saw it inappropriate for the chosen case studies.

per day, to be covered. It is noteworthy that I did not employ surveyors at all. Rather, I made the whole task myself.

3.7.1 The design of the survey form

In order to get a well-structured questionnaire, the proposed survey form passed three stages. Initially, the researcher visited case study areas and conducted informal and unstructured short interviews. Afterwards, the researcher referred to some literature on the correlation between space and society. The form was developed from many works, among which is Can (2012). From both informal site visit and the literature the researcher prepared a draft of a form that covers various issues including questions in terms of basic information (i.e. demographic data such as gender, age, education, education, etc.), housing data (i.e. household tenure and unit size), external social ties, walking and safety, sense of community and so forth (see appendix 5). In other words, the form included not only social data, but also spatial factors. The purpose has been to know not just the socioeconomic profile of the people, but also their social network and whether they care about their neighborhoods. Further, questions regarding satisfaction of public facilities were included. This seems to reveal, to a certain extent, the degree of marginalization in the case studies. In order to get the most complete and accurate questionnaire, the researcher took into consideration the proper length of the questionnaire, and the level of knowledge and other preferences of the people. So, questions were simple and clear in order to avoid poor understanding. Further, questions which are likely to get not answer such as asking about income level were excluded from the form. Instead, indirect questions revealing socioeconomic status (e.g. household tenure and size) were included. In order to test the efficiency of the draft form, the researcher printed a limited number of copies (about 30) and distributed in the three

case studies. Inevitably, some few questions, such as inquiries about the number of people known by the informant within his quarter were left with no answer. So, the task in the final version of the survey form was to minimize such problems. Ultimately, the filled forms were processed using the statistical software package SPSS.

 In the form, open ended questions, multiple choices and multiple answers were employed. Three measurement scales used here: nominal (occupation, gender and the like), ordinal (Never, sometimes, a lot; Likert scale of Disagree, neither agree nor disagree, and agree) and interval scale (continuous variable such as age). Beyond just correlating one variable with another, scale reliability helps correlating groups of questions with others. In order to measure the inter-consistency/ the scale reliability of the questions in this questionnaire, a Cronbach's alpha was run for each group of variables (4 groups in our study) and for the whole questionnaire. The value of Cronbach alpha normally ranges between 0 (for the lowest internal consistency) and 1 (for the highest internal consistency). Cronbach's alpha increases as the interrelations among variables included in the questionnaire increases. As a rule of thumb, if a question has a value of less than 0.3, then this variable should be deleted from the instrument. Discarding such unreliable question and the like from the scale could increase the alpha level. Otherwise, the questionnaire should be revised. In other words, the Cronbach's alpha of a scale should not, in all cases, less than 0.60. Otherwise, this would be a warning bell (Dörnyei and Taguchi, 2010: 95).

3.7.2. Measuring Sense of Community

First of all, the researcher would like to differentiate between the concepts of sense of community and that of place attachment. Sense of community refers to emotional connections and bonds between people based on mutual

concerns and interests, while the concept of place attachment revolves around emotional connections between people and place (Manzo and Perkins, 2006). According to McMillan and Chavis (1986), sense of community is "a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (p. 9). On The other hand, Edgü and Cimsit (2011) define place attachment as 'the feeling of possessiveness that an occupant has toward a particular territory' (p. 158). The experience of place is formed through the interaction between members of the community and spatial settings (Low& Altman, 1992; Lawrence, 1992). Importantly, both sense of community and place attachment are intertwined with each other (Pretty et. al, 2003; Manzo and Perkins, 2006).

The Sense of Community Index (SCI) is frequently used to measure sense of community. It is composed of several items loading onto four subscales of SOC suggested by McMillan and Chavis (1986): (1) *membership,* feeling of safety, belongingness and identification (2) *influence,* the reciprocal influence between community and the individual (3) *integration and fulfillment of needs*, fulfilling physical and psychological needs and therefore fostering individual's commitment to the community (4) shared emotional connection, shared interests and history concerning community membership. However, a sense of community can be measured as a one factor model (Townley and Kloos, 2009: p. 363). Moreover, SCI scale has been criticized for using exploratory factor analysis rather than confirmatory factor analysis (Long and Perkins, 2003) and for having weak reliabilities for the whole scale and the subscales as well (Chipuer and Pretty, 1999). This led to creating a new scale for measuring sense of community, the *Brief Sense of Community Index* (BSCI) (Long and Perkins, 2003). The new scale is

composed of three dimensions of sense of community: (1) *social connections* (three items), (2) *mutual concerns* (three items), and (3) *community values* (two items) (Long and Perkins, 2003; Long and Perkins, 2007). In this study, the researcher used BSCI with numerous modifications regarding the formulation of the questions themselves. He did not create a completely new scale, but simplified the questions to fit people understanding in informal areas and also added some new items and removed other. For example, the researcher removed the subscale of community values because it has only two items loading uniquely on it (see Costello and Osborne, 2005: p. 5; Wilmot, 2008: p. 168; Green, 2013: p. 135). The reliability analysis of the scale showed that Cronbach's alpha for the whole three cases is 0.823. The validity of the scale was assessed through factor analysis using Principle Component Analysis (PCA) method for extraction and a Varimax method for rotation. SPSS extracted two main factors (*mutual concerns, and social connections*) from the pool of seven variables. The first factor explained 49.780 % of the total possible variance among all 7 items. This indicates that the scale is unidimensional— as a rule of thumb, the first factor should explain at least 20% of the variance to be stable (Reckase, 1979 in Härtel et. al, 2011). The second factor explained an additional 15.805 of the total variance. Another way for indicating unidimensionality is examining the ratio of the first to the second eigenvalue. Morizot et al. (2007) proposed that this ratio should be over 3 for a unidimensional scale (Ibid: 302). In this study, the eigenvalues were 4.480 and 1.422 for the first and the second factors respectively. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.819, indicating that Exploratory Factor Analysis (EFA) was appropriate for the 7 time scale and for this sample. As a rule of thumb, KMO should be over 0.7. Bartlett's test of Sphericity was significant at 0.01 (p = 0.000). Another output of factor analysis is the table of component

matrix. It showed that six items are loading on the first factor, while one item loads only on the second (see appendix 5). The rotation process using the direct Oblimin method was employed to clear up the picture produced in the component matrix. The outputs of the rotated component matrix showed that four items have high factor-loadings on the first factor, while three questions have loaded onto the second factor. In order to make sure that the pattern has not been simply forced by Oblique rotation method (Oblimin) the researcher re-ran the analysis using an orthogonal rotation method (Varimax) as well (see Green, 2013). The results are same in terms of which item load on which factor suggesting a two-factor Model. However, a one-factor solution is also applicable (see Townley and Kloos, 2009).

3.8. DATA NEED AND AVAILABILITY

- Maps:

1) In order to trace spatial transformation of Cairo through time (from 1517 to 2012), good historical maps containing streets and urban blocks are needed to construct the axial maps. Survey maps from *Le Description de l'Egypte,* the Egyptian, ESA (Survey Authority) and GOPP (General Organization for Physical Planning) were used to construct the diachronic configurational models of Cairo.

2) In order to carry out field surveys for land use and pedestrian movement, maps at plot scale were bought from a company based in Cairo (Interconnection) for creating digital spatial database. Field surveys (conducted by the author) of 2013 provided the retail data and pedestrian movement pattern. Actually, site observations of the locations of the shops' places were carried out as a result of lack of updated land use maps for two of the case studies and for consistency the third was also surveyed by the authors.

- Demographic Data:

In order to identify areas of poverty in Cairo, data on poverty indicators such as income level, education, and unemployment and mortality rate are needed. 2008 data provided by UNDP Egypt are used to get data on population numbers, density, illiteracy unemployment, percentages of people beneath the poverty line, and deprivation.

In order to indicate whether the residents of the case study areas are spatial/ transpatial societies, data on internal and external social networks is needed. Questionnaires are employed to reveal not only social ties, but also to indicate important issues such as feeling of safety and sense of community.

3.10. CONCLUSION

This chapter has outlined the various methods employed in this thesis. In addition, it has described the various sources of data and has also explained how on-site data are complied. The gathered data are complemented with the syntactic one. As a matter of fact, the use of a triangulation or 'mixed method approach' is considerably helpful in overcoming the deficiencies of employing only one method. For instance, the use of the space syntax method reveals the physical properties of the case studies, whilst the questionnaire supports the syntactic results and indicates important issues such as sense of community and social interaction. However, using more than one method does not fit properly with individual work. Gathering on-site data is challenging in terms of time and safety. Furthermore, managing and analyzing various data sources are relatively difficult. Nevertheless, the Geographic Information System (GIS) package 'ArcMap' and the statistical tools of 'JMP' and 'SPSS' are extremely useful in facilitating the process. In chapters from 4 to 7, the empirical part, different data sources will be revisited and various research methods will be applied.

4 GREATER CAIRO REGION

Chapter Four

Greater Cairo Region

4.1. INTRODUCTION

Before analyzing the spatial configuration of the case study areas, it is necessary to understand the global structure of the region —the wider socioeconomic context— and the factors that produced the current spatial structure. Thus, the major interventions in the Greater Cairo Region (GCR) will be reviewed. As such, the primary forces that create a slum can be indicated. To understand the spatial structure of deprived areas, configurational models of historical development will be constructed and analyzed. Furthermore, diachronic models will help understanding the dynamics of urban growth, which can show whether urban space plays a role in directing that growth. Finally, spatial analyses will be overlapped with social data obtained from UNDP Egypt 2006.

4.2. THE DEFINITION OF GCR

Like many megacities, the boundaries of GCR are not commonly agreed (Sims, 2009). The purpose here is not to sail in this dialectic issue. Rather, the researcher takes the administrative boundaries of GCR as defined by the Japanese International Cooperation Agency (JICA) (see Piffero, 2009; Adel, 2011). Note that some parts of Cairo and Giza governorates were separated on 17 April 2008 to create the two new governorates of Helwan and Sixth of October respectively (Sims, 2009; Piffero, 2009). However, the two new governorates were reincorporated into the governorates of Cairo and Giza in April 2011 (Tarbush, 2012). The urban agglomerate of GCR is comprised of the whole governorate of Cairo as well as the city of Giza and Shubra El-Kheima and nine peri-urban or rural districts of Giza and Qalyubiya governorates, plus other new urban communities (eight new towns) situated

93

around Cairo (Sims, 2009: 6-7; Piffero, 2009: 54). According to census 2006, GCR hosts approximately 16,202,000 inhabitants occupying 4,367 square kilometers (Sims, 2009).
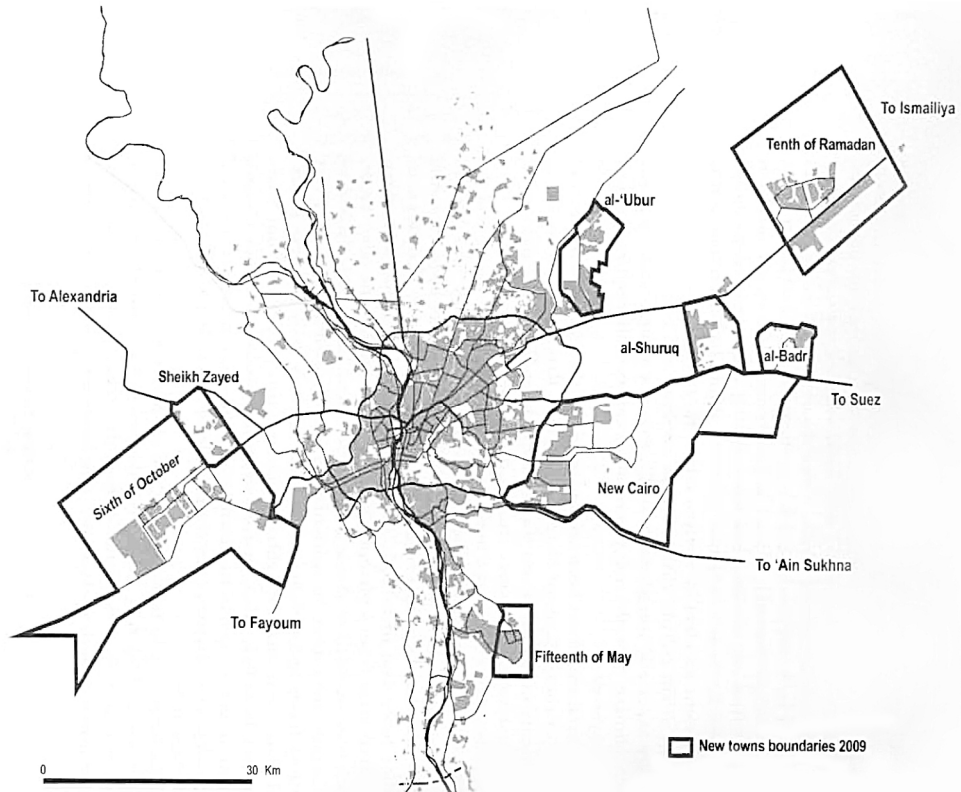
Figure 4.1 Boundaries of Greater Cairo Region. (Source: Sims, 2009; Tarbush, 2012)

4.3. MAJOR PLANNING TRANSFORMATIONS

4.3.1. Historical background of planning practices in Cairo

The first sign of settlements in Cairo dates back to the tenth century AD by the Fatimid dynasty. Cairo had a significant role in the Ancient Egyptian period. The best-known artifacts from these periods are the pyramids, still visible in Cairo city.

The history of the city backs to 640 AD when the Arabian conqueror, Amr ibn al-As, led the Muslim conquest of Egypt. In 642, Amr had established the first capital, Fustat (Misr). A series of palatine cities followed Fustat and influenced the city's form over many centuries afterward: the Abbasid city of al-Askar (750); the Tulunid city of al-Qata'i (868), slightly further north of al-'Askar.
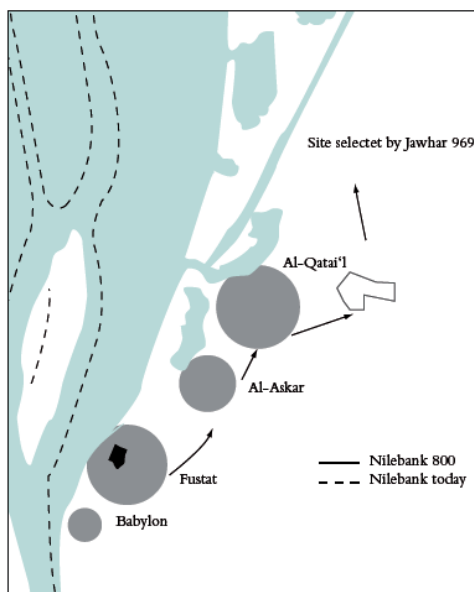
Figure4.2. the first Muslims' settlements (http://www.studio-basel.com/projects/cairo/atlas)

Not until 969 did the Shii'te Fatimid Caliphate, Mu'izz L-Din Allah, conquer Egypt. Mu'izz ordered Jawhar Al-Siqilli to lead the troops towards Cairo to occupy the land around the Nile. Afterwards, Jawhar selected a site north of Fustat to establish a new city for the residence of the Fatimid Caliphs, al-Qahira. The city's structure was a rectangular grid and functioned as a royal refuge. Contrary to this, Fustat remained the dominant commercial metropolis of the Egypt (Abu-Lughod, 1971).

During the Ayyubid period, Salah al-Din established the Citadel, the seat of power in 1176, between al-Qahira and Fustat. He built a wall to encompass the two cities within a single enclosure (Raymond, 2001; Abu-Lughod, 1971, Mohareb and Kronenburg, 2012). However, the two cities did not evolve into a single conurbation, but rather developed separately in a contrasting way (Raymond, 2001). Indeed, the large empty zone between Qahira and the Citadel was the start point of urbanization that continued after the Ayyubid era. On the other hand, Salah al-Din allowed the public to construct their houses within Qahira that was a princely quarter during the Fatimid's reign. This of course changed its old function and structure, since new streets and denser patterns of buildings began to overwhelm the area.

In the Mamluk period (1250-1517), Qahira completed its transformation, and numerous shops and caravanserais (*wakalas*) were constructed along the Qasaba, the major axis within Qahira from Bab al-Futuh to Bab Zuwayla. The urban development extended beyond Qahira to the neighboring areas, in response to the needs of population growth and the ambitious plans of the Mamluks. In the north, sparsely inhabited quarter, Husayniyya, was established, northwest of Bab al-Futuh (Ibid). Likewise, the southern zone between Qahira and the Citadel was actively urbanized, though relatively uneven except along the main routes. As for the west, the expansion was confined to corridors along the Khalij and the principal axes crossing over it. For example, urban clusters had emerged near Boulaq's port, northeast of the Nile, which played a significant role in the grain trade (Ibid).
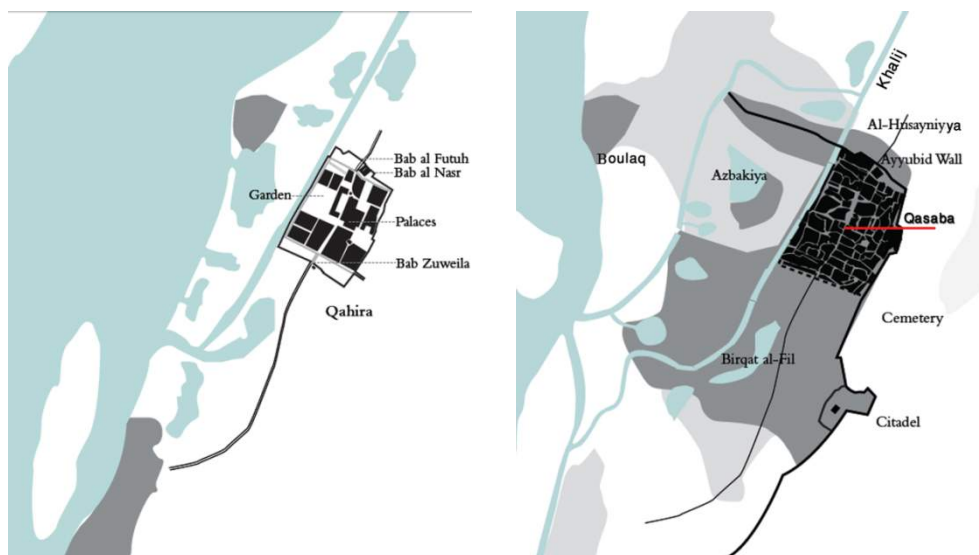
Figure4.3 Fatimid Cairo (left) and Mamluk city (right) (http://www.studio-basel.com/projects/cairo/atlas/islamic-cairo.html)

Under the Ottoman regime (1517-1798), Cairo experienced a few changes. The political and economic anarchy during the Ottomans led to a growing dispersed pattern of settlement. Cairo's southern part did not experience large-scale urban works until the mid-seventeenth century.

Modernizing Cairo starts with the reign of Mohamed Ali (1805). Although few physical interventions such as filling lakes and opening small streets were undertaken in the city's layout, new royal suburbs were established on the outskirts. An example of that is Shubra, in the north, and the island of Roda, in the south, which formed the nuclei of the future expansion (UNCHS, 1993).

During Khedive Ismail's reign (1863-1879), tangible changes occurred on the whole city plan. Ismail wanted to modernize and westernize Cairo. His visit to Paris in 1867, as a special guest of Emperor Napoleon III, was the

starting point that influenced the future of Cairo. He observed the progress of Paris and admired Hussman planning "the city of light". He noted closely the new Paris and with his minister, Ali Mubarak, thought of a new style in Cairo similar to that in Paris. The first step he made was to convey the seat of power from the Citadel to Abdeen Palace. Accordingly, he constructed Mohamed Ali Avenue to connect the old city with his new capital. After that, he planned the Cairo CBD district to be the business center of the city. The vision was to make the Cairo CBD as an open-air museum; wide and clean streets with areas for pedestrian only and spacious gathering points for cultural discussions. For instance, cultural nourishment was held in the music kiosks in the place of Al-Azbakeya Lagoon that was already filled and turned into a public park. In fact, equipment such as electricity, water supply, hotels, cinemas, theaters and banks were all provided. In other words, the mediaeval city was a vibrant urban environment for residents, workers and visitors. That is not all the story as the development extended over the Nile to the western part, where many bridges were constructed to link the east bank of the river to the west. Furthermore, Cairo became a central station after inaugurating Suez Canal, which required creating three railway lines to connect the city with the surroundings. Actually, the three railway axes shaped the city future expansion in three directions: north through Shubra; south leading to Helwan; and east through Abassia and Ain Shams and ending with Suez (UNCHS, 1993).

Figure4.4. Ottoman city (left) (*Le Description de l' Egypte)*. Khedivial Cairo
(right) (http://www.studio-basel.com/projects/cairo/atlas/islamic-cairo.html)

Despite Ismail's achievements mentioned above, his prodigality led the
country to a financial crisis and finally to the British colonization of Egypt in
1882. This forced public authorities who were in charge of supplying
infrastructure, identifying planning regulations, and safeguarding historical
monuments to hand over part of their work to foreign companies. Therefore,
all the development projects were elite residential areas (El Shakry, 2006).
For example, Zamalek island was planned in 1905 by Behler society,
whereas Heliopolis was established in the desert ten kilometers east from the
center of Cairo by Baron Empain. In addition, Maadi, about 12 km upstream
from the city center, was planned in 1905 by a retired Canadian officer,
Captain Alexander J. Adams. In fact, the absence of a unified entity for
governing the city exacerbated the degradation of the situation and made it
difficult to control the future extension. It is also worth mentioning that
many immigrants targeted Cairo at the beginning of the Second World War
searching for a better job opportunity in the factories in charge of meeting

the needs of foreign armies. However, after the end of the war a huge number of workers lost their job increasing the unemployment rate and accelerating the housing crisis. In this way, the city entered a recession period. It is also deserves remembering that in 1947 the government released a law, which freezes the rents and protects the tenants from being evicted by the owners (Sims, 2009; UNCHS, 1993). This contributed to the exacerbating the housing crisis in two ways: first, the house owners neglected maintenance because of the low rents they get from the tenants; second, the investors began to produce houses only for sale purposes. For that reason and for the others a unified body for managing the city was urgently needed and, thus, Cairo municipality was established in 1949.

A bloomy event that caught the wind of change was the burning of Cairo in January 1952. 6 months later, specifically on 23th of July, a military coup d'état led by the free officers movement to oust king Farouk and to announce the republic regime.

The first master plan 1956

After the 1952 revolution, the country was in need for a policy that addresses the development policy. Accordingly, a master plan for Cairo, initiated in 1953, was approved in 1956 (UNCHS, 1993; El Kadi, 2009). In reference to "English town and country planning" the developed scheme considered "…the notions of ideal size, containment, development standards for new growth,.." (Serageldin, 1989: 261). The idea was about establishing six satellite industrial towns (workers' cities) around Cairo (UNCHS, 1993; Raymond, 2001; El Kadi, 2009), within a 30 km radius from the center (UNCHS, 1993), on existing industrial areas (UNCHS, 1993; El Kadi, 2009). The selected locations were Qaha, Abou Zaabal, Helwan,

Hawamdeyah, Birkash and El-Tebbin. These six locations were to be the poles of the future growth that could absorb the tremendous demographic growth of Cairo[1] (Ibid). Nevertheless, Serageldin (1989) stated that:

"Its [the 1956 master plan] most damaging legacy resulted from its major recommendation (that the industrial suburbs ought to absorb rural migrants) which ended up promoting development on agricultural land".

(Serageldin, 1989: 261)

To continue, two sub-centers, Elbasatine to the north of Maadi and Sekkiet Mekki on the west bank were to entice light industries displaced out of the old center (UNCHS, 1993; El Kadi, 2009). In fact, the association between the residence and workplaces was accentuated in this master plan (El Shakry, 2006; UNCHS, 1993).

The decentralization policy was given great importance in this master plan in order to redistribute the population and to restore the balance between the rural and urban areas. In doing so, establishing new industrial areas and improving utilities in secondary towns were taken into consideration (UNCHS, 1993, El Kadi, 2009). The Suez Canal towns were to be the second industrial pole after the six industrial cities around Cairo. Besides, the third industrial pole was to be located in the area around iron mines, south of the Nile valley (El Kadi, 2009).

Regarding Cairo's future extension, two self-contained suburban areas, Mokattam and Madinet Nasr, were chosen in the desert land at the eastern part of the city rather than in the fertile western agricultural land in order to meet the housing demand of the middle class (UNCHS, 1993; El Kadi, 2009). Moreover, Madinet Nasr was planned to be the bureaucratic

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[1] The target population for the six cities is 1,500,000 people by the year 2000 (El Kadi, 2009).

administrative town that could receive all the major ministries, which were supposed to be moved from the medieval city (El Shakry, 2006; UNCHS, 1993). However, the implementation phase only considered providing basic facilities to Cairo because of the Suez Crisis, the Tripartite Aggression in 1956, which gave first priority to the reconstruction of the bombed towns in the Suez Canal Region (UNCHS, 1993). Furthermore, starting Madinet Nasr project required compensating the army barracks who were already occupying the land. Consequently, the central government allocated allotments on the *waqf* lands[2], currently Mohandessin, situated on the western bank of the river as a solution for the escalating housing demand of the middle class. Definitely, this chaotic urban development on agricultural land had negative consequences of losing the best arable land. It is noteworthy that the projected population of Cairo for the year 2000 was 5.5 million; however, the enumerated population in 1965 reached 4.2 million in the capital, and 6.1 in the metropolis (Raymond, 2000; Raymond, 2001). In other words, the master plan failed to match with reality.

Another shift from the recommendations of the 1956 master plan is the establishment of a petrochemical industrial area at Shubra El Kheima, northern Cairo, in the fertile northern margin (UNCHS, 1993; El Kadi, 2009). Actually, out of the six towns proposed in the master plan, only Helwan was taken into consideration (UNCHS, 1993; Raymond, 2000; El Shakry, 2006). The reason for excluding the other cities around Cairo was regarded as a security policy. In other words, any social conflict in the planned cities around the capital, the seat of power, could put it under the siege (El Kadi, 2009). Apparently, the mismatch between the master plan recommendations and the implementation phase led to the inflation of the

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[2] The construction phase of *Awqaf* city was already begun before 1952 revolution (El Kadi, 2009).

capital, and exacerbated the problem of rural-urban migration creating more pressure on infrastructure and increasing housing demand. Due to poverty and economic devastation, migrants resided in the less attracting locations along old parts of the city, railways, steep slopes, and canals resulting in poor spatial conditions (high density and poor infrastructure networks). Eventually, a new master plan was inevitable.

The master plan of 1970

Between 1956 and 1966 Cairo population grew to 4,220,000 inhabitants, whereas the total number of the metropolis, including the two neighboring governorates of Giza and Qaliubeya, was nearly 6,113,000. In this way, Cairo was considered the largest city in Africa (UNCHS, 1993). The aim of the 1956 master plan was to guide the urban development of the city to avoid any haphazard urban growth. However, the urban development in 1965 had reached its optimum level of anarchy. Therefore, problems of collapsing infrastructure and traffic congestion appeared vividly. In response, the Greater Cairo High Committee (GCHC) was established in 1965 in order to elaborate a new master plan for the capital. Establishing GCHC paved the way for the formation of the Planning Agency for Greater Cairo (PAGC), charged with management and planning issues (Ibid).

Between 1966 and 1969, data about the problems affecting Cairo was collected and a draft report was published in 1970. Problems of inadequate infrastructure (UNCHS, 1993; Raymond, 2000; Raymond, 2001), high density, decay of old districts, and overpopulation were all reported (UNCHS, 1993).

With an annual growth rate 2.2 percent, Greater Cairo was anticipated to have 14.8 to 16 million inhabitants in 1990 (UNCHS, 1993; Raymond, 2000). According to the new master plan, the city urban agglomeration

would provide housing for only 9.5 million inhabitants depending on vertical expansion in low-density districts (Sims, 2009). Furthermore, four satellite towns were supposed to receive all excess inhabitants, 5.3 million. Criteria of minimization of economic cost, and preservation of agricultural land from urban expansion were taken into consideration in the choice of towns' locations. As can be seen in figure4.5 (right), two towns were planned in the eastern desert (one along Cairo-Suez road and the other adjacent to El Khanka), while two others were situated in the western desert (one along Cairo-Fayum road and the other was close to Abou Rawach) (Sims, 2009, UNCHS, 1993).

Following the idea of preventing any further expansion of Cairo agglomeration, a peripheral ring road was reflected in the 1970 master plan (UNCHS, 1999; Raymond, 2000). The road system aimed at transferring through traffic to the periphery. In addition, a series of inner-city highways and regional roads were planned to improve the connectivity of the city and to link it with the satellite towns. Furthermore, a series of bridges were planned within the city to relieve traffic jams.

Similar to 1956 master plan, abrupt halt was put to the 1970 master plan because of many reasons related to the financial difficulties after the war of June 1967, known as the Six-day War. At that time, the primacy was for the reconstruction of the Egyptian army. Even after 1973 and after the signing of the 1979 Camp David Peace Treaty between Egypt and Israel, the resources again directed towards the rebuilding of the Suez Canal zone, "and to the reopening of the Canal" (UNCHS, 1993: 130; Raymond, 2000; Raymond, 2001). In other words, Cairo's formal expansion may have been blocked; however, the rural exodus to GCR continued. In addition, Cairo received about one million people left Suez Canal towns during the War of Attrition.

Accordingly, the capital had to absorb this huge number of surplus population. Hence, informal growth sped up in the large fringe areas to meet the escalating housing demand of low and middle class who cannot afford legal unit in the city. Simultaneously, core villages continued to expand; even, new informal areas began to be constructed. Such areas were shaped very quickly and did not have a sufficient time to adjust or self-correct their inefficient movement network.

Unlike the socialism policy during Nasser leadership, the government moved after the war of 1973 to the so-called *infitah* (open-door) policy. The aim of this liberalization policy was to encourage the private sector and to attract international investors. Greater Cairo Metropolitan received a large amount of this investment.

Renovating Cairo road network was of great importance to match the attitude of the new policy. The mission was delegated to a German company. Infrastructure projects such as the Sixth of October Bridge, 6 km long, fostered the accessibility between the east and the west bank of the Nile. Consequently, the first underground line, 45 km long, and a series of new highways were added onto the city layout in 1980s in order to ease movement to the city center (Sims, 2009). This coincides with the 1970 master plan options.

Importantly, the concept of developing new towns in the desert was elaborated in the 1969 master plan and was approved in 1974; however, the idea itself was originally proposed in the 1956 master plan. Fifteen towns were delineated on government-owned land (UNCHS, 1993), eighteen in whole Egypt (El Shakry, 2006). Some of the proposed towns were freestanding (economically independent of Cairo, e.g., 10th of Ramadan, south/west between Cairo and Ismailiya) with projected population 500,000 for each town (UNCHS, 1993; Raymond, 2000; Raymond, 2001) and at 40

to 90 km from the majors centers (UNCHS, 1993). Some others were satellites (e.g., 15th of May, close to Helwan; and El Obur, north/east) (UNCHS, 1993; Raymond, 2000; Raymond, 2001; El Kadi, 2009) with projected population of 250,000 for each and were located within 30km from the urban centers (El Kadi, 2009). To say it differently, some of the towns were purely residential, while others were to be large industrial cities. Finally, it deserves remembering that places of El Obur and 10th of Ramadan are consistent with the recommendations of the 1970 master plan, whereas the location of the 15th May coincides to the 1956 master plan (UNCHS, 1993).
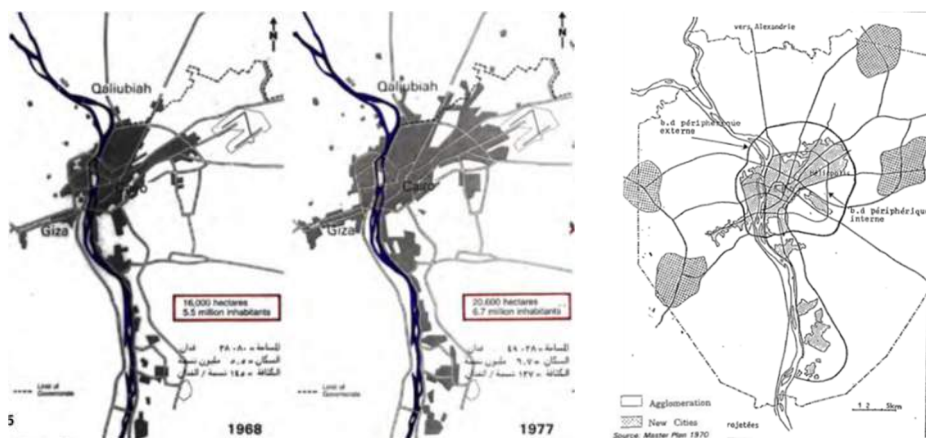
Figure4.5 The urban agglomeration of metropolitan Cairo in 1968 and 1977 (left and middle) (GOPP, 2012). The 1970 master plan (right) (El Kadi, 1990; UNCHS, 1993)

The 1983 master plan

The Egyptian economy progressively grew up under the new liberalization policy, *infitah.* Importantly, Egyptians did not need a visa to travel abroad. Many of Egyptian workers began to flood the neighboring Gulf countries that were awash in money due to oil revenue. Rapidly, these Egyptians earned a lot of money and sent back remittances to their families, who began

to invest in land and construction materials (Sims, 2003; Sims, 2009; El Kadi, 2009). Ultimately, impetuous urbanization overwhelmed the city changing large areas of fertile agricultural land into informal constructions (UNCHS, 1993).

While the urbanization process slowed down at the beginning of 1980s due to the oil price fall "in 1983-1984, and in the Iran-Iraq War of 1980-1988" (GTZ, 2009: 18), the drawbacks of *infitah* policy continued pressures on all poor citizens. Insufficient affordable housing was coupled with problems of electricity cut, overflow of sewage system, and traffic jams that were frequently occurring (UNCHS, 1993, Fahmi, 2010). Therefore, the elaboration of a third master scheme was urgently needed to remedy this urban crisis.

The third master plan, launched in 1981 and approved in 1983, was produced in collaboration with the French *Institut d'aménagement et d'urbanisme de la région d'Île-de-France* (IAURIF) through three stages. First, a strategic map for the year 2000 showing the options for the principle routes and new further extensions was drawn after nine months. Seven months later, three cardinal alternatives were created. The recommended alternative was a rectified version of the 1970 master plan. The last stage started from May 1983 until April 1984 and included the following options (UNCHS, 1993):

- Ten new settlements, with carrying capacity 2-3 million people (Sutton &Fahmi, 2001 in Fahmi, 2010), were to be constructed on desert land close to the city, within 2 to 3 km from the urban agglomeration, to benefit from the advantage of proximity(UNCHS, 1993). The intent was to allot 300 to 500 hectares yearly to meet housing demand of low-income population; hence, the informal expansion on arable land could be stopped (UNCHS, 1993; Raymond, 2000). The target population of the

settlements was supposed to be 2,000,000 by the year 2000 (UNCHS, 1993), only one-third of the projected increase of the metropolis population between 1982 and 2000 (7.6 million people) (Raymond, 2000, Raymond, 2001). It is worth mentioning that the first phase, 1987-1988, introduced 10,000 housing units in six of the new settlements (UNCHS, 1993; Raymond, 2000; Raymond, 2001; Fahmi, 2010). Such units were given to the residents of the old city who turned homeless after the earthquake of 12 October 1992 (UNCHS, 1993; Fahmi, 2010), some other victims were rehoused in Kattamia (El Kadi, 2009).

- The peripheral ring road proposed in 1970 was to be implemented to relieve traffic jams and to connect the new settlements directly with the metropolis. Such peripheral avenue framed only three-fourths of the main cluster; the western crescent on the farmland in Giza was not planned for fear of urban encroachment on the arable area.

- Reconsidering the administrative boundaries of the city's districts by dividing the metropolis into sixteen self-sufficient homogenous sectors (HSs) was of great importance in order to enhance the decentralized management (UNCHS, 1993; Raymond, 2000). The population size of each sector ranged between 500,000 to 2,000,000 people and was supposed to meet inhabitants' needs in terms of employment and utilities (Fahmi, 2010; Raymond, 2000).
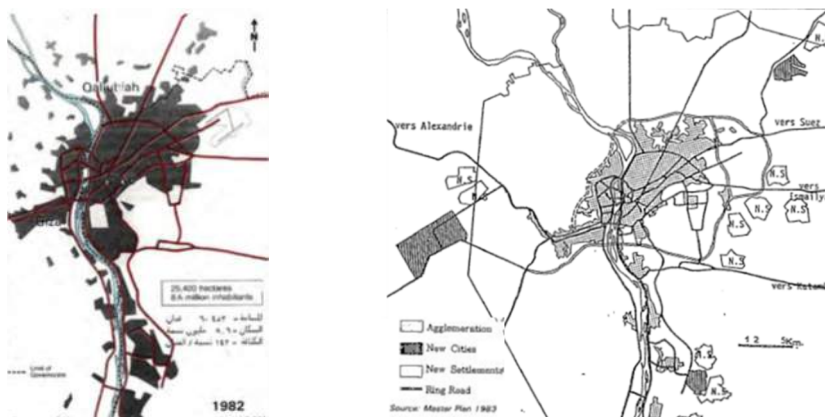
Figure4.6. The urban agglomeration Cairo metropolitan in 1982 (left)
(GOPP, 2012). The scheme of 1983 (right) (El Kadi, 1990; UNCHS, 1993).

Apparently, this master plan adopted integrated urban development approach
through the linkage between physical and socioeconomic domains. However,
the implementation phase of this plan witnessed relative modifications in the
years 1991 and 1997. Primarily, prioritizing the improvement of Cairo
infrastructure absorbed excessive costs leaving deficient financial resources
for the establishment of the new settlements (UNCHS, 1993). The western
crescent of the ring road, coupled with the 26th July road axis, was developed
in the peripheral agricultural land of Giza's towards 6th October city (Fahmi,
2010). Progressively, vehicular movement dominated Cairo road system
through the execution of the plan, whereas pedestrians were completely
marginalized. Meanwhile, the peri-urban areas were disregarded in the
transport system, enlarging the physical segregation of such areas (UNCHS,
1993). On the other hand, only nine of the ten new settlements were
considered even their sites were altered because of many limitations
regarding bureaucratic procedures, military purposes, and land availability,
the deviation of the eastern arc of the ring road 2 km east of the capital
(Fahmi, 2010). Besides, the green belt project between the capital and the

eastern new settlements was cancelled as well as paving the way for the development of 'New Cairo City' (figure4.7.) (Ibid).

Source: Greater Cairo Master plan 1990 Up grading

Figure4.7. Greater Cairo Region master plan 1990 updating (UNCHS, 1993)
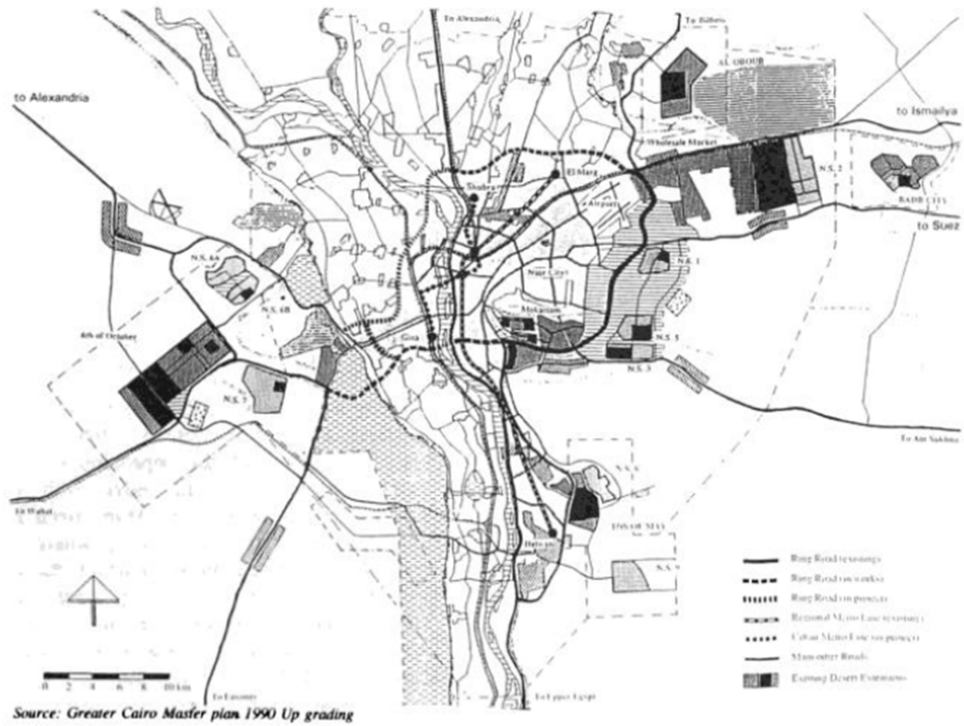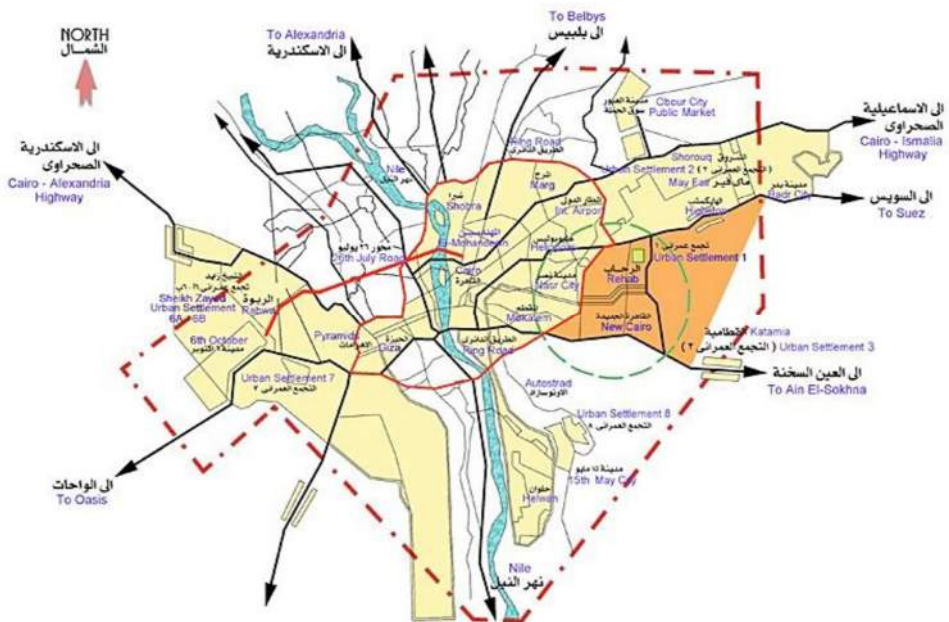
Figure4.8 Greater Cairo master plan 1997 updating (Fahmi, 2010)

The most striking fact is that the failure of the 1983 master plan and its 1991-1997 updated versions backs to the failure of the new towns to entice population (Fahmi, 2010). For instance, cities of the first phase around the capital (10th of Ramadan, 6th of October, El Obur, Badr and 15th of May) attracted only 70,000 out of 520,000 inhabitants for the target population of 1989 (El Kadi, 2009). In fact, poor infrastructure coupled with expensive housing dissuaded people to settle in desert cities. Living in informal settlements was preferred to reside such ugly cities that attract only speculators (Fahmi, 2010). Raymond (2000) argued that "… the city [Tenth of Ramadan] functions less as a catchment for Cairo's overflowing than a focal point for internal migration" (Raymond, 2000: 355; Raymond, 2001: 355). Similarly, El Shakry (2006) showed that "…many new towns were plagued by a hierarchal and divisive organizational layout, with clear segregation between high-, middle-, and low-income groups,…" (El Shakry, 2006: 91). For instance, Tenth of Ramadan was divided into class-segregated

districts (high strata, a low standard and workers' districts). To say it differently, beyond the under-population of the new towns, *Infitah* policy was geared toward developing the economy that in turn will attract newcomers to absorb surplus population; oppositely, the Nasser epoch focused on building the citizen through integrated models of constructing societies (El Shakry, 2006).

To sum up, "The vicious circle" of "dwellings without inhabitants and of inhabitants without dwellings", already noticed in the older centers, is reproduced in the new cities" (UNCHS, 19993: 138)
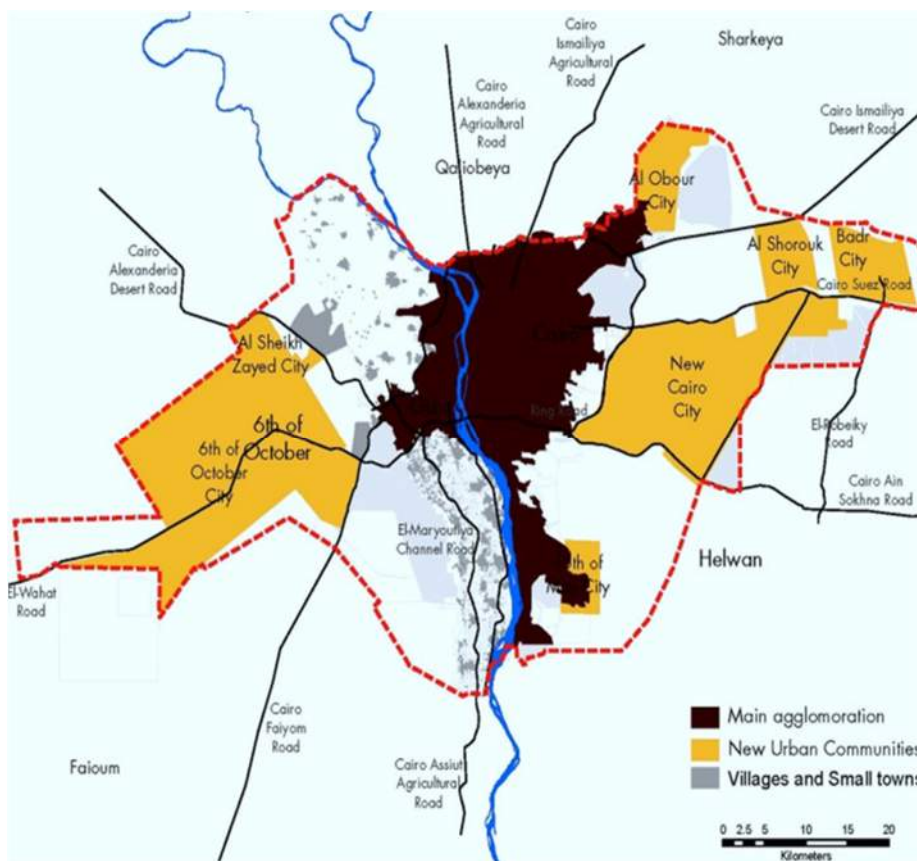
Figure 4.9 Cairo metropolitan area in 2012 (Author according to GOPP, 2012)

4.4. CONFIGURATIONAL ANALYSIS

...the visible spatial structures are particularly important as they are a product of political, economic or social factors (e.g. changing lifestyles, living arrangements and preferences, consumption patterns, etc.).

(Deffner and Hoerning, 2011: 6)

A series of Cairo's historical maps were selected for analyzing the major urban transformations from the medieval city from 1517 to 2012. The chosen periods are:

- 1517, which marks the end of the Mamluk era
- 1744, which represents the traditional city under Ottoman reign
- 1809, which represents the city after the French expedition and the accession of Muhammad Ali (1805-1848)
- 1888, which represents the city after Ismail's rule
- 1920, which represents the situation after the 1919 revolution
- 1933, which shows the city during the unrest of Britain's occupation that officially ended in 1936
- 1958, which reflects the situation after the 1952 revolution
- Finally the 2012 Cairo map as the current situation after the 25 January revolution. These events and their impact on society all influenced the city's shape and produced the current urban agglomeration.

All angular segment maps, except the 2012 map acquired from a road-center line map[3], were derived from axial line maps drawn in AutoCAD. In the case of the 2012 map, the study area excludes all new urban communities and covers only about 498 square kilometers of the main urban agglomeration of metropolitan Cairo rather than its gross area within the administrative boundaries [Figure4.10].

The historical segment maps are analyzed through UCL Depthmap software. Parameters of angular integration (NC/MD) and angular Choice (log CH+2) were calculated at different metrical radii from local to global: 500, 800, 1200, 2000, 5000, 10000, and n. Furthermore, angular step depth from the segments with higher topological choice on local and global scale was measured to investigate the spatial properties of the city.

Figure4.10. Map indicating the study area within Greater Cairo Metropolitan 2012 (base map by GOPP, 2012).

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[3] Even were a good satellite image for the whole Cairo available, constructing an axial map for the city would take too much time. Nevertheless, the road-centre line map was corrected in ArcGIS using advanced editing tools, and all vertices were checked and all arcs were generalized.

4.4.1. Global Integration through Time

The 1517 and 1774 Configurational Models

The two models, except the western fringe, have similar urban structures. Both maps show that the most integrated line (in red) is that spine which runs parallel to Khalij Canal constituting the western boundary of the traditional CBD, Qahira, in the Mamluk era. After it, comes the perpendicular junction that draws the southern boundary of Qahira. In other words, the central district of Qahira with its girding walls is perfectly distinguished from the exterior zones.

In addition, both models record the urban development of the southern and western sectors of the city at that time, as the integration value of the Qasaba, Now Almuiz St, in Qahira increases southward along the segments that join Bab Zuwayla to Saliba allowing for the development of new suburbs and secondary economic centers around Birkat al-Fil. The westward expansion can also be read through the crossing thoroughfares over the Khalij. In 1517, the west of the canal, Khalij, was nearly uninhabited. Rapidly, in1744, patches of new communities started to emerge. It is worth mentioning that most of the inhabitants of such areas belonged to minorities. As for the northern part, no remarkable changes can be noticed from 1517 to 1744. It is also apparent that the city's plan, in general, consists of narrow and snaky streets with frequent dead ends. That is because of the absence of wheeled transport in Cairo at this time. Such simple transport system with Cairo's great size explains why secondary centers were established and pushed toward the periphery where suburbs tended to be at a distance from the city's central core.   It is worth mentioning that wealthy Mamluk administrators of the country have settled in the outskirts of Cairo around Azbakiya and Birkat al-Fil lagoons (Raymond, 2001).
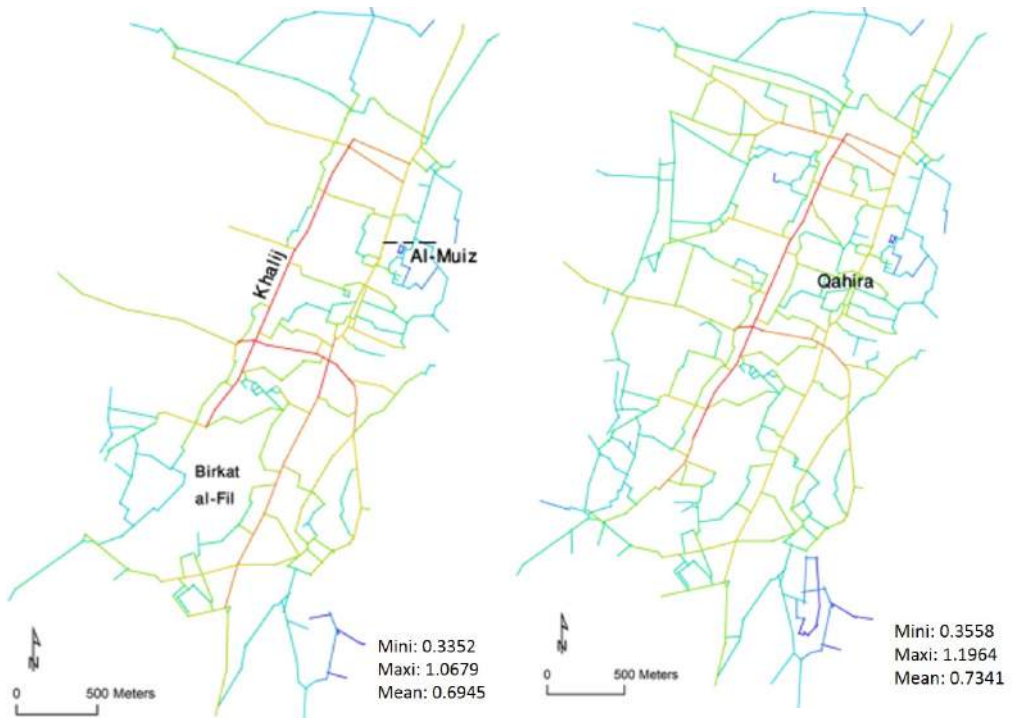
Figure4.11. Normalized angular global integration in Cairo in 1517 (left) and 1744 (right)

The 1809 Configurational Model

In the 1809 model, the spine along the Khalij with the major crossing streets on either of its sides still has the highest value of integration. In fact, the good linkage between the center of Cairo and the western suburbs encouraged more urbanization westward. Likewise, the southern sector had become densely urbanized. Contrary to this, the northern part of the city, Husaynia quarter, showed less urbanization marked by less integration. Such unequal expansion displaced the central core of the city in an off-center position in the far northeast sector causing partial segregation in some parts of Qahira. Nevertheless, Qahira did not lose its vitality and remained overwhelming.

The far southeast end of the city is the most segregated part. That is the place where Great Qarafa cemeteries are located. In fact, cemeteries and Muqattam hills hindered the development eastward.
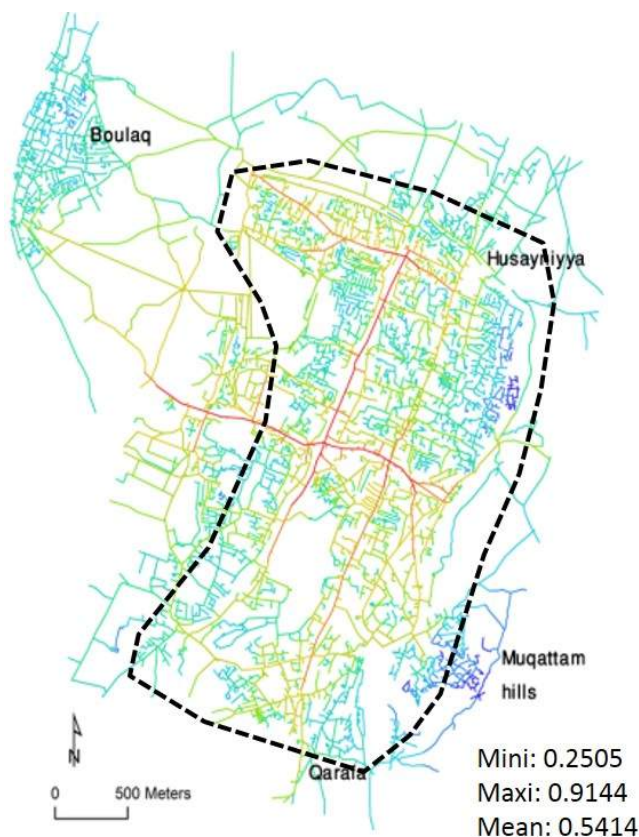
Figure 4.12: Normalized angular global integration in Cairo in 1809

The 1888 Configurational model

Contrary to the narrow, crooked and anarchy street network of the previous models, the 1888 layout is another story. Here, the urban structure of the new capital, straight streets with spacious squares, is clearly distinguished from the old city. The Muhammad Ali street was constructed to connect the two cities. Actually, the city expansion gave rise to some structurally important

streets towards the west indicating tangible shift of the core out of the historic center westward. For instance, Muhammad Ali street shows the highest integration value; After it, comes El-Manakh (now Abdel-Khaliq Tharwat) and Taufiq (now segments of Oraby and Sherif Pasha) respectively. Nonetheless, the old center of the city can still be read as part of the core of integration. For example, both El-Sikka El-Gedida and El-Muiz streets are going to define the central axes of the eastern sector of the city, though show slight decline in their integration.

1 Mohamed Ali St.
2 El-Sikka El-Gedida St.
3 Al-Muiz St.
4 Oraby St.
5 Abdel-Khaliq Tharwat St.
6 Sherif Pasha St.

Mini: 0.2875
Maxi: 1.2602
Mean: 0.7975

0   500 Meters

Figure 4.13: Normalized angular global integration in Cairo in 1888

The 1920 and 1933 Configurational Models

Cairo has experienced rapid growth from 1882 to 1937 to meet the rapid demographic growth. For instance, Heliopolis is laid out northeast and is inhabited by the elite. Likewise, fashionable quarters has crossed the Nile, in Zamalek and Rawdah islands. Another residential quarter for the wealthy is Garden City along the eastern bank of the Nile. Accordingly, the overall silhouette of the city has changed from a compact shape, in the previous models, into a branched structure (northeast, south and west branches). While the old historic area has lost much of its global integration, the Khedivian City is still in the integration core. Nevertheless, the pattern of global integration is pulled northeast. In the 1920 model, Abbas St., now Ramsis, shows the highest value of integration. Similarly, in the 1933[4] model, the most integrated line of the city at this time is El-Amir Faruq St., now El-Geish. In fact, not much change can be marked between 1920 and 1933 except slow urbanization in the far northeast.

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[4] The historical map from which this model has been constructed is relatively simplified and many of small alleys were not presented on it.

1 Ramsis St.
2 Shubra
3 Zamalek
4 Garden City
5 Rawdah
6 Heliopolis

Mini: 0.3887
Maxi: 1.4303
Mean: 0.8786

1 El-Geish St.

Mini: 0.4035
Maxi: 1.6773
Mean: 1.0023
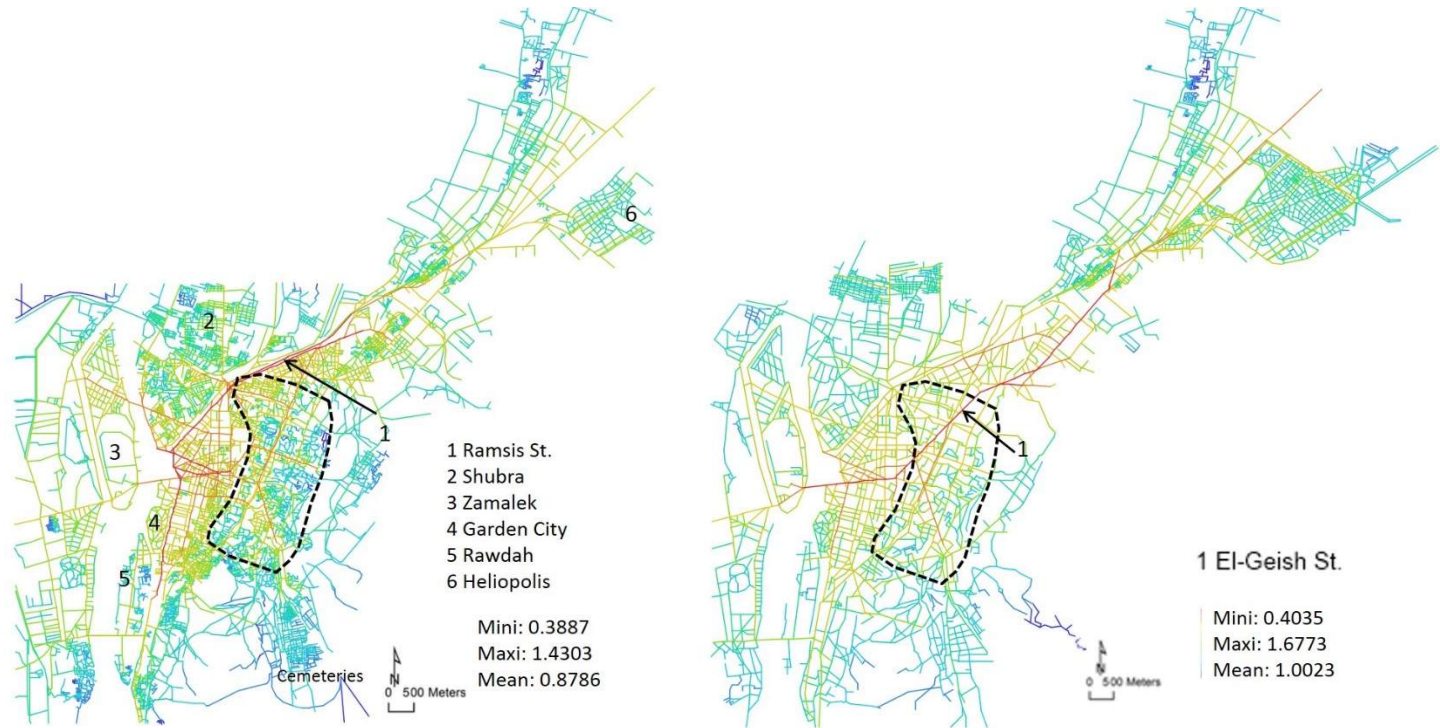
Figure 4.14: Normalized angular global integration in Cairo in 1920 (left) and 1933 (right)

The 1958 configurational model

In this model, two fundamental corridors draw the city's further development. The two directions of the corridors correspond to 26 July and Ramsis St. (west-east corridor), and El-Khalig El-Misri, now Ahmed Helmy, (south-north). The model also shows that the integrated core of the city still corresponds to the triangular area of the Khedivian CBD; its three furthest points are Ramsis Square in the north, Abdin in the east and Al-Tahrir in the west. Up to this time, the southeastern part of the city still had the most segregated values because of constraints of the cemeteries and Mokattam hills.
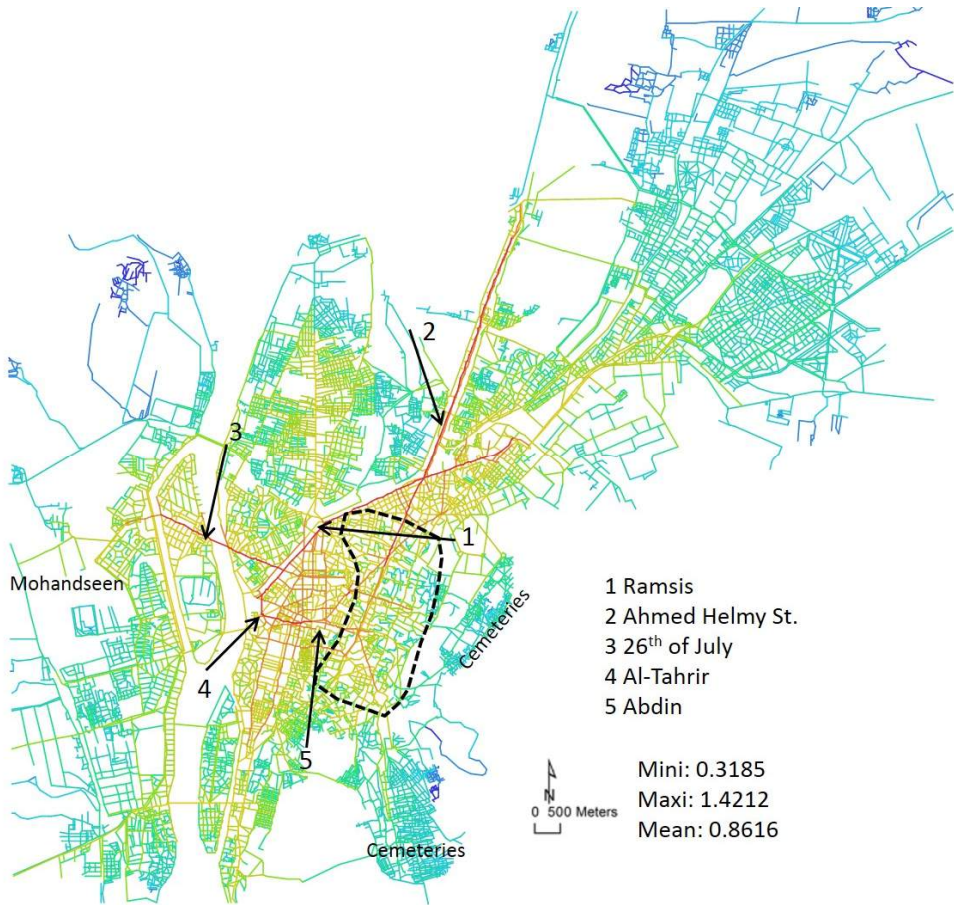
Figure 4.15: Normalized angular global integration in Cairo in 1958.

The 2012 configurational model

In this model, a more significant transformation can be noticed since urban growth had absorbed all neighboring villages. However, the shape of the conurbation is still relatively fragmented. Furthermore, green and blue patches of segregated settlements, mainly located on the peripheries and along the railway track, appear vividly in the whole fabric of the city. Initially, these patches reflect the fragmentation of the development process, and reveal socioeconomic differences. On the other hand, the model highlights the significance of the west-east corridor starting from

Mohandseen in the west to Heliopolis in the east, where warmer colored lines –red, orange and yellow− can be easily noticed. It deserves mentioning that such integrated lines are located within the residential elite sector.

Mini: 0.3720
Maxi: 0.9225
Mean: 1.3666
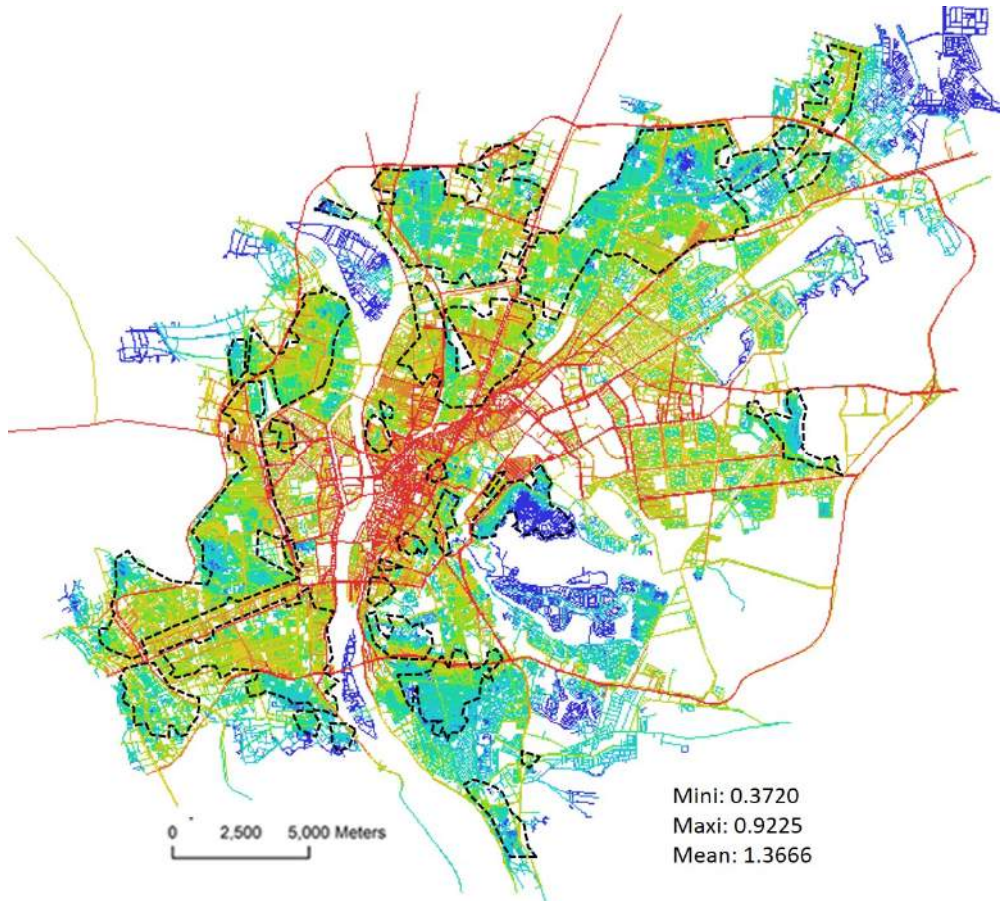
Figure 4.16: Normalized angular global integration in Cairo in 2012 overlapped with the location of informal areas (encircled by black dotted lines).

4.4.2. Spatial Drivers of Urban Growth in Cairo

The purpose of this section is to highlight the generative spatial structures in Cairo. The outcome of normalized angular choice (NACH) for Cairo's diachronic axial models show that new developments tend to emerge along

spatially accessible streets (Figure 4.17). The models strengthen the importance of these streets in directing the city's urban growth and in generating new routes. The main integrating routes are semi continuous /longer ones and has a simple form of horizontal and vertical lines complemented with diagonal ones. However, diagonal routes are missing in the first three models do not have a tendency of forming a wheeled urban structure. Contrary to this, the 1888, 1920, 1933 and 1958 configurational models show that spatially accessible streets form a deformed wheel type with partial rim. Finally, the 2012 configurational model shows that the high choice routes tend to form a balanced deformed wheel.

Mini: 0.0
Maxi: 1.5649
Mean: 0.5186

Mini: 0.0
Maxi: 1.6066
Mean: 0.5313

1517 →

a) 1517   b) 1744

Mini: 0.0
Maxi: 1.5731
Mean: 0.4304

Mini: 0.0
Maxi: 1.5621
Mean: 0.8441

c) 1809   d) 188

Mini: 0.0
Maxi: 1.5816
Mean: 0.8472

e) 1920

Mini: 0.0
Maxi: 1.6446
Mean: 0.8958

f) 1933

Mini: 0.0
Maxi: 1.6018
Mean: 0.8752

g) 1958

Mini: 0.0
Maxi: 1.5576
Mean: 0.6384
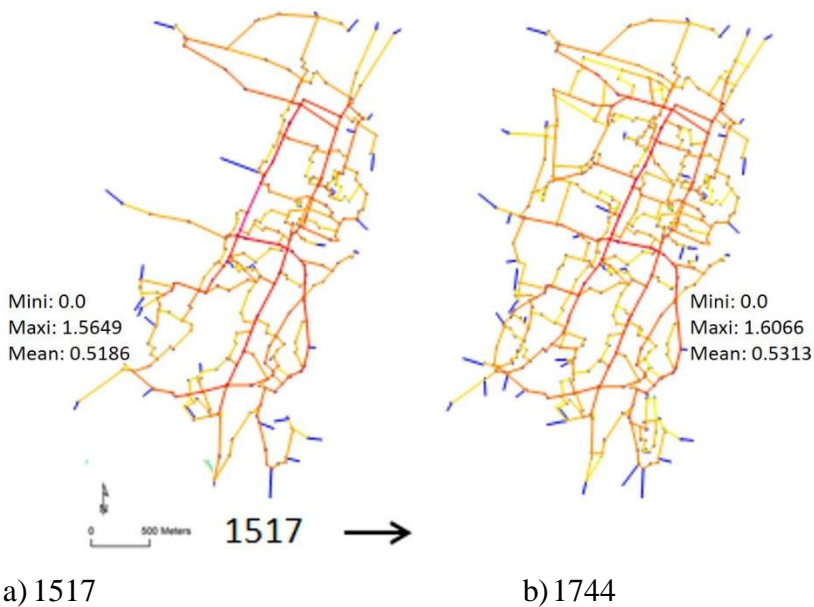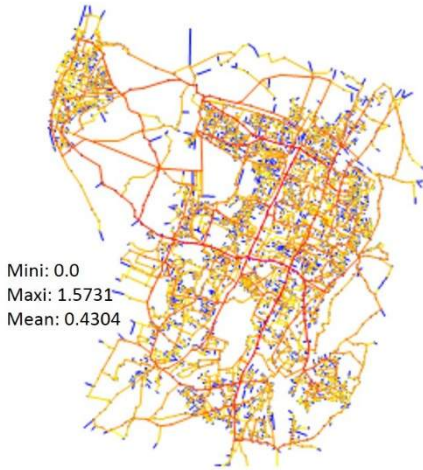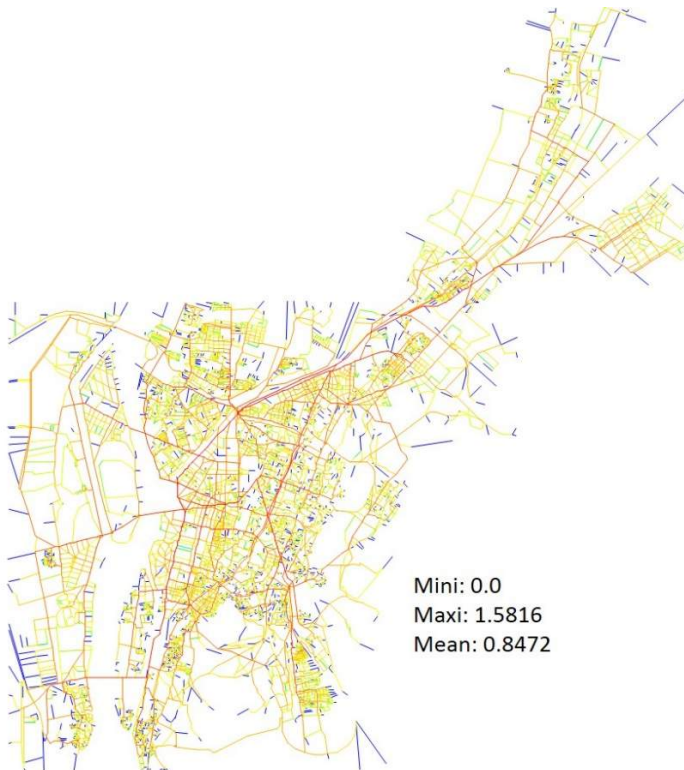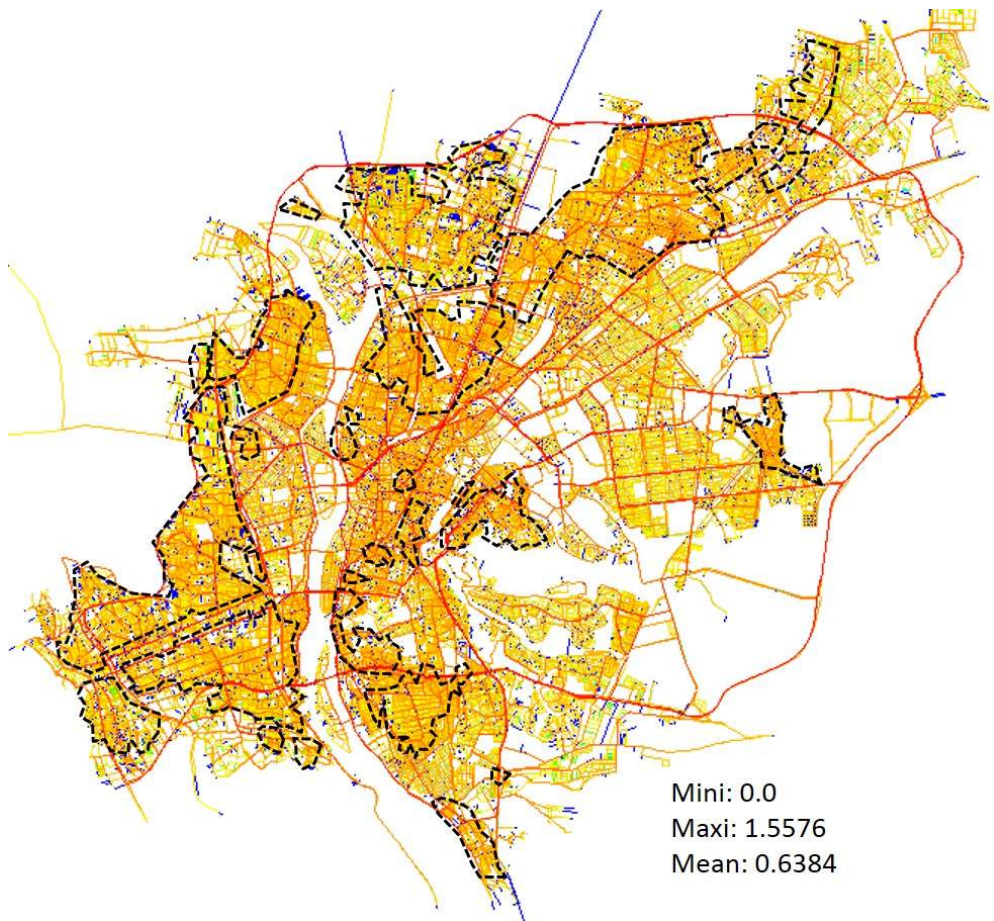
h) 2012

Figure 4.17. Normalized angular choice Rn through selected eras.

4.4.3. The Integration Core of Cairo through Time

Figure 4.18 highlights the integration core of Cairo through time, top 25% integrating lines for historical models before 2012 while top 10% is suggested for the integration core of Cairo 2012. The integration core indicates the location the city's urban centers. It is notable that the city's center grows north-west over three periods of time (1744, 1809 and 1888), and migrates entirely from the historic zone (the oldest part of the city) in 1920 onward. Furthermore, the new parts of the city's spatial structure tend

to be emerged along the most accessible longer routes, the spatial drivers of urban growth.

Remarkably, the city's center takes various shapes upon the time. First, it takes a simple form made up of horizontal and vertical during the first three periods. Secondly, and gradually, diagonal lines emerge along with the semi-grid structure with relatively apparent tendency for shaping a wheeled spatial pattern. Thirdly, and finally, the integration core of Cairo 2012 takes the form of a balanced 'deformed wheel', small semi-grid integrated segments comprising a hub in the center linked to the ring road (the rim) by axial integrators representing spokes. It penetrates into the whole system reducing journey lengths between the live center and all other parts.

The ring road has a high integration value at radius n, which corresponds to the high amount of vehicular movement. This explains why such a global integrator of the city, the ring road, loses its integration at local scale. The local scale corresponds to short trips. However, it is also clear that Cairo CBD has high integration values at global as well as local scales, which explains its high degree of vitality until today. Nevertheless, Cairo CBD loses some of its integration when the radius decreases. The integration core of Cairo moves towards the northeast with a low radius. It is noteworthy that the historic area, Fatimid Cairo, is not highlighted at all in the integration analyses with different radii. This may explain why this area is deteriorating and has inferior socioeconomic conditions.

1517   1744   1809

1888   1920

Meters
0   500

1933

Meters
0   500

1958

Meters
0   5000

Cairo 2012 Integration Core Rn
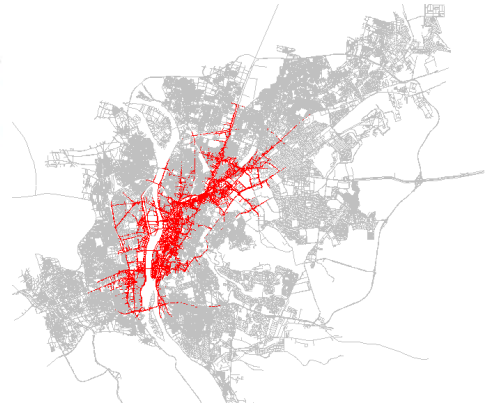
Cairo   2012   Integration   Core
R10000m
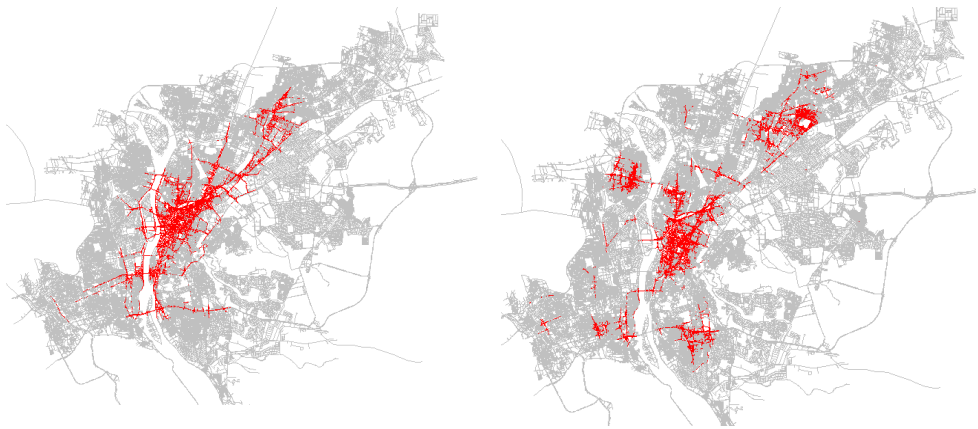
Cairo   2012   Integration   Core   Cairo   2012   Integration   Core
R5000m   R2000m

Figure4.18. Segment angular integration showing the integration core of Cairo through time. (a) Radius n. (b) Radius 10000. (c) Radius 5000. (d) Radius 2000 meters.

4.4.4. Spatial Characteristics of Cairo's Informal areas

Figure 4.19 (a) shows the angular global choice analyses. Although morphologically dissimilar, no obvious syntactic difference can be discerned between the formal and informal settlements, as informal settlements disappear within Cairo's main route network. It is also notable that several of the informal areas are located along one or more than one definable edges, which tend to be highways or roads along railways and walls. Meanwhile, the edges are active in attracting commercial uses and other economic activities through informal areas' facing boundaries because of significant global and local vehicular movement, which in turn is generated by the edges' spatial properties. Put differently, the edges on which informal settlements are situated have the highest global choice values and tend to be a part of Cairo's overall main routes network such as highways and motorways. This also represents a spatial potential for residents of informal

settlements to access potential workplaces and other activities across the city.

Another spatial characteristic of informal areas is the dense internal spatial structure, which tends to form a polarized pattern that stands alone in isolation from the surrounding areas. This strong spatial structure appears vividly in local angular choice, radius 1200 and lower [Figure4.19 b, c and d], which corresponds to local sub-centers. Similar results can be observed in local angular integration [Figure4.19 e, f, and g]. For example, angular integration R400m (figure 4.19 g) shows that informal areas are very distinctive, hot spots, from the surrounding urban context, while elite districts such as Nasr city, Mohandseen and Maddi are less locally integrated, green and blue areas.
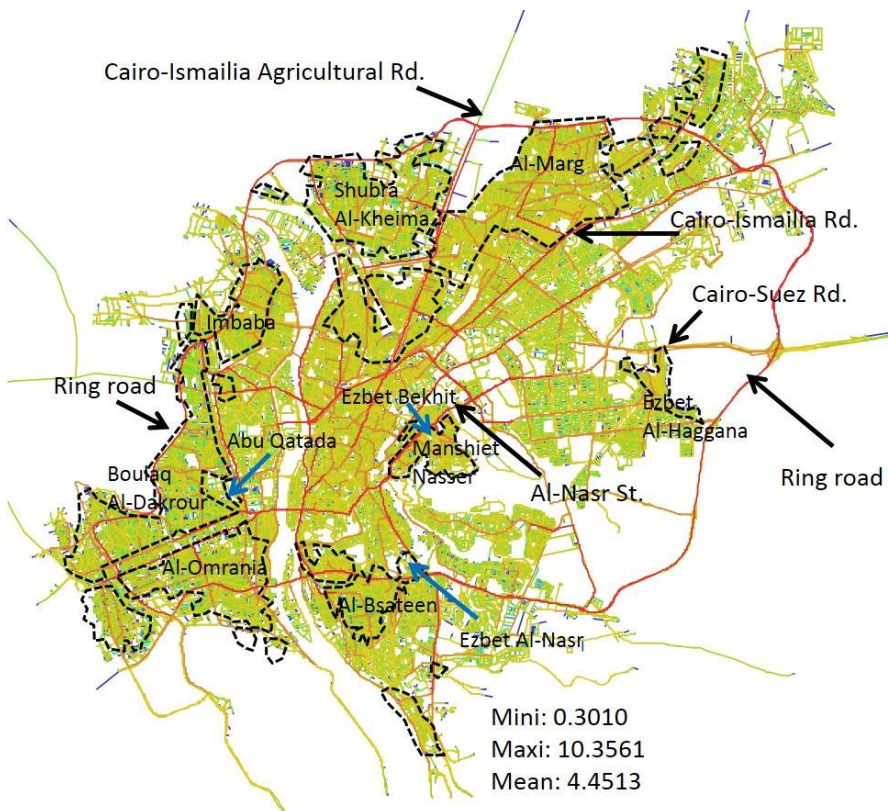
(a) Angular global choice Rn (Log (Ch+2)) showing the location of informal areas along main roads.

Mini: 0.3010
Maxi: 6.7229
Mean: 2.9232

Mini: 0.3010
Maxi: 6.2942
Mean: 2.6806
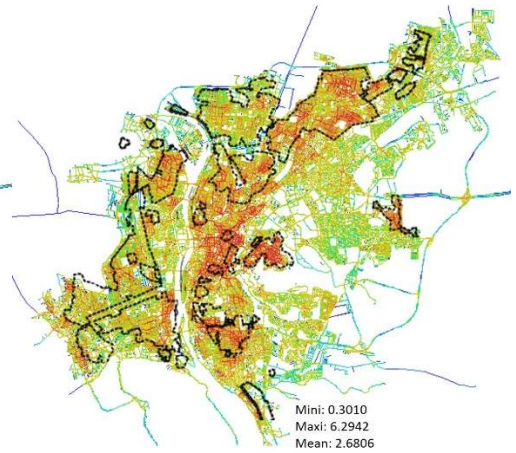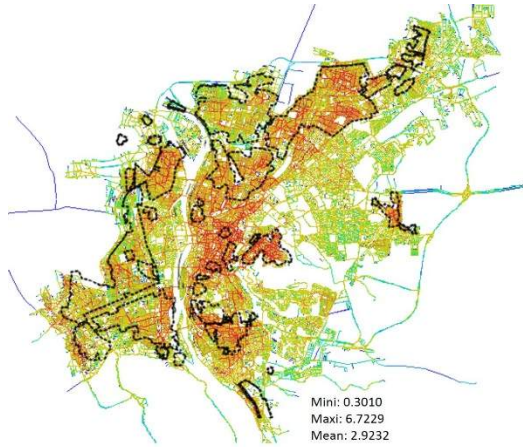
(b) Choice R1200   (c) Choice R800

Mini: 0.3010
Maxi: 6.2942
Mean: 2.6806

Mini: 4.9762
Maxi: 2461.41
Mean: 530.432
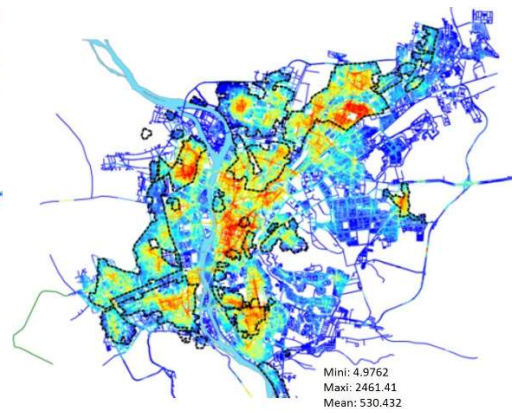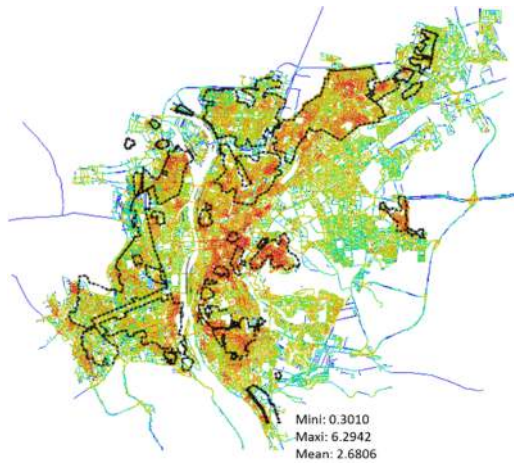
(d) Choice R400   (e) Integration R1200
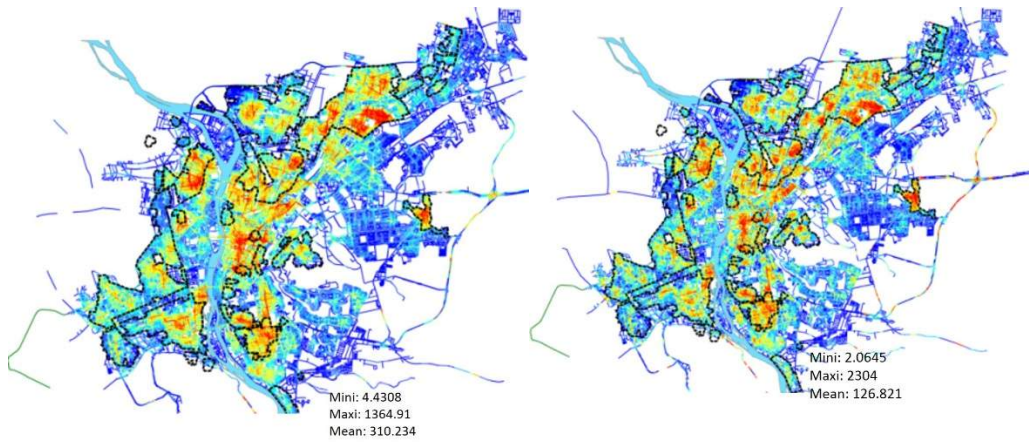
(f) Integration R800   (g) Integration R400

Figure4.19. Global and local-scale angular choice, and local angular integration analysis.

When comparing the map of informal and deteriorated areas [Figure4.20] with the maps of the angular choice and integration analyses with radii 1200,800 and 400 [Figure 4.19 b, c, d, e, f, g], some notable correspondences can be found. There is a weak correspondence in the case of informal settlements established on agricultural land compared with those established on desert land. That is because informal areas located on desert land tend to have a strong internal structure of self-organized organic pattern, whereas those on agricultural land tend to follow the pattern of the agricultural basins (*ahwad*), which run in a linear and gridiron form [Figure4.21].
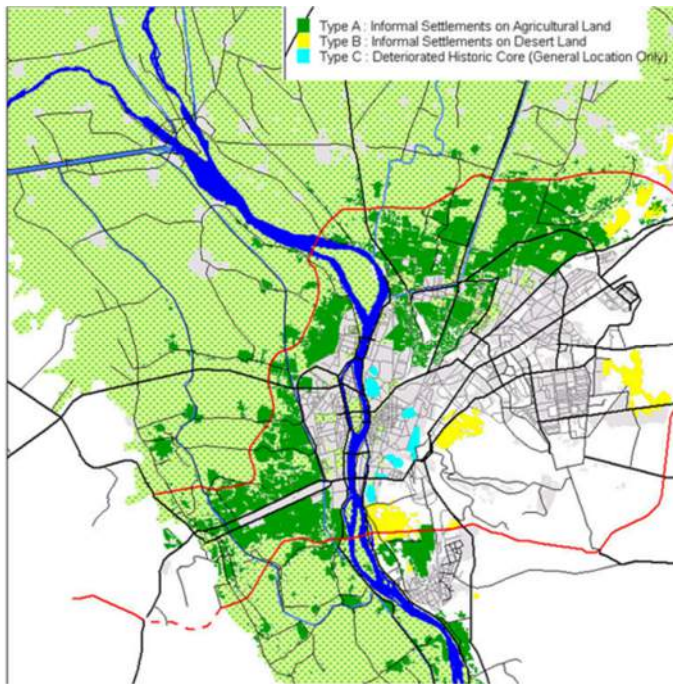
Figure4.20. Map of informal and deteriorated areas (Sims, 2003)
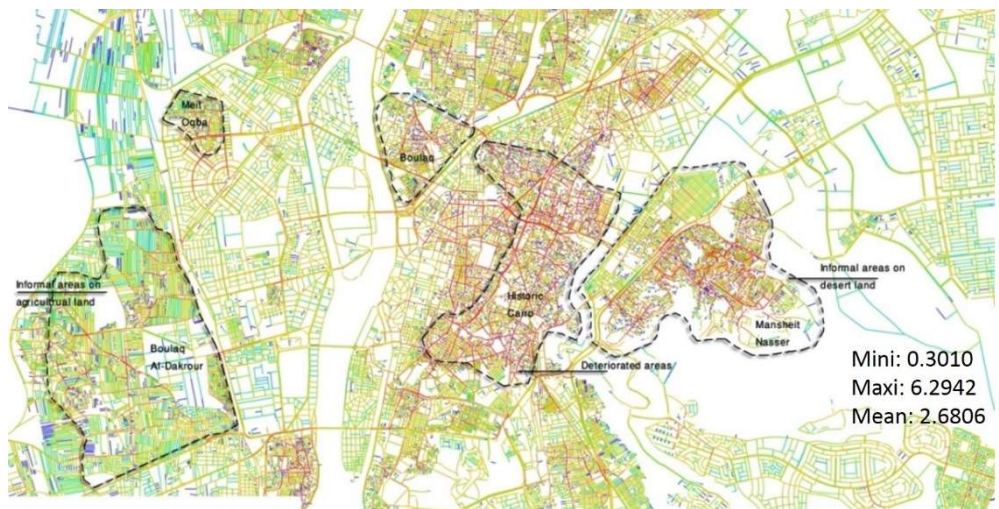
Figure 4.21. A snapshot of angular choice R800 of some informal and deteriorated areas (encircled by black dotted lines).

4.5. CORRELATING SOCIAL AND SPATIAL FACTORS

Various available data from 2006 on poverty, literacy and unemployment are plotted against the spatial analyses from 2012 in order to show what spatial factors might say about socioeconomic differences.

The report from UNDP Egypt provides data about some key social variables (only available for neighborhoods of Cairo governorate) such as percentages of people beneath the poverty line, unemployment rate, mortality rate, and deprivation index. Due to data limitations, social and configurational parameters for only the eastern part of the metropolis (no. of analyzed neighborhoods= 275) were compared thematically. The spectrum includes ten equal classes with a color spectrum that goes from dark red (for higher values) to light red (for lower values) for social variables and from red (for most integrated) to blue (for most segregated) for the spatial configurative attributes.

As can be seen in figure 4.22(a and b) the west-east corridor as well as the eastern part of the city show the least percentage of illiteracy and people beneath the poverty line. This can be noticed in the concentration of light red areas through the west-east corridor and in the eastern part of the city. Conversely, the northern and southern (except Maadi) areas show highest levels of the two indicators. Obviously, this spatial divide between rich and poor implies relative social segregation between Cairo's advantaged and disadvantaged people.

The strong correspondence between illiteracy rate and the percentage of people beneath the poverty line has been verified statistically by exploring the relationship between these two indices [Figure 4.23]. In fact, the correlation between these two social variables is very strong ($r = 0.9989$, $p=0.000$). Further, in the scatter plot it is easy to perceive how the affluent

neighborhoods cluster in the lowest levels of both illiteracy and poverty line. Oppositely, the impoverished areas stand on higher levels of both indicators.

The map of unemployment rate per district, presented in figure 4.22 (c), shows that the least percentage of unemployment is clustered in the central area of the city. Oppositely, northern and southwestern districts show the highest levels of unemployment (darker red neighborhoods). Remarkably, regression analyses show a significant inverse relation with illiteracy (r of -0.1779, p=0.0031) and percentage of people beneath the poverty line (r of -0.1823, p=0.0024).

The Deprivation Index (DI) is also mapped in GIS. The thematic map presented in figure 4.22 (d) shows a strong order as the maps of literacy and the percentage of people the beneath poverty line, where the least deprived neighborhoods are concentrated to the east of the city. Statistical analysis shows that the deprivation index has a significant positive correlation with both illiteracy rate (r= 0.9254, p< 0.0001) and percentage of residents beneath the poverty line (r= 0.9271, p< 0.0001) [Figure 4.23].
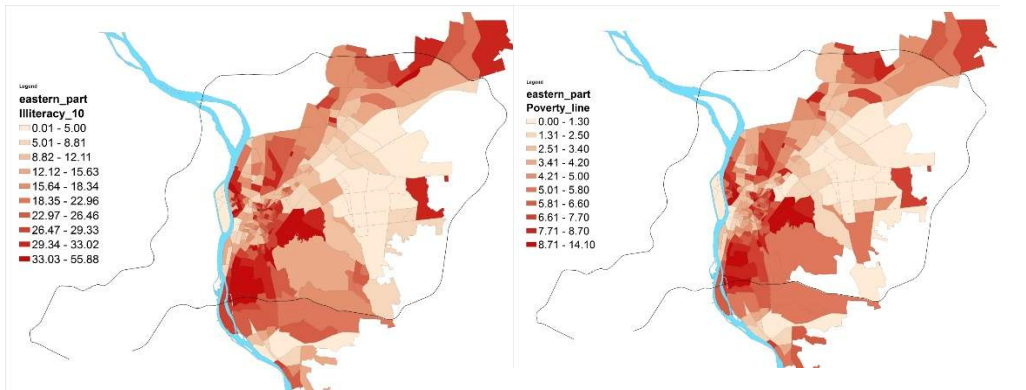
(a) Illiteracy rate (+15) per neighborhood (2006) (according to UNDP Egypt, 2008)

(b) People beneath poverty line per neighborhood (2006) (according to UNDP Egypt, 2008)
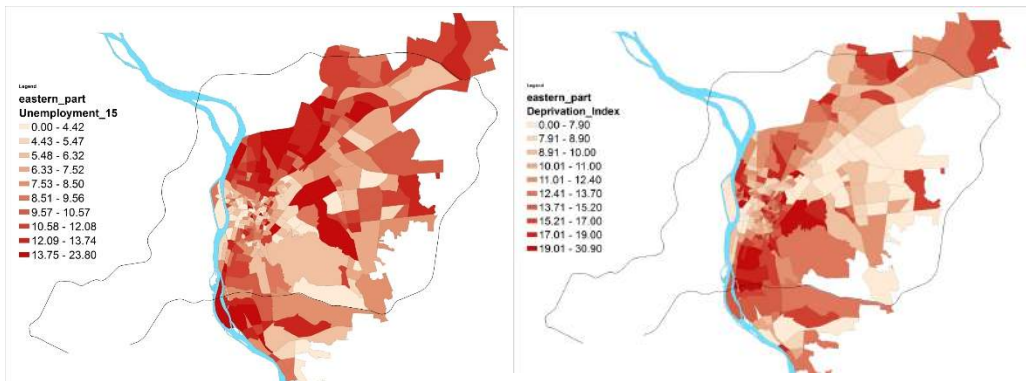
(c) Unemployment rate (+15) per neighborhood (2006) (according to UNDP Egypt, 2008)

(d) Deprivation Index (DI) per neighborhood (2006) (according to UNDP Egypt, 2008)

Figure 4.22. Socio-economic factors at a neighborhood level.
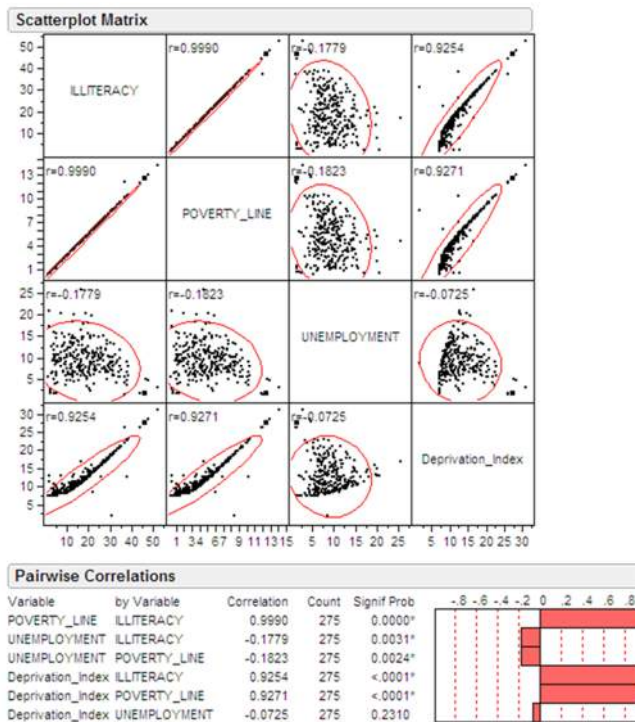
Figure 4.23. The relationship between different social variables and each other.

In the maps with the angular global and local integration analyses [figure 4.24], the mean value for each syntactic attribute was obtained by separating the segments within or partially within each administrative zone. As discussed previously, the angular global and local integration analyses show that Cairo's central core has high integration values and that peripheries have the lowest integration values. Many central areas such as El-Sharabia (adjacent to Masr train station) and some of the old historic areas of Cairo have low global integration values due to physical segregation caused either by railways, or the spatial configuration of the street network itself. Such physical segregation disappears at a local level with a metrical radius of 1200 units and lower, due to the strong internal spatial structure of these areas.

Cairo's global and local integration analyses show a remarkable difference manifesting in the strong west-east corridor. This corridor is distinguished significantly in the angular global integration map compared to the angular local integration analysis, where this corridor seems to shrink and shift towards the central area.
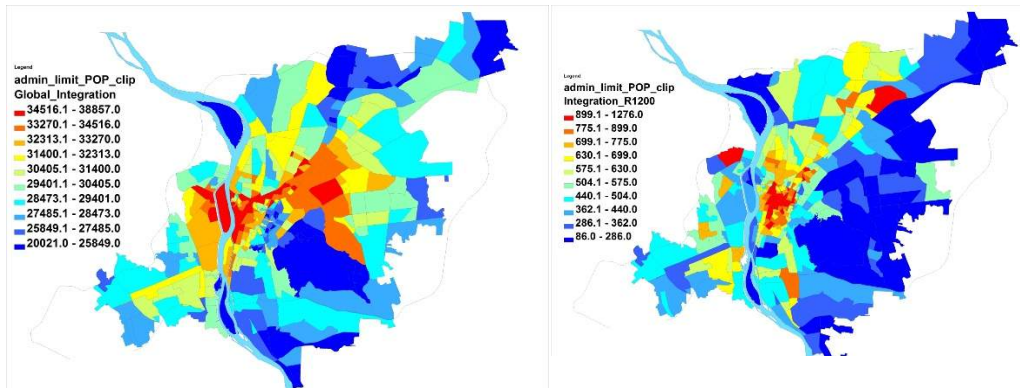
(a) Angular Global Integration Rn per   (b) Angular Integration R1200 per
neighborhood.   neighborhood.

Figure4.24. The mean of syntactic measures at both global and local levels.

To what extent do the socioeconomic variables follow spatial configurative measures? The results of the spatial configuration analyses were overlapped with maps with the socioeconomic registrations using the JMP software to give evidence on the correlation between the efficiency of spatial configuration and socioeconomic conditions. Figure 4.25 (a) shows the results of the regression analysis between social and spatial variables, which reveal a significant correlation between some social variables and global integration. For instance, we found a significant inverse relation between illiteracy rates and global integration (r of -0.4033, p<0.0001). Likewise, global integration correlated negatively with the percentage of people beneath the poverty line (r of -0.3908, p<0.0001). This means that affluent settlements will be more integrated while poor areas will be more

segregated. In addition, global integration correlated negatively with deprivation index (r of -0.3908, p<0.0001). It is noteworthy that such correlations become stronger when neighborhoods comprising older districts such as Boulaq are excluded (N= 257, R square of 0.19, 0.20 and 0.18 for the relation of illiteracy, % of people beneath poverty line and deprivation index with global integration respectively) [Figure4.25 b]. In fact, Boulaq was one of the outskirts of Cairo and still not completely integrated. Furthermore, excluding more outliers such as the rich local authorities in the east (e.g. the neighborhoods comprising Al-Nozha) and south (i.e. Maadi) strengthen the relations (N=243, R square of 0.25, 0.26 and 0.23 for the relation of illiteracy, % of people beneath the poverty line and deprivation index with global integration respectively). The reason for excluding these outliers is their partial independence from the city. Maadi, for example, was established in 1904 and was about 12km upstream from Cairo CBD. Progressively, Maadi has been engulfed by the city, but still maintains a certain independence. To say it differently, Cairo has developed following a "patchy" process (Raymond, 2001). That is why we tried to recheck the correlations without such districts and the like. Surprisingly, considering only the neighborhoods (N=15) comprising the districts of Al-Nozha and Maadi by themselves showed strong inverse relations of angular global integration with illiteracy (r of -0.6584, p<0.0075), the percentage of people beneath the poverty line (r of -0.6583, p<0.0075), and deprivation index (r of -0.6413, p<0.01). However, this is not the case when considering Boulaq's neighborhoods by themselves (N= 19).
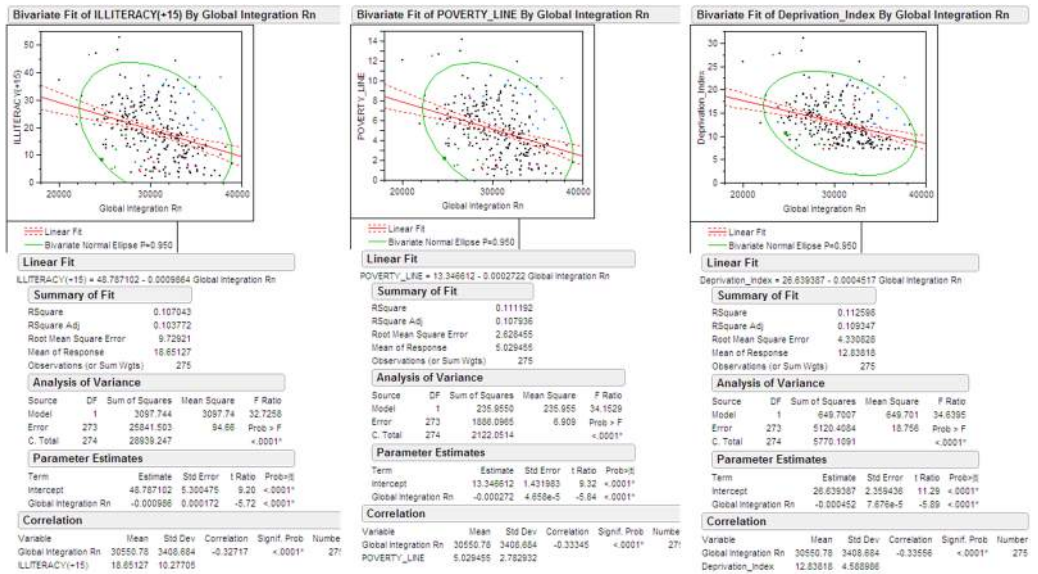
(a) All neighbourhoods
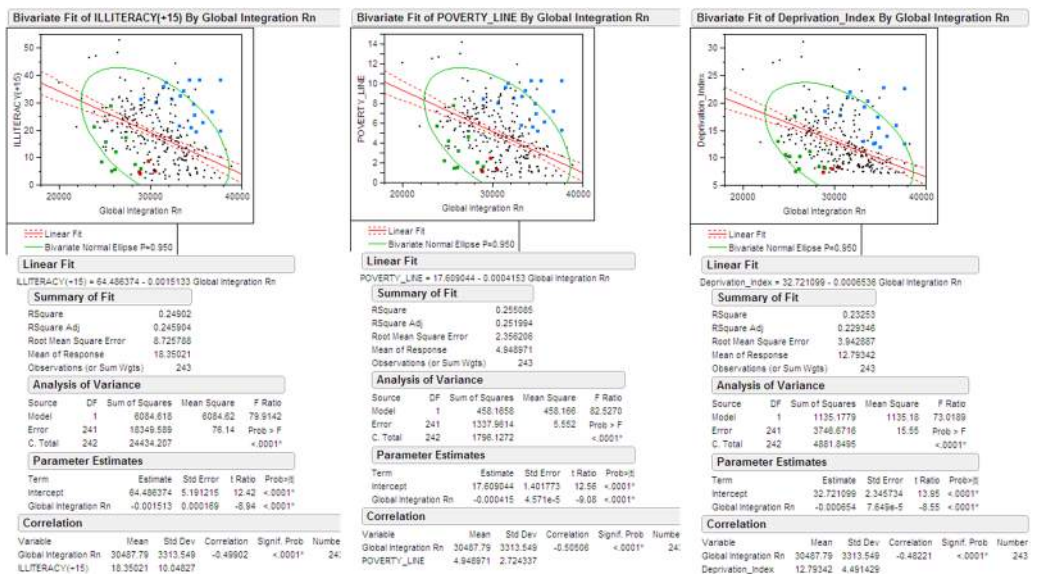
(b) excluding neighbourhoods comprising districts of Boulaq (blue), Maadi
(green) and Al-Nozha (red).

Figure4.25. the relation of illiteracy, % of people beneath poverty line and
deprivation index with global integration at neighborhood level.

These findings demonstrate the role of global integration in enhancing socioeconomic conditions. The results also show that some parts of the city such as Maadi and Boulq seem to work independently of the whole system and, thus, need further effort to integrate with the rest of the city.

4.6. CONCLUSION

The degree of spatial accessibility and socioeconomic degradation of a settlement are closely related. Spatially integrated settlements have better socioeconomic conditions than spatially segregated areas and vice versa.

Tracing urban transformations of Cairo shows that socioeconomic and political aspects are the main causes that create a slum. Due to socioeconomic forces, the disadvantaged people select to reside in the less attracting places within the city. Furthermore, informal areas are shaped very quickly. The outcomes are informal settlements with poor physical conditions.

Analyzing the diachronic axial models of Cairo through different eras shows that Cairo's center migrated at least twice and that Cairo is a polycentric urban region. Moreover, the historical models reflect the dynamics of urban growth and show that longer routes with high choice values are the main spatial drivers the city's expansion. The reconfiguration of the urban pattern is quite clear after the revolution of 1952, since the metropolitan underwent a fast growth and a considerable number of firms have been moving to the north-eastern part of the city. Furthermore, the configurational model of 2012 shows that Cairo CBD is not the only nucleus of economic activity. However, Cairo CBD still competes new centers and still livable until today. This demonstrates that physical environment resists societal changes (Ceccarelli, 1972) and shows that the influence of socioeconomic and physical transformations on each other is less straightforward.

Informal areas are locally integrated, but globally segregated. To explain, informal areas, and urban areas in general, develop two types of spatial structure: a local structure, which enables the local functioning of the area; and a global structure, which facilitates them to interact efficiently with wider urban context (Hillier, 1996, pp. 343–4). Although having an integrated internal – or local- structure, informal areas have a segregated external- or global- structure. They lack the axial integrators that link their local street network with the rest of the city.

Importantly, contemporary urban planning practices in Cairo contributes to Cairo's centuries-old divisions. The discontinuous development has resulted in a fragmented urban structure of affluent enclaves, the deprived areas and everything in between. Each urban area, whether affluent or deprived, has its own center. However, its degree of livability depends on how the city's main road network is able to transport potential investment to both formal and informal centers for the stimulation of the "virtuous cycle" of regeneration.

Finally, the correlation presented in this chapter between social and spatial variables needs to be verified at a street segment level. Accordingly, the next chapter will examine the relationship between spatial factors and social aspects (people and activities) at a micro scale level.

5 SPATIAL ANALYSES OF LOCAL SETTLEMENT AREAS INSIDE CAIRO

Chapter Five

Spatial Analyses of Local Settlement areas inside Cairo

5.1 INTRODUCTION

This chapter sets out to provide a historical overview of the case studies. Ezbet Bekhit and Ezbet Al-Nasr are examples of informal neighborhoods on desert state-owned land. Land topography in Ezbet Bekhit is hilly, while Ezbet Al-Nasr's topography is a semi-flat. Both areas provide a good example for studying how spatial and social patterns function against each other. In contrast, Abu Qatada is an example of an informal area built on former privately owned agricultural land where the urban block subdivision tends to follow that of agricultural basin lines. Different from the previous three informal areas, Al-Sharekat in Nasr City is an example of a planned neighborhood with absolutely different urban pattern and syntactic values. As such, a significant comparison can be held between formal and informal parts where the understanding of mutual relations among spatial parameter, commercial activities distribution and movement flows can be highlighted.

The aim here is to investigate the role of spatial configuration in shaping movement and commercial land use patterns at a street segment level in Cairo's informal areas. Importantly, both movement and commercial activity influence social and economic segregation. According to Hillier et al (1993), the spatial configuration influences both movement and urban activity. Moreover, movement and activity affect each other. In other words, most accessible spaces will generate higher movement, which in turn will attract commercial activities. Commercial activities, in turn, will bring in more activities and so forth.

5.2. DESCRIPTION AND HISTORICAL CONTEXT OF THE CASE STUDY AREAS

<u>Ezbet Bekhit:</u> it is located in the Mansheit Nasser District, Egypt's densest and largest informal settlement on desert government-owned land, hosting about 262050 inhabitants (CAPMAS, 2006) living in 7.27 kilometers. Mansheit Nasser was used previously as a limestone excavation from Fatimid epoch until recent times. In the early 1960s, a group of people living on the edge of Fatimid Cairo (Al-Azhar and Al-Darrasa) were displaced in order to build a hospital on their land. The government rehoused the evicted people in Mansheit Nasser, which was a far distance from Historic Cairo at that time (Tag-Eldeen, 2003). Simultaneously and specifically in 1972, garbage collectors living in Imbaba were evicted too, and were relocated in the far upper plateau of the Mokattam hills in Mansheit Nasser (Joos and Conrad, 2010). Furthermore, influx refugees from the Suez Canal's cities settled in the settlement after the war of 1967, between Egypt and Israel. Progressively, more new comers from different places in Cairo and from Upper Egypt targeted the area. Ultimately, the Egyptian former President "Gamal Abd El-Nasser" legalized the area and permitted extending water and electricity to the settlement, and that is why the area is so-called Mansheit Nasser. Historical maps show that urban growth in Ezbet Bekhit, and Mansheit Nasser in general, started along Autostrad and extended towards the southeast (figure5.1).

Figure5.1. Urban evolution of Mansheit Nasser district. (source: Al-Helo, 2011)

Ezbet Bekhit is a home for roughly 37,000 inhabitants living over 18.5 hectares (equivalent to 45 feddans) (Sims, 2003). The quarter is located in a crossroad strategic location in Mansheit Nasser. Al-Nasr (Autostrad) and El-Tayaran streets demarcate the edges of the area from north and east respectively, whilst other areas of Mansheit Nasser surround Ezbet Bekhit from the other two sides. In addition, the old British railway line separates the area from Al-Nasr road northward and from Ezbet Al-Arab eastward, whereas Al-Nasr road itself isolates the quarter from the large cemetery at north and works as a strong edge for pedestrians. On the other hand, sharp mountain cliffs segregate Ezbet Bekhit from its surroundings from both south and west sides and expose the residents to potential risks of rock slide exactly similar to what already happened in 2008 in the adjacent quarter of Dewika. Topographic features of sharp edges can also be observed within Ezbet Bekhit itself, where strong cliffs divide the area into two relatively different parts, one of which is called "EL-Gora" (Fig.).

147
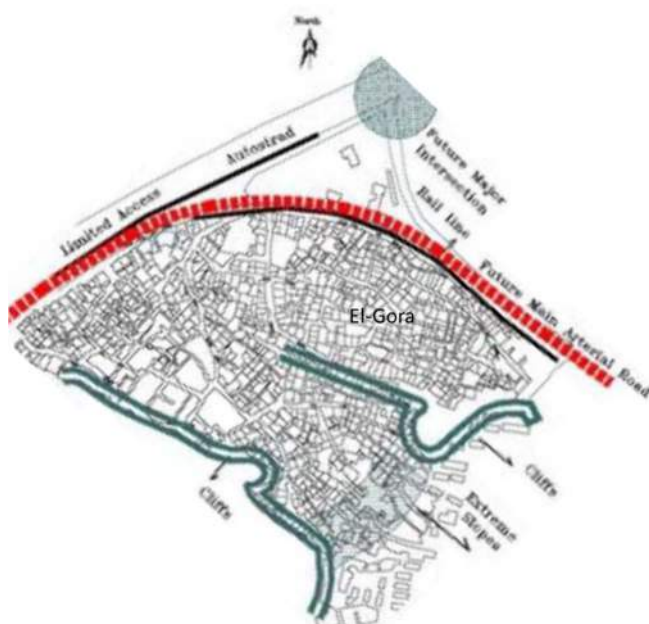
Figure 5.2. Site plan of Ezbet Bekhit shows the boundaries. (source: The Project Team, 1998 in Tag-Eldeen, 2003)

Due to the efforts of KFW (German Development Bank) that was in charge of financing the provision and extension of infrastructure to Mansheit Nasser, Ezbet Bekhit is nearly serviced with potable water and sanitation system; nevertheless, many interviewees reported that the basic infrastructure is still inadequate and partially poorly installed. Although electricity supply is notably good in Ezbet Bekhit in general, many interviewees claimed that some dwellings in the far southern part of the quarter are illegally connected to power service. Likewise, there is no garbage collection system in Ezbet Bakhit. Waste is either dropped in alleys and hence attracting flies and mice or dumped and burned close to sharp cliffs passing by the area. On the other hand, basic facilities are not available, remarkably health care and educational services. The only public services available within the area are mosques and some administrative buildings such as a post office. The dense urban fabric

leaves no space for constructing non-existent community services. Nonetheless, some educational (three primary schools, one preparatory and one technical secondary school for architecture) and recreational facilities (one youth center) are available in the nearby western quarter. Although reachable in less than five minutes walking distance from Ezbet Bakhit, Al-Shaikh Zaid hospital is unaffordable and inadequate for many inhabitants. Otherwise, people have to go to Al-Zahraa or Al-Hussain hospitals (about 3 to 4 kilometers) in some cases or Rabia Al-Adawia health care center in other cases.

Importantly, the narrow broken sinuous road system impedes accessibility for emergency vehicles and police cars, which are a major concern in terms of safety and security.

<u>Ezbet Al-Nasr</u>, formerly so-called Turab Al-Yahud (Jewish cemeteries), is an informal settlement covering about 55 hectares of state-owned desert land (TU Berlin, 2010, IUSD, 2013). It is located in a strategic position (only 4km east of the River Nile and 8 Km south of Cairo CBD) attributed to Al-Basateen district in Cairo Governorate. However, the area is, to a certain extent, physically and socially segregated (http://egypt-urban.net/where-we-work/ezbet-el-nasr/). It is bordered by the slaughterhouse and a vacant plot from the north, and a fenced historic Jewish cemetery from the western edge, whilst highways fence the settlements from the southern (the Ring road) and eastern (Autostrat) boundary. This makes the quarter externally poorly accessible, especially for pedestrians, who oblige to cross multi-lane dangerous routes. However, the quarter's internal street network is good for pedestrians, but not for vehicles. Besides, two access points, two tunnels in the south and a service road in the northeast, connect the area to the surrounding districts.

The history of the area's establishment dates back to the beginning of 1970s with the first generation of rural immigrants coming from the southern governorates, mainly from Qena and Sohag Governorates (TU Berlin, 2010). The immigrants settled in the area due to its proximity to stone quarries. Consecutively, a second generation of influx immigrants came to the area following their family members and relatives. Eventually, Ezbet Al-Nasr turned from a transitional point into a permanent community with relatively strong social solidarity (Ibid). The area is now a home to roughly 60,000 residents inhabiting around 30 hectares, whilst the rest of the area (about 25 hectares) is occupied by a Jewish cemetery, one out of use sewage treatment plant and an undeveloped paved land (about 6 hectares) that has been used in the past as a bus depot and a second hand car market (Ibid).

Figure5.3. Uses surrounding Ezbet Al-Nasr (source: http://egypt-urban.net/grants-calls-for-proposals/ezbet-el-nasr-2/)

Apart from some religious and educational public buildings manifesting in some Mosques and a large school complex, Ezbet Al-Nasr lacks many public facilities, more specifically administrative, security, recreational and medical ones. Although in a close proximity to the area, the hospital of Girahat Al-Yoom Al-Wahed (one day surgeries) is often too expensive to be afforded by local residents. Accordingly, many inhabitants have to go to long distance hospitals such as Al-Khalifa and Ahmed Maher. Furthermore, there is no police station or any administrative building in the area. Although the size of the area, 123 Feddans, is under the urban standards for providing a police station that covers about 200-5000 feddans (Allam, 1993), the urgent need for a security service has been reported by all interviewees. They asserted that thugs and drug dealing spread all over the area, more specifically in the north eastern part of the settlement adjacent to the cemetery in what so-called *Zerzara*, where movement rate is quite low especially at night. As such, the absence of police control relatively increases exclusion and leaves a room for anti-social behavior.

Notably, there is no waste management system in Ezbet Al-Nasr so garbage is either dumped in alleyways or in the vacant land on the northern boundary. This influences inhabitants' health. On the other hand, natural gas service is not supplied in the area, so dwellers rather use gas cylinders which sometimes exceed 50 EGP per cylinder. The majority of dwellings are provided by both potable water and sewage systems; however, the two systems are not well functioning as sewage pipes overflow periodically, whilst water mains burst and sometimes the pressure becomes too weak to reach upper stories starting from the third floor (IUSD, 2013). Similarly, many interviewees have reported that electricity is cut from time to time and even many houses are unofficially

connected through unsecure illegal cables. Undoubtedly, this is extremely dangerous and confirms in some way marginalization and exclusion.

Abu Qatada, including Noufal Al-Gadida and Noufal Al-Qadima, is a highly populated quarter attributed to Boulaq El-Dakrour district, which was in the past a village attributed to Giza Governorate. Today, Boulaq El-Dakrour is the largest informal settlement (about 13 square kilometers, 85 % of which is inhabited by more than 569,227 persons) on formerly private agricultural land. Not until the early 1960s did informal housing begin in some parts of the district, especially the neighborhood of Abu Qatada due to its proximity to the campus of Cairo University, where students' need for cheaper accommodation is remarkably high. It is noteworthy that Abu Qatada is one of the district's oldest Neighborhoods. Residents claim that the history of the area dates back to a tomb, discovered in the mid of the past century during excavation, belongs to a religious person, hence the name. The neighborhood is divided by a main internal street, Al-Gameia St., into two parts: Delawar and Abu Qatada. The gross area of the quarter is about 28 hectares populated by 27016 persons (CAPMAS, 2006).

Unlike both Ezbet Bekhit and Ezbet Al-Nasr, secure tenure here is high. The illegality comes from the conversion of agricultural land into housing plots without official permission from public authorities. Therefore, dwellings do not follow building regulations. Land parceling in Abu Qatada is linear following the former basin lines. Apart from outer borders, all roads inside Abu Qatada are not paved, broken and potholed. Despite its strategic location in central Cairo metropolitan districts (e.g. richer districts of Mohandseen and Dokki), Abu Qatada is bounded by strong physical barriers that isolate the quarter from its surroundings. To the south, the area is demarcated by King Faysal street, whereas Sudan street, Cairo railway Metro line and El-Zumour

Canal border the area from the east. To the north is Tharwat bridge and Saft El-Laban corridor, whilst the walled Agricultural Research Center belonging to the Faculty of Agriculture runs westward. Subsequently, Abu Qatada is somewhat physically isolated. In other words, cars get access to the area through a limited number of gateways, whereas pedestrians have only two bridges over the Zumour corridor, and two metro stations (Cairo University and Faysal).
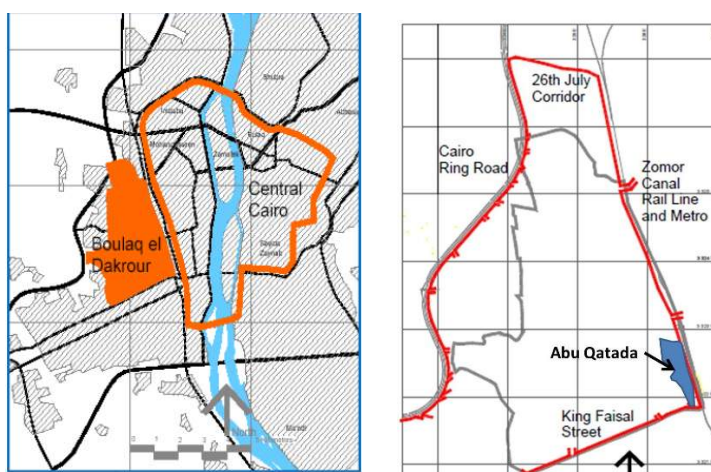
Figure5.4. Location of Boulaq El-Dakrour district (left) and Abu Qatada neighborhood within Boulaq El-Dakrour (right) (source: Piffero, 2010)

Abu Qatada is mainly made up out of residential apartment blocks. The only available facilities are mosques, one private primary school (Al-Agial school), two kindergartens, one small youth center and one charity complex. People go to Boulaq Al-Dakrour public hospital, which is located at less than five minutes walking. Otherwise, residents have to go to Al-Qasr Al-Eini in Cairo CBD, just in case. Under the absence of security service, drug trafficking and bullying spread over the area, especially along narrow alleys in an area called "Alwasaaia" close to Al-Gameia Street (based on interviews with residents,

2013). Further, the insufficient solid waste collection system contributes significantly to the contamination of the open Canal of El-Zumour (previously was used for irrigation, but now has been used for drainage) and the quarter as a whole. Rubbish either left in the streets, where kids usually play, or collected in an open dump site adjacent to El-Zumour Canal, where insects and rodents find their way and hence unhealthy conditions in the area.

Al-Sharekat is one of the neighborhoods comprising Nasr City. The land on which the city was built was formerly a military zone attributed to the ministry of Defense. The establishment of the city was initiated in 1960s by President Gamal Abdel-Nasser who was the first man that suppressed the Muslim Brotherhood. After the military coup in 1952, Abdel-Nasser aimed at building a socialist country based on Arab nationalism and cultural and spiritual values. His ideology was built around anti-colonial trend manifesting in the eradication of the symbols of the British occupation such as the barracks and some palace, and erecting new symbols of the state power. Nasr City symbolizes this new ideology (Herzog et al, 2009).

The city was planned by the government in 1956-1958 and turned into a private company in 1964. The city was supposed to be an administrative capital within the capital. Many ministries located in downtown Cairo, the colonial district, were to be moved to Nasr City (Herzog et al, 2009). However, only few institutions (e.g. ministries of new economy and defence) were displaced. Finally, Al-Azhar University was moved from the historic part of Cairo to Nasr City.

Al-Sharekat is a home for 8900 inhabitants living over 41 hectares (UNDP, 2008). Salah Salem and Al-Tayaran streets demarcate the edges of the area from north and east respectively. The neighborhood has a strict orthogonal

grid with large super blocks. The center of the neighborhood contains educational buildings as well as other public facilities. There are five schools, three mosques, nine pharmacies, four restaurants, two youth centers, one fire station, four banks, three companies, one hotel, nine governmental buildings, one cinema, one post office, and some ministries and military attributed buildings.

Figure5.5. Location of Al-Sharekat neighborhood in Nasr City, Cairo. (Source: Herzog et al, 2009).

5.3. COMMUNITY'S GENERATING ACTIVITIES IN THE CASE STUDY AREAS

Mixed-use is a frequent phenomenon in informal areas, where the ground floor is often used for micro-economic activities. Commercial activities exist over

outer roads as well as internal streets and alleyways. In the three informal areas there two types of community's economic activities:

1) Local shops such as groceries, bakeries, restaurants, coffee shops, clothing, street vending and hairdressing salons. Such activities are usually located along alleyways to provide essential daily goods. Daily markets exist within informal areas, where street vendors share the street with shop owners and passersby. As meeting points, Coffee shops play a significant role not only in strengthening social interaction between residents, but in providing job opportunities for temporary laborers as well.

Like informal areas of Abu Qatada, Ezbet Al-Nasr and Ezbet Bekhit, supermarkets and other kinds of local shops are situated in the ground floors of apartment blocks in Al-Sharekat neighborhood in Nasr City.

2) Vocational activities such as car repair, carpentry, iron work, building material, junk trading, and marble processing are mainly located along external streets in order to facilitate service for outsiders, who are usually middle and upper class. Here, residents of informal areas try to generate any income through establishing their workshops along active edges of their settlements.

Unlike the three informal areas, light manufacturing activities such as workshops are missing in Al-Sharekat settlement. Rather there are global integrating activities that provide services to non-local as well as local residents such as hotels, cinemas, car Expo and banks.
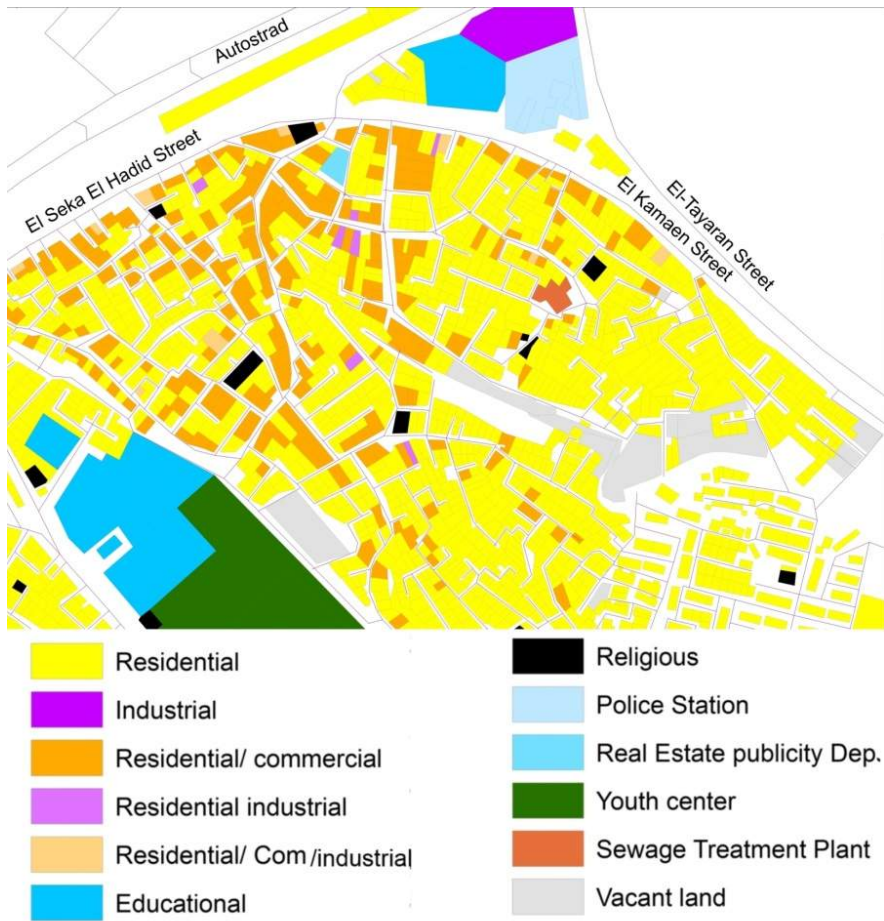
Figure 5.6. Land use in Ezbet Bekhit (source: author).
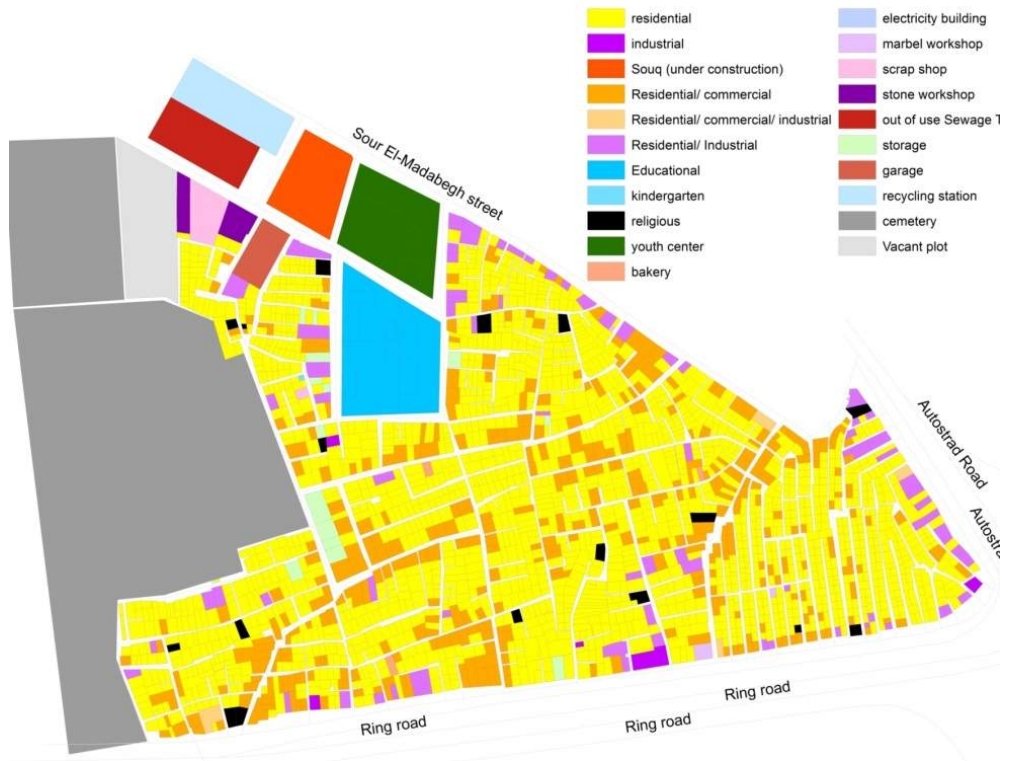
Figure 5.7 Land use in Ezbet Al-Nasr (source: author).
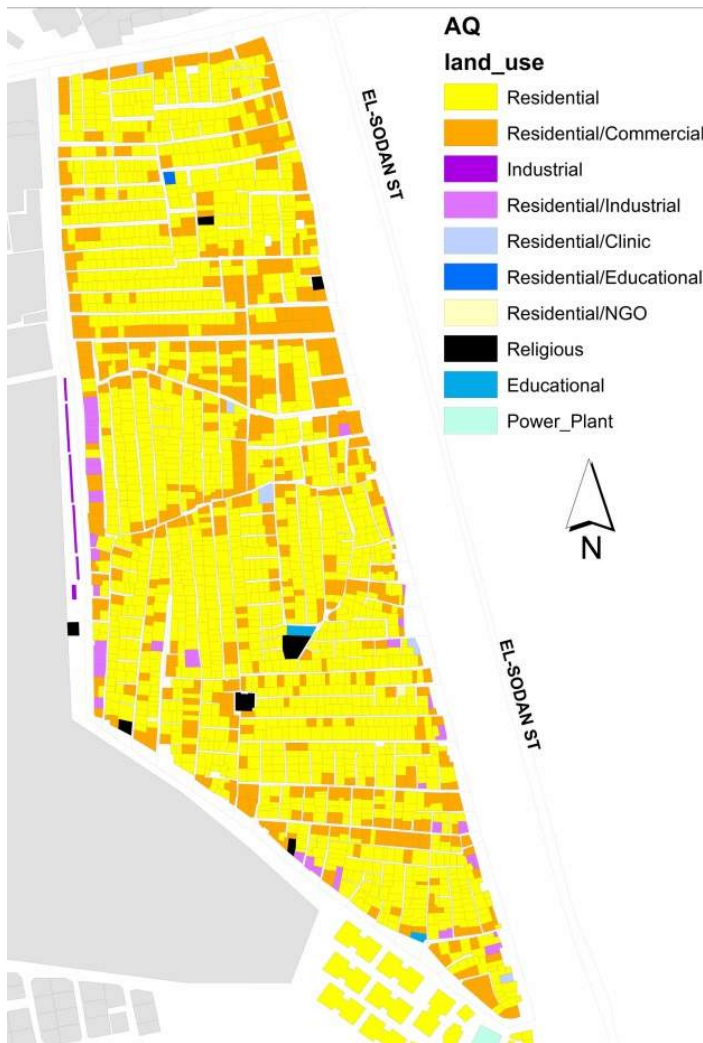
Figure 5.8 Land use in Abu Qatada (source: author).

Figure 5.9. Land use in Al-Sharekat (source: author).

5.4. SYNTACTIC ANALYSES

In order to fully understand the influence of spatial configuration on movement and land use pattern, we need first to grasp the case study areas within the wider context of Cairo. Figure 5.10 shows the normalized angular global integration Rn of the four cases. The red lines show the highest values, while the blue streets are the lowest ones. Apparently, Al-Sharekat neighborhood is the most integrated globally, while Ezbet Bekhit is the most segregated.

Figure 5.10 Normalized angular global integration Rn in Ezbet Bekhit (top left), Al-Sharekat (top right), Ezbet Al-Nasr (bottom left) and Abu Qatada (bottom right).

At a local scale measure, morphological differences can be captured between the four case studies. Syntactically speaking, Al-Sharekat has the highest normalized angular integration R400m. After it, comes Ezbet Al-Nasr, Abu Qatada and Ezbet Bekhit respectively.

Figure 5.11 Normalized angular integration R400 in Ezbet Bekhit (top left), Al-Sharekat (top right), Ezbet Al-Nasr (bottom left) and Abu Qatada (bottom right).

The map of node count 400m reflects the degree of intensification of urban grid in the case study areas. Unplanned areas have larger number of street segments (node counts) in short metric distance than planned ones. In Ezbet Bekhit, small grain structure can be seen in red and orange colors along outward edges, while larger blocks are shown in yellow-green range in the deeper parts and along internal mountain's cliff. Actually, Ezbet Bekhit has the highest node count due to its organic structure and short block length, which is a result of strong topography.

In Ezbet Al-Nasr, the urban grain structure is small in the central area and eastward where red and orange colors are dominating, while western parts have larger sizes in blue and green colors. The school complex, the cemetery, the vacant plots, and the sewage treatment plant are shown in the blue-green spectrum. The large block size in such places might explain why pedestrian movement is low around. Slaughterhouse and cemetery blocks seem to segregate the neighborhood from north and west respectively.

Abu Qatada has a small grain compared to surrounding parts with bigger grain urban structure in the blue-green range. Cairo University campus and Agricultural Research Center are also shown in blue color.

Al-Sharekat has much larger blocks (dark and light blue) than those found in the three previous informal areas.
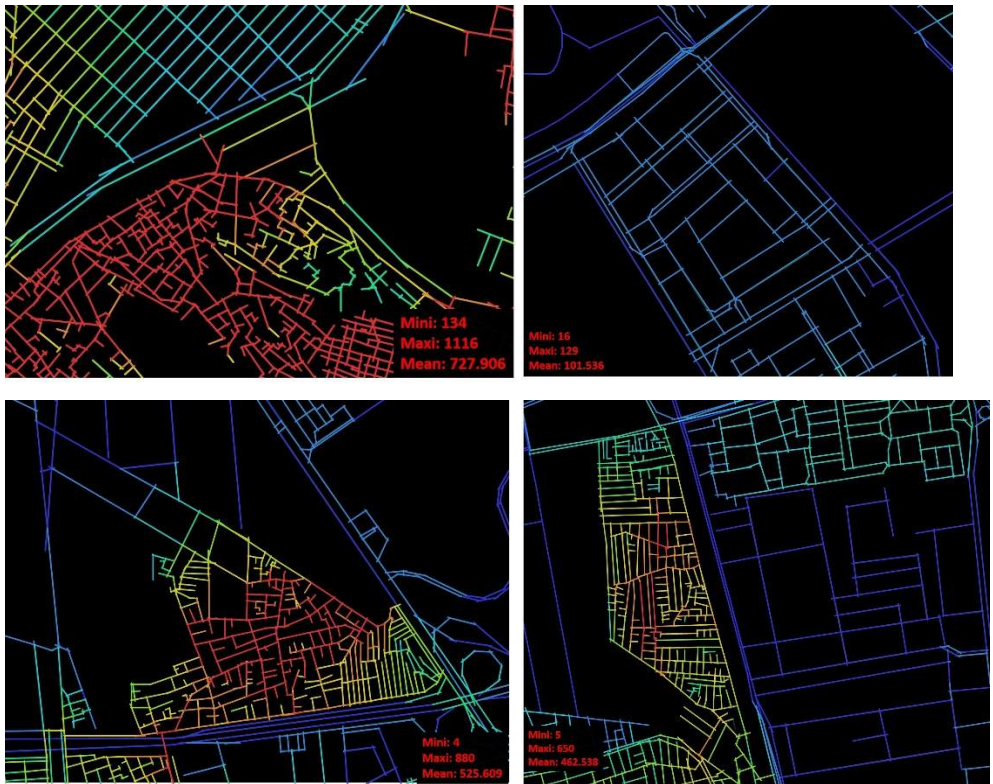
Figure 5.12 Node count R400m in Ezbet Bekhit (top left), Al-Sharekat (top right), Ezbet Al-Nasr (bottom left) and Abu Qatada (bottom right).

Figures 5.13, 5.14, 5.15 and 5.16 show the visualized angular choice for the four neighborhoods at radii 2000 and 400 meters. The maps are coded thematically including ten equal quintiles with a color spectrum that goes from dark red (for the 10% most accessible streets) to blue (for most segregated ones). In the three informal areas, a visual interpretation of syntactic maps implies possible correlations between syntactic parameters and commercial uses distribution (shown on the maps as dots). It implies that shops and workshops are mainly located along the most accessible segments. Furthermore, residential buildings tend to cluster along the most segregated streets. Unlike informal areas, commercial activities in Al-Sharekat

neighborhood seem to be distributed randomly. However, statistical analysis is needed to demonstrate such claims. Lastly, it can be noted that the ratio of plots with commercial activity located in the border to the total number of shops in Al-Sharekat is remarkably lower than other case study areas.

a) Angular Choice R2000m

b) Angular Choice R400m

Figure 5.13 Ezbet Bekhit's angular segment analysis overlapped with the distribution of commercial activities.

a)   Angular Choice R2000m

b) Angular Choice R400m

Figure 5.14 Ezbet Al-Nasr's angular segment analysis overlapped with the distribution of commercial activities.
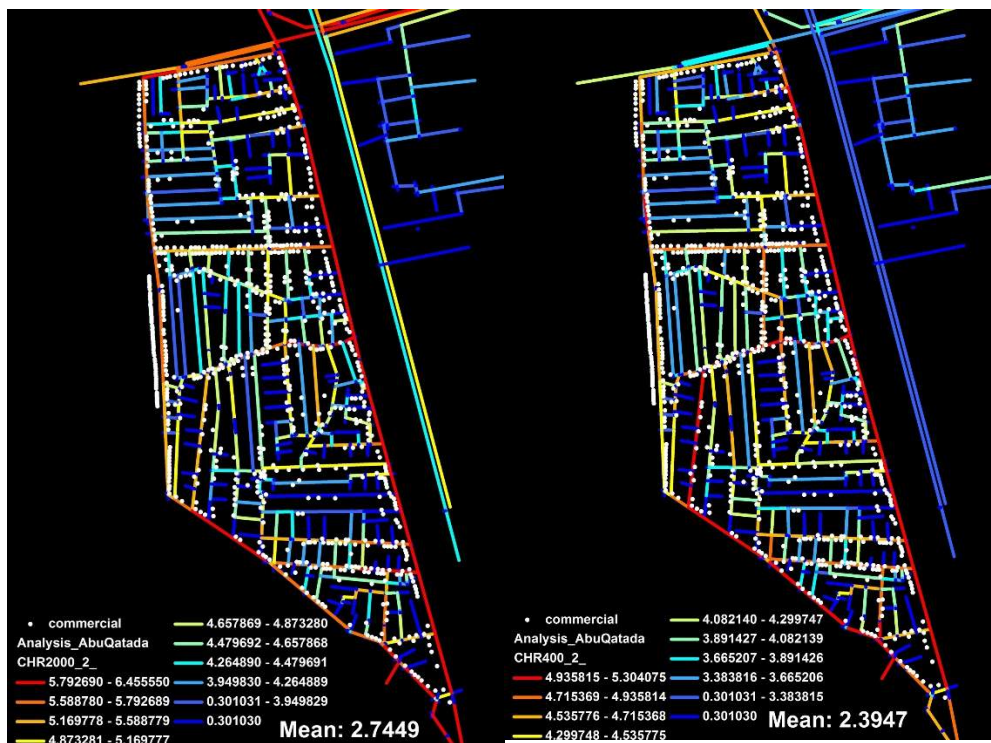
a) Angular Choice R2000m   b) Angular Choice R400m

Figure 5.15 Abu Qatada's angular segment analysis overlapped with the distribution of commercial activities.

a) Angular Choice R2000m

b) Angular Choice R400m

Figure 5.16 Al-Sharekat's angular segment analysis overlapped with the distribution of commercial activities.

Table5.1 summarizes the spatial parameters of the case study areas. It shows that Al-Sharekat is more globally and locally integrated than the three informal areas. In terms of part-whole relation, all the case study areas are unintelligible, since both intelligibility and synergy values have a very weak coefficient of determination (R^2). This means that the four neighborhoods are poorly embedded in the wider context of the city. This implies that visitors and those who are not familiar with the neighborhoods have problems in way-finding/ orientation. Nevertheless, Al-Sharekat has the highest intelligibility and synergy values.

	Ezbet Bekhit	Ezbet Al-Nasr	Abu Qatada	Al-Sharekat
Mean normalized angular integration Rn	0.7771	0.908	0.9328	**1.0602**
Mean normalized angular integration R400	0.8584	1.079	1.033	**1.1625**
Node Count	1100	1280	1020	218
Intelligibility (Topological Integration Rn/ Connectivity)	$R^2 = 0.0314$	$R^2 = 0.1253$	$R^2 = 0.0840$	$R^2 =$ **0.1649**
Synergy (Topological Integration Rn/ Integration R3)	$R^2 = 0.1713$	$R^2 = 0.1770$	$R^2 = 0.2248$	$R^2 =$ **0.4301**

Table5.1 Values of syntactic attributes for each case study.
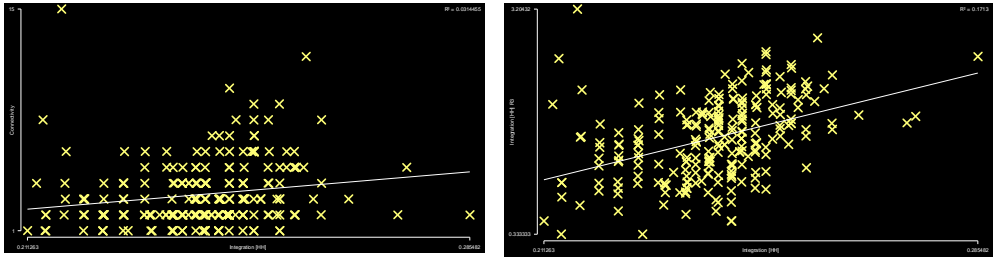
(a) Intelligibility (left) and Synergy (right) in Ezbet Bekhit
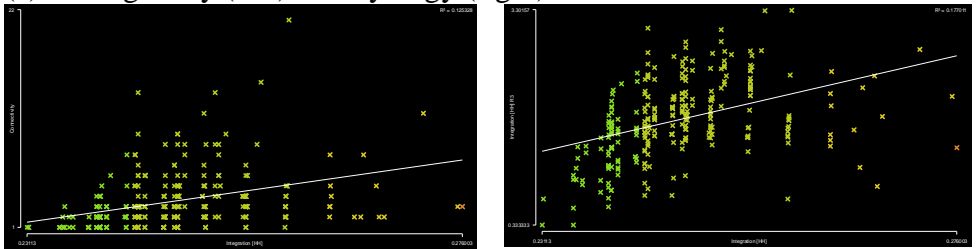
(b) Intelligibility (left) and Synergy (right) in Ezbet Al-Nasr
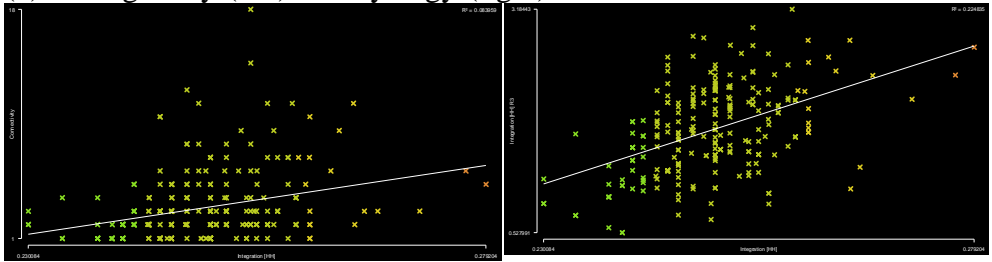
(c) Intelligibility (left) and Synergy (right) in Abu Qatada
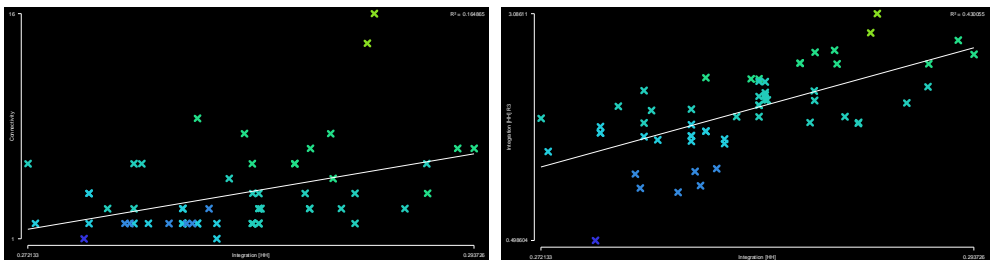
(d) Intelligibility (left) and Synergy (right) in Al-Sharekat

Figure5.17. Scattergrams of Intelligibility and Synergy for the case study areas (source: author).

5.5. PEDESTRIAN MOVEMENT PATTERN

As explained in the methodology chapter, the virtual gate method was employed to study pedestrian movement pattern in order to investigate the relationship between pedestrian movement pattern and spatial configuration in space of informal settlements in Cairo metropolitan area. Vehicular movement is excluded from this study as cars are less observed within informal areas due to narrow broken sinuous road system. Due to time limitations only 10 gates, from busiest to poorly used routes, were selected for each case study to record peoples' movement at different times of a weekday. Observation was done for 6 hours distributed along three different periods; morning, afternoon and evening. The field study was carried out on in February 2014. The weather was moderate, and the temperature was 25-27° C.

As can be seen in figures 5.18, 5.19 and 5.20, movement rate in main streets especially external ones is higher than alleyways, which are mainly for single residential uses. For example, in Abu Qatada **,** movement observation showed that there are more people along important junctions such as El-Zumour Canal Street. That is because the metro station of Cairo University is located on this street. Accordingly, through travelers are frequently depicted.

Visual correlation between pedestrian movement pattern and spatial accessibility reveals that they are closely related. However, this correlation needs to be proven statistically.
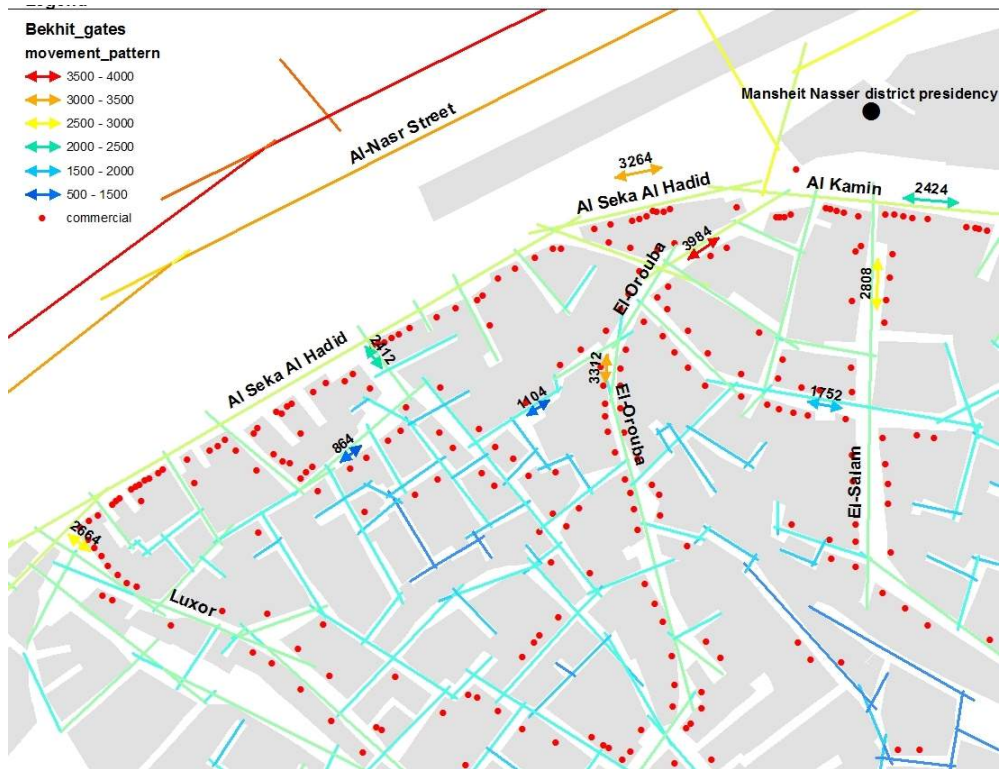
Figure 5.18 Pedestrian movement observed on a weekday overlapped with angular integration Rn in Ezbet Bekhit. *Source: author*
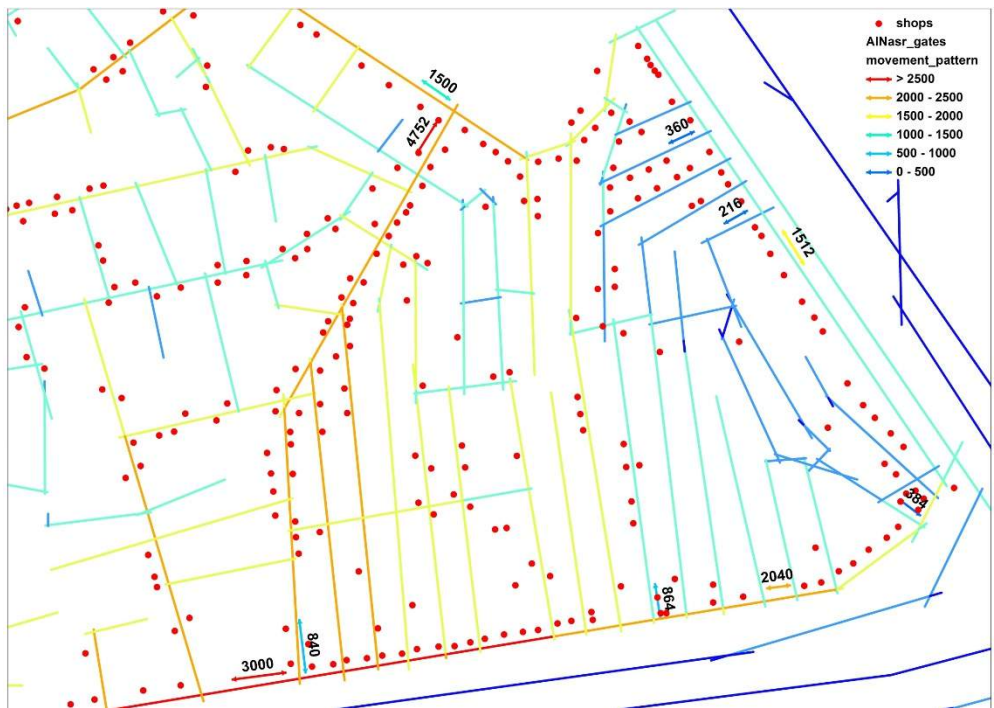
Figure 5.19 Pedestrian movement observed on a weekday overlapped with angular integration Rn in Ezbet Al-Nasr. *Source: author*

Figure 5.20 Pedestrian movement observed on a weekday overlapped with angular integration Rn in Abu Qatada. *Source: author*

Exploring the relationship between pedestrian movement pattern and spatial parameters showed a significant positive association with different radii of angular integration (see tables 5.2, 5.3 and 5.4). Comparing the three informal areas with each other demonstrates different relationships between pedestrian movement pattern and different radii of angular integration. In Ezbet Bekhit, movement is related to both local and global integration. In addition, Ezbet Al-Nasr is more related to local, while Abu Qatada is related to global. In short, movement in Abu Qatada is more globalized. In other words, movement in Abu Qatada has a mixture of local and non-local people. This might be due to existence of the major node of Cairo University metro station which works

as a n origin and a destination and, thus, used by those not local to the area. Unlike Abu Qatada, there is a lack of mixture of local and non-local people in Ezbet Al-Nasr.

	Movement pattern				Movement pattern		
	R	R^2	p-value		R	R^2	p-value
Integration Rn	**0.7984****	0.6375	0.0056	Choice Rn	**0.6618***	0.4379	0.0371
Integration R2000m	**0.7952****	0.6324	0.0060	Choice R2000m	**0.7513***	0.5645	0.0122
Integration R1200m	**0.8389****	0.7037	0.0024	Choice R1200m	**0.6508***	0.4233	0.0416
Integration R800m	**0.8044****	0.6470	0.0050	Choice R800m	0.5551	0.3082	0.0957
Integration R400m	**0.6944***	0.4822	0.0259	Choice R400m	0.5551	0.3082	0.0957

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table5.2. Correlations of movement rate and syntactic parameters in Ezbet Bekhit.

	Movement pattern				Movement pattern		
	R	R^2	p-value		R	R^2	p-value
Integration Rn	0.2457	0.0604	0.4938	Choice Rn	0.4790	0.2294	0.1613
Integration R2000m	0.4739	0.2246	0.1664	Choice R2000m	0.6063	0.3676	0.0631

Integratio n R1200m	0.5698	0.324 7	0.085 5	Choice R1200 m	**0.6421** *	0.412 2	0.045 3
Integratio n R800m	**0.6514** *	0.424 3	0.041 3	Choice R800m	**0.6679** *	0.446 1	0.034 8
Integratio n R400m	**0.6743** *	0.454 7	0.032 5	Choice R400m	**0.6679** *	.4461	0.034 8

*. Correlation is significant at the 0.05 level (2-tailed).

Table5.3. Correlations of movement rate and syntactic parameters in Ezbet Al-Nasr.

	Movement pattern				Movement pattern		
	R	R^2	p-value		R	R^2	p-value
Integratio n Rn	**0.6454** *	0.416 5	0.043 9	Choice Rn	0.521 9	0.272 4	0.121 8
Integratio n R2000m	**0.7009** *	0.491 2	0.024 0	Choice R2000 m	0.513 5	0.263 7	0.129 0
Integratio n R1200m	**0.6646** *	0.441 7	0.036 0	Choice R1200 m	0.476 6	0.227 1	0.163 8
Integratio n R800m	0.2570	0.066 0	0.473 6	Choice R800m	0.436 4	0.190 5	0.207 3
Integratio n R400m	0.1583	0.025 1	0.662 3	Choice R400m	0.436 4	0.190 5	0.207 3

*. Correlation is significant at the 0.05 level (2-tailed).

Table5.4. Correlations of movement rate and syntactic parameters in Abu Qatada.

5.6. THE CORRELATION BETWEEN COMMERCIAL RATE AND SYNTACTIC PARAMETERS

In order to quantify the configurative findings, banding method is employed. The banding method was applied to the four case studies. In all cases, Commercial streets tend to have a number of lower bands larger than residential segments. In other words, there is a significant inverse strong correlation between the true commercial rate and segments bands (see figure 5.21). That could be a result of smaller blocks, which fosters pedestrian movement by virtue of minimizing trip lengths.

$R^2 = 0.5687$ $R = -0.7541**$
$P = 0.0029$

$R^2 = 0.4272$ $R = -0.6536**$
$P = 0.0013$

$R^2 = 0.5906$ $R = -0.7685**$
$P = 0.0002$

$R^2 = 0.3923$ $R = -0.6263*$
$P = 0.0392$
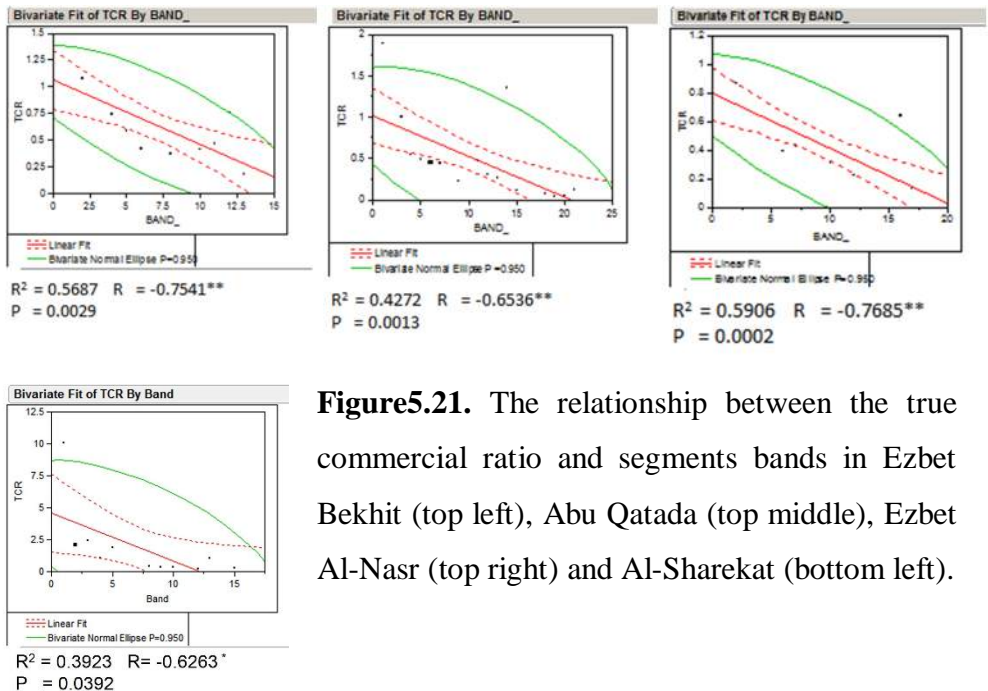
Figure5.21. The relationship between the true commercial ratio and segments bands in Ezbet Bekhit (top left), Abu Qatada (top middle), Ezbet Al-Nasr (top right) and Al-Sharekat (bottom left).

One main critical question is addressed: is the distribution and rate of commercial activity within the case study areas mainly driven by the spatial composition of the area itself? Or is it more related to the overall structure of the city? Table5.5 shows the relationship between the true commercial ratio of the case study areas and the mean angular choice R2000 and R800 in each

band. The results from the regression analysis reveal a significant positive correlation between commercial activities and angular choice at radii 2000m, 800m in the cases of Ezbet Al-Nasr and Abu Qatada, but not in Ezbet Bekhit and Al-Sharekat.

Seemingly, the distribution of commercial activity in both Al-Sharekat and Ezbet Bekhit is relatively random and did not take the advantage of the spatial configuration. As for Al-Sharekat, a potential explanation is that the service center of the neighborhood is planned on the basis of pure geometric distance so that many activities are buried in the geographic center of the area. But what about Ezbet Bekhit? Is commercial activity really distributed randomly? Or is such problematic issue more related to banding method itself? Seemingly, another method is needed to complement the previous findings.

		True commercial ratio		
		R Square	Correlation	P-value
Ezbet Al-Nasr	Choice R2000	0.2453	**0.4953**[*]	0.0366
	Choice R800	0.2348	**0.4846**[*]	0.0415
Abu Qatada	Choice R2000	0.5329	**0.7300**[**]	0.0002
	Choice R800	0.2964	**0.5444**[*]	0.0107
Ezbet Bekhit	Choice R2000	0.007995	0.089413	0.7714
	Choice R800	0.000675	-0.02599	0.9328
Al-Sharekat	Choice R2000	0.0572	0.2392	0.4788
	Choice R800	0.0556	0.2358	0.4851

Table5.5 The relationship between the true commercial ratio and the local and global choice in the case study areas.

Apparently, looking at the percentage of commercial buildings captured by the top decile of accessibility is very helpful in indicating the relationship between commercial activity and spatial accessibility. Table 5.6 shows the percentage of commercial plots in the top deciles of accessibility at medium radius (Choice R2000m). In the three spontaneous settlements, the results indicate that the distribution of commercial land use is structured according to the spatial accessibility. In other words, the commercial plots are unequally distributed indicating that they follow the most accessible locations. Similarly, the results of the calculated Gini coefficient values of the three informal areas indicate that the distribution of commercial activity is not random regarding the spatial accessibility.

Unlike the three informal areas, the largest proportion of commercial activity in Al-Sharekat is captured by the top 30% most segregated buildings. Notably, the Lorenz curve indicates that commercial activity is unevenly distributed along poorly accessible buildings. On the other hand, the outward facing edges in Al-Sharekat have lower economic activities than the three informal areas of Ezbet Bekhit, Ezbet Al-Nasr and Abu Qatada. Accordingly, economic activities in Al-Sharekat do not have the benefit of passing trade (see table 5.6 below).

	Ezbet Bekhit	Ezbet Al-Nasr	Abu Qatada	Al-Sharekat
Top 10% (Choice 2000m) Com.	31.768	13.6824	15.1515	8.6207
Top 20% (Choice 2000m) Com.	56.630	38.5135	37.1901	12.931
Top 30% (Choice 2000m) Com.	73.204	56.0811	61.5702	27.5862
Gini (Choice 2000m) Com.	53.1447	38.6635	38.8677	21.6598

Edge Oriented Commercial Activity (EOCA)	3.0916	3.2802	4.0151	2.9790

Table5.6 Gini coefficient; EOCA; and Commercial activity distribution in the case study areas according to the upper percentages of accessibility (Choice R2000m).
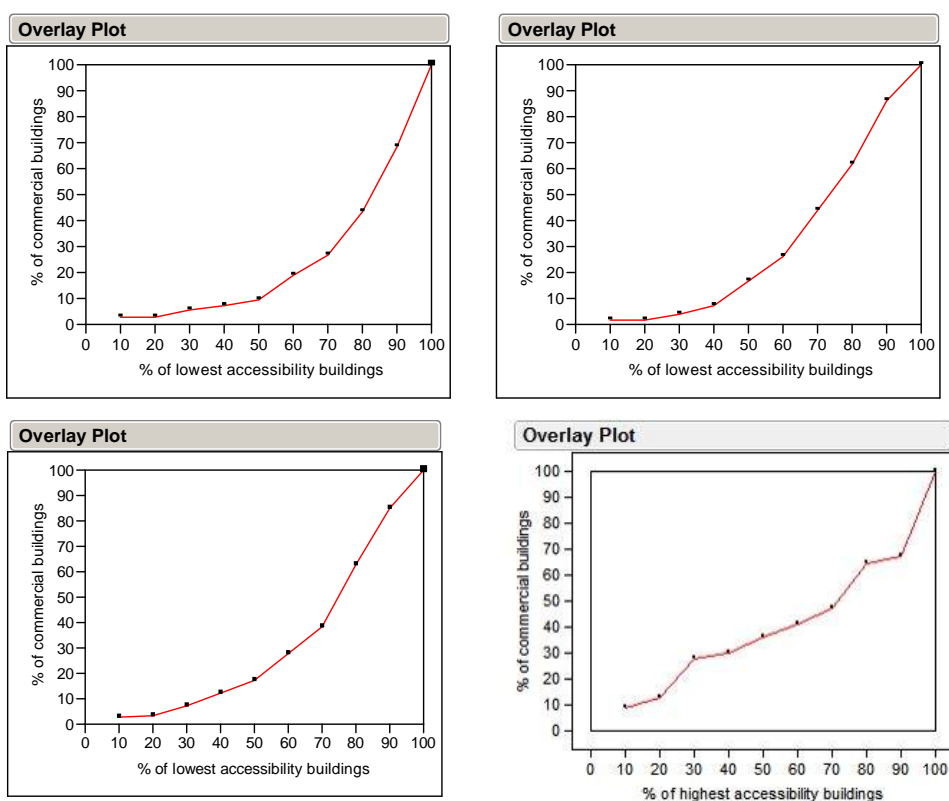
Figure5.22. The Lorenz curve of commercial activity distribution amongst all the plots in Ezbet Bekhit (top left), Ezbet Al-Nasr (top right), Abu Qatada (bottom left) and Al-Sharekat (bottom right) based on the rank of spatial accessibility rank (Choice R2000m).

5.7. CONCLUSION

The main purpose of this chapter was to study the influence of spatial attributes on the distribution of commercial activities and movement flows in four settlements— Ezbet Bekhit, Ezbet Al-Nasr, Abu Qatada and Al-Sharekat.

The chapter first gave a historical background about the case study areas and their main activities and public facilities. After that, the influence of spatial accessibility on pedestrian movement rate and on the distribution of commercial uses and has been explored.

Analysis of pedestrian movement pattern indicates that commercial streets, and main streets in general, have higher rates than non-commercial ones such as alleys and dead ends. For example, in Abu Qatada, important junctions of streets nearby Cairo University metro station as well as those comprising Al-Gameia Street witnessed high flows of people. Furthermore, statistical analysis demonstrates that there is a significant positive relationship between pedestrian movement rate and angular integration; the more integrated a street segment, the higher the movement generation.

In the spontaneous settlements, commercial activities are usually concentrated along higher-accessibly street segments and not just limited to outward facing edges. Seemingly, residents of informal areas seem to have a local knowledge of their neighborhoods, specifically a proper knowledge of spatial conditions that can get the chance of capturing passers-by. Contrary to this, economic activities in the planned settlement of Al-Sharekat are placed along internal local routes with poor spatial accessibility and this in turn will minimize economic gain as a result of time consuming travels.

When compared with other research projects undertaken in Chile this research's output concurred with most of their findings. In Hillier et al (2000) and Greene (2003) research on seventeen Chilean informal settlements, the axial analysis showed some correspondence between the concentration of commercial activities and the pattern of topological integration. They found that locally well-embedded settlements will develop commercial activities on their busy borders, 'an edge economy', rather than within the internal routes. Unlike Hillier et al and Greene, this thesis takes into account angular route choice and uses a tool independent of settlement's size to investigating the relationship between the pattern of commercial activities and spatial accessibility. The 'Gini Coefficient' measure has proven its ability as a reliable and valid tool for examining such relationship.

6 MEASURING SOCIAL TIES INSIDE LOCAL AREAS

Chapter Six

Measuring Social Ties inside Local Areas

6.1 INTRODUCTION

This chapter discusses the analysis presented in the previous chapters. As mentioned earlier, the results of Chapter4 showed that informal settlements have distinctive spatial characteristics, amongst which are that they are relatively spatially segregated from the wider urban context, that they have a strong internal spatial structure at local measures, and that they are mostly located along main movement thoroughfares. On the other hand, chapter5 investigated the relationship between spatial parameters and both commercial land use distribution and movement rate and found that spatial configuration plays a significant role in forming urban land use and movement flows. The present chapter aims to explore whether the informal settlements are also distinctive in terms of their social network, occupation, and other socioeconomic parameters. In other words, do these areas have territorial preferences or a transpatial social network? Furthermore, this chapter investigates the magnitude of exclusion in the case study areas in terms of education, land tenure, unit size, etc. Finally, this chapter examines whether non-physical variables can have an impact on social solidarity and a sense of community.

Based on the questionnaire explained in the methodology chapter, this chapter sets out to provide a detailed description of social and economic aspects (e.g. origin, marital status, education, occupation, etc.) of the three informal areas of Ezbet Bekhit, Ezbet Al-Nasr and Abu Qatada. To investigate the degree of assimilation into the host society, parameters of social network and sense of community are revealed. Next, urgent problems

in the neighborhoods are indicated. Finally, the correlation between different social attributes, as well as differences in gender and ownership groups in terms of belongings and urban safety, are examined.

Planned areas located within Cairo's Ring Road would be used as a control variable to be compared with the three informal areas in terms of socio-economic profile and social network to indicate the degree to which residents of informal settlements are socially and economically excluded.

6.2. SOCIO-ECONOMIC ASPECTS

The results of 400 questionnaires (100 in each case study area) revealed the socioeconomic structure and social ties in the case study areas of Ezbet Bekhit, Ezbet Al-Nasr, Abu Qatada and planned Cairo. 300 forms were filled in on site in the three informal areas. As for planned Cairo, unlike informal areas, an online survey form was created using Google Drive and was posted in social media. Respondents were asked to name the district where they live. Only respondents living in planned districts located within Cairo's Ring Road were considered. The researcher considered 80 out 83 respondents. Consequently, he had to gather data of 20 more forms on site.

In the three informal areas, the majority of participants are male, married, self-employed, illiterate, and were born in Greater Cairo. The participants are mostly artisans and shopkeepers who commonly work inside their neighborhoods. Unlike the three informal areas, the results of the questionnaire conducted in planned Cairo reveal that the largest proportion of informants is single females who work in governmental sector and have a university degree. In consonance with the questionnaires 63% of planned Cairo respondents have a university degree (versus 13%, 10% and 6% in Abu Qatada, Ezbet Al-Nasr and Ezbet Bekhit respectively). This may

explain why 64% have their workplaces outside their settlements (opposite to 10% in Ezbet Bekhit, 19% in Ezbet Al-Nasr and 23% in Abu Qatada).
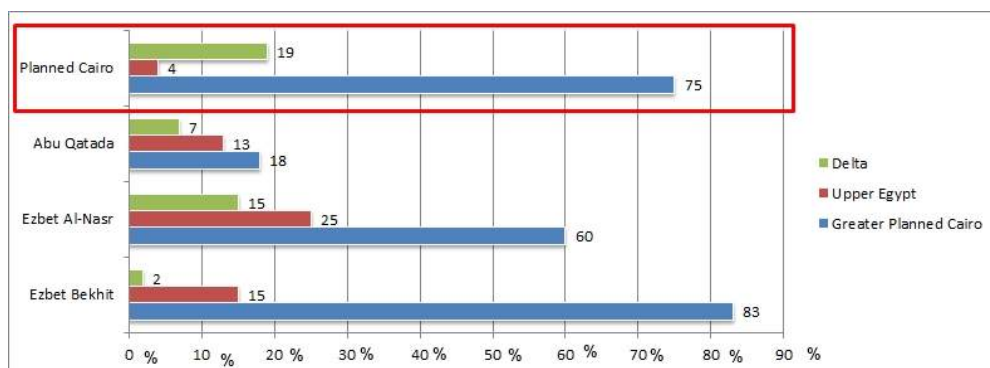
Figure 6.1. Birthplace in the case study areas.
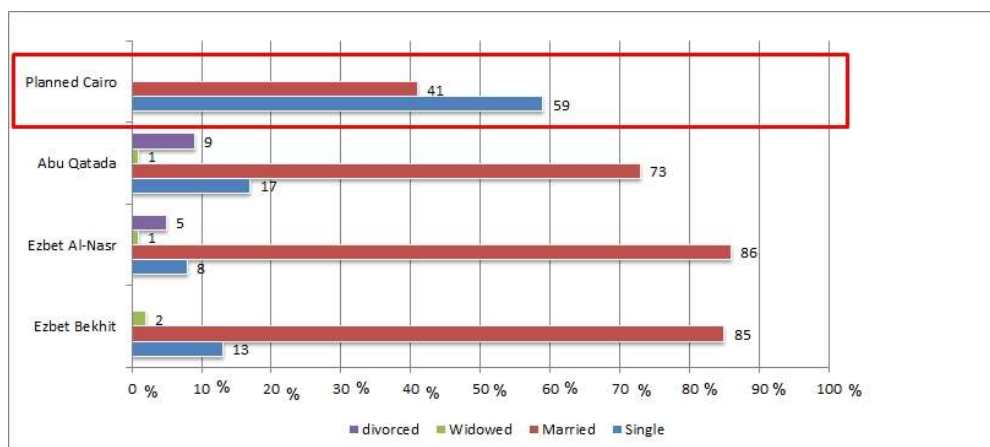
Figure 6.2. Marital status in the case study areas.
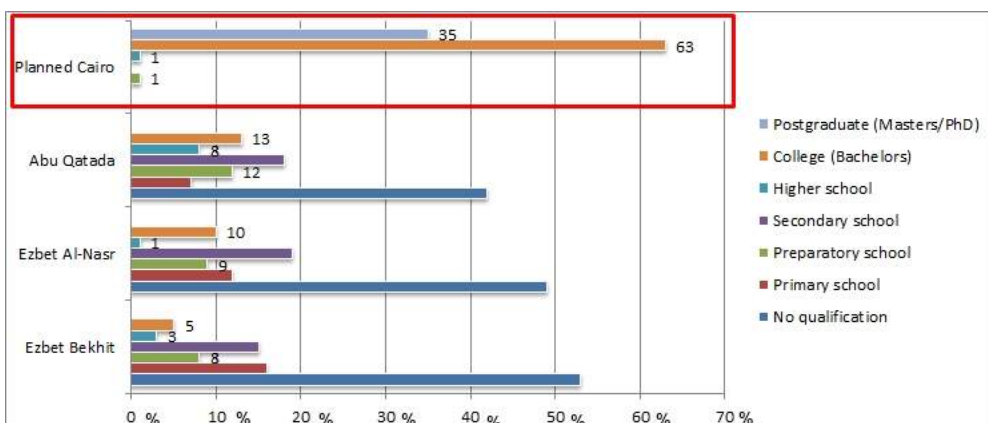
Figure 6.3. Education level in the case study areas.
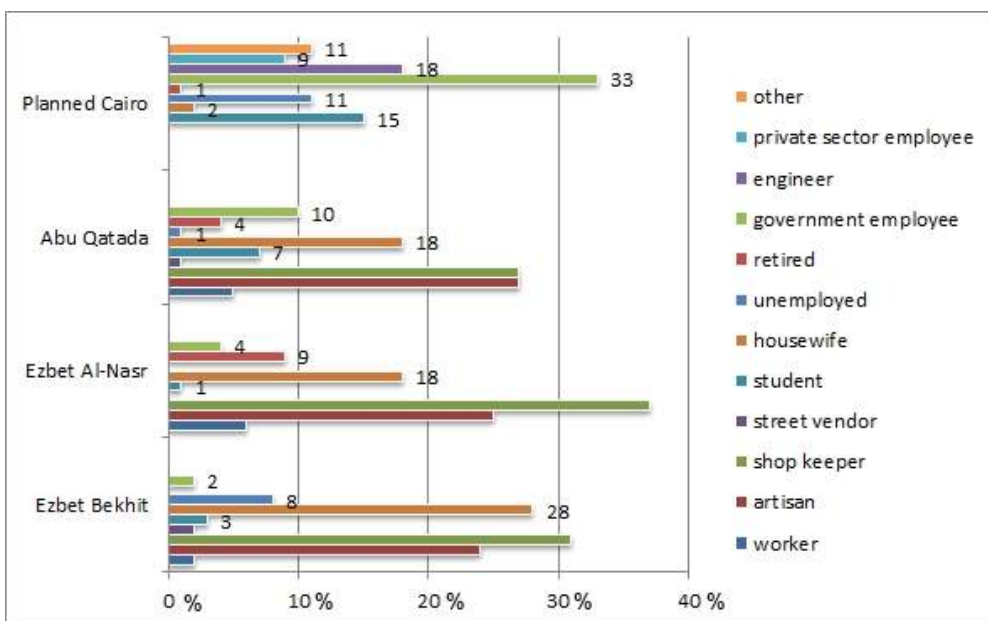
Figure 6.4. Occupation in the case study areas.
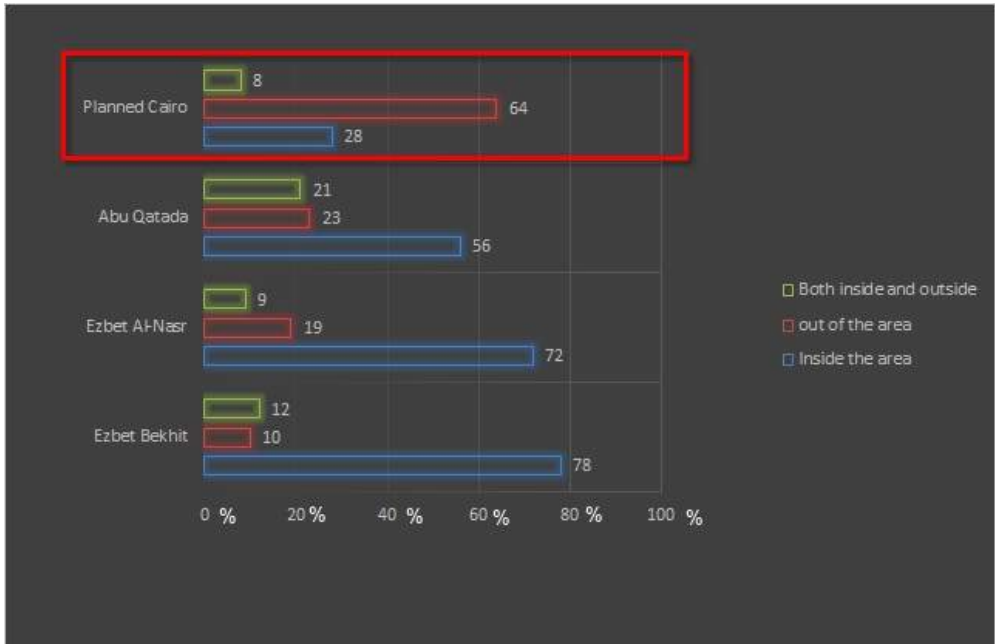
Figure 6.5. Respondents' workplaces.

In terms of homeownership, 72% of the respondents in planned Cairo are owners— this is considerably a higher proportion than that for Ezbet Al-Nasr (54%), Abu Qatada (52%) and Ezbet Bekhit (46%). Units' size in Cairo starts from 60 to 400 square meters with mostly 3 rooms per flat; this is relatively a higher proportion than that for the three informal areas. Finally, as for length of residence, 40% of the respondents in planned Cairo live in their settlements for more than 20 years— this is at a similar ratio to that of Ezbet Al-Nasr (39%) and is considerably less than that in Abu Qatada (76%) and Ezbet Bekhit (60%).
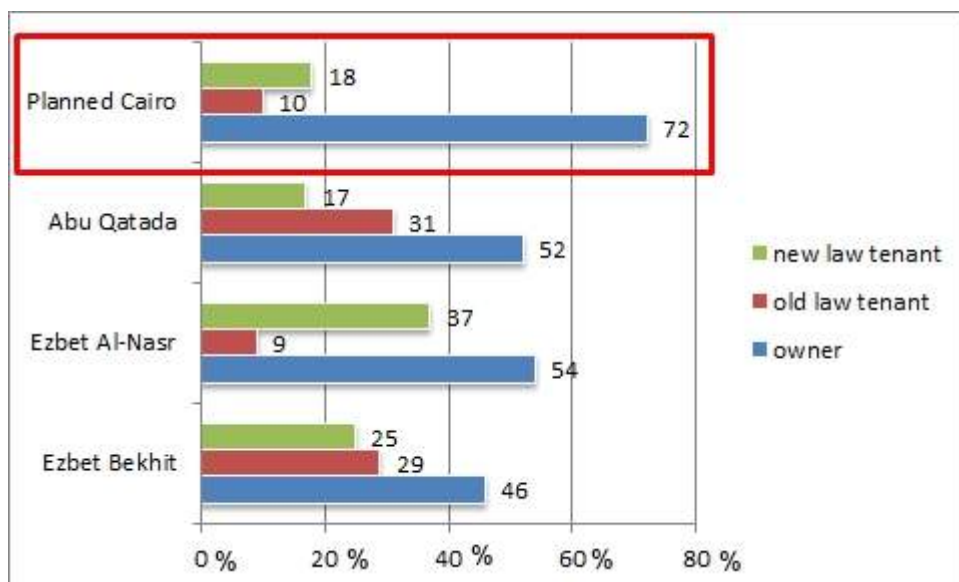
Figure 6.6. Homeownership status in the case study areas.
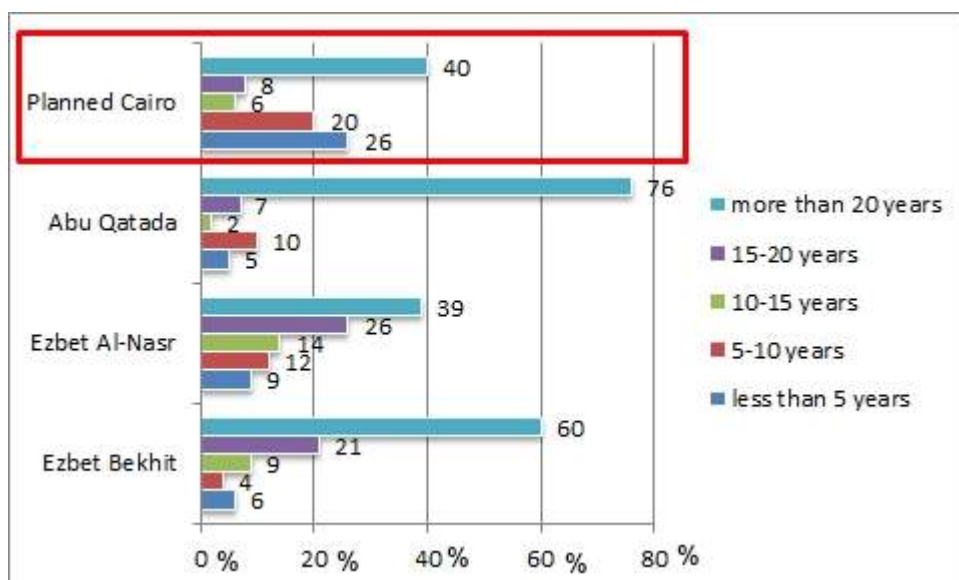
Figure 6.7. Length of residence in the case study areas.

	Ezbet Bekhit	Ezbet Al-Nasr	Abu Qatada	Planned Cairo
Gender	1.38	1.38	1.37	1.66
Birthplace	1.19	1.55	1.27	1.43
Marital status	1.91	2.03	2.02	1.41
Education	2.14	2.41	2.82	6.31
Occupation	4.08	3.88	4.16	8.92
workplace	1.34	1.37	1.65	1.80
Since when do you live here?	4.25	3.74	4.39	3.14
Household Tenure	1.78	1.83	1.65	1.46
How many rooms do you have in your house?	2.05	2.23	2.22	3.08
unit size	61.65	60.62	55.18	148.56

Table6.1. Mean of socio demographic structure in the case study areas.

6.3. SOCIAL TIES AND INTERACTIONAL PLACES

The results of the questionnaires in Cairo's informal areas indicate that the largest proportions of respondents visit their families daily and reside at a short distance with no more than 15 minutes from their relatives. On the other hand, in planned Cairo, the largest group of people asserted that they see their families once a week as 30% of people live at a distance between

30 minutes and 1 hour from their families. In all cases, reasons for not meeting up with family and friends are mainly paid work, childcare responsibilities, and lack of money for visit.
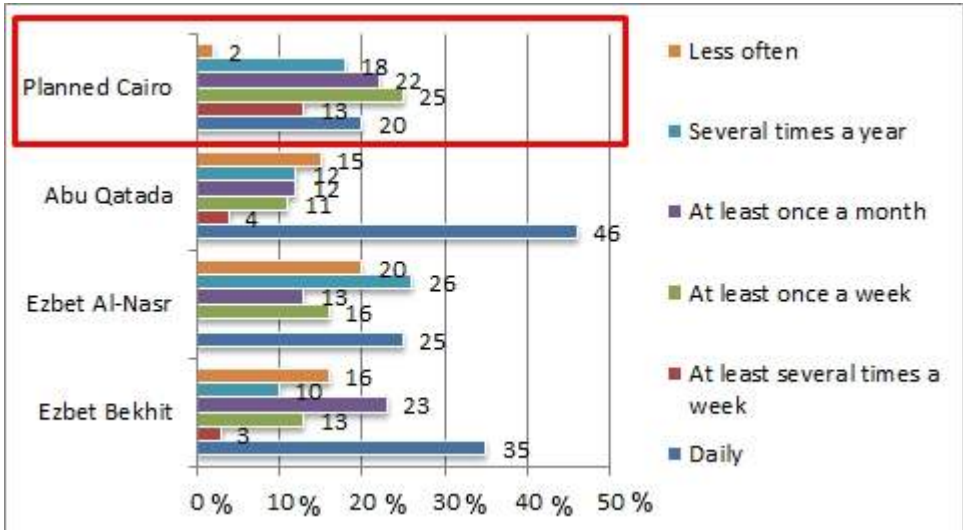
Figure 6.8. How often do you see or visit the members of your family?
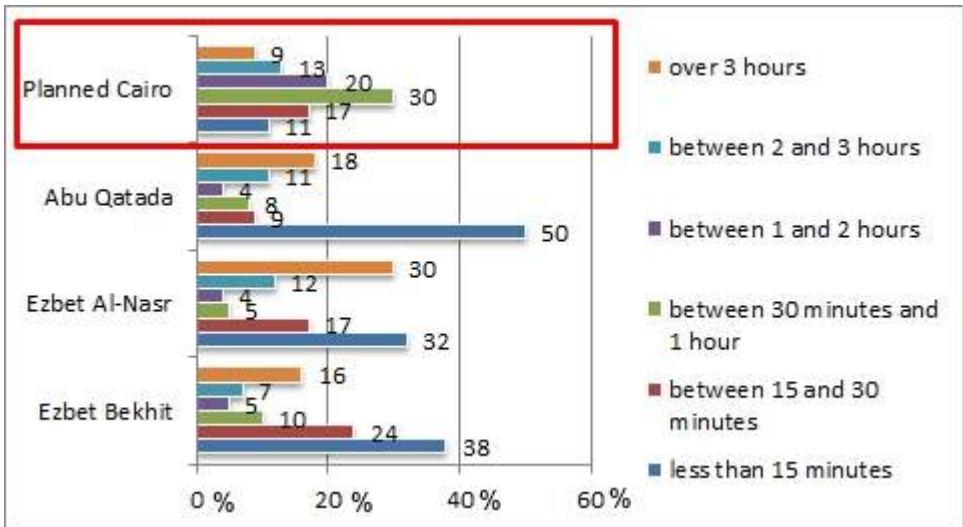
Figure 6.9. About how long would it take to get to where the members of your family live?
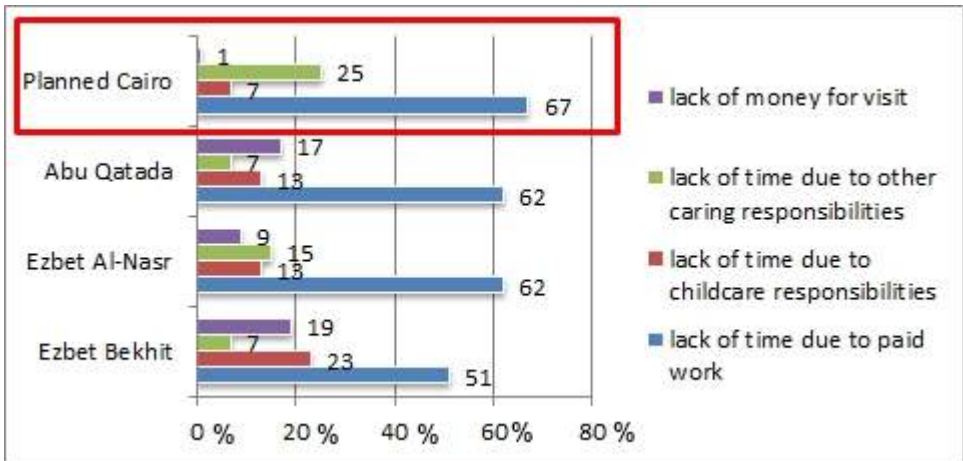
Figure 6.10. Which factor prevents you from meeting up with family or friends more often?

Interestingly, 59% of the respondents in Ezbet Bekhit have no close friends outside their neighborhood (this is a 13%, a 19% and a 54% higher than Ezbet Al-Nasr and planned Cairo respectively) and 80% of them (opposite to 62% in Ezbet Al-Nasr, 71% in Ezbet Bekhit and only 11% in planned Cairo) never visit such friends (figure 6.11).
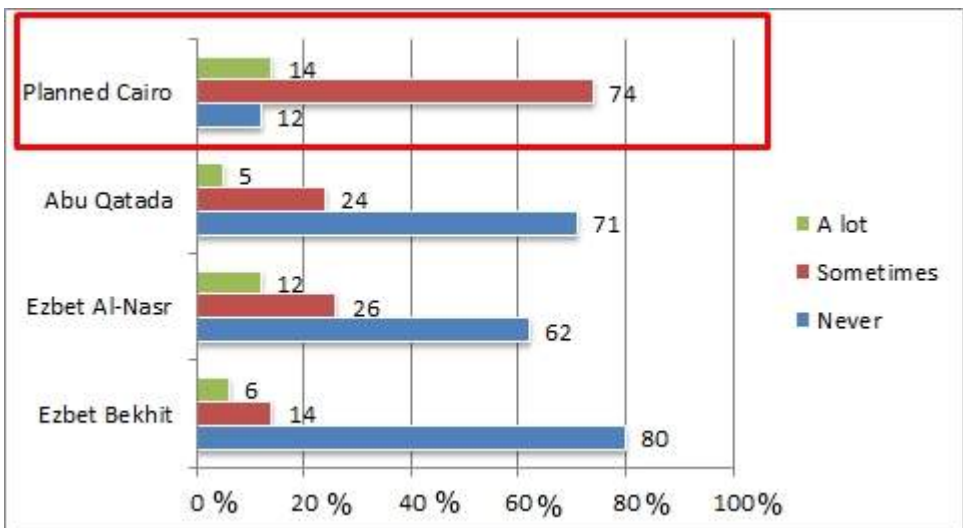
Figure 6.11. How often do you visit close friends located outside your neighborhood?

In terms of acquaintances within case study areas, the majority of respondents in Cairo's informal areas (65%, 52% and 75% in Ezbet Bekhit, Ezbet Al-Nasr and Abu Qatada respectively) claim that they know most people living in their residential block, whilst 64% of people in planned Cairo state that they have few acquaintances. In all cases, at relatively similar proportions, the largest group of people never visit acquaintances and friends living in their neighborhoods. Rather, they mostly meet up in streets and alleyways and at cafes and workplaces.
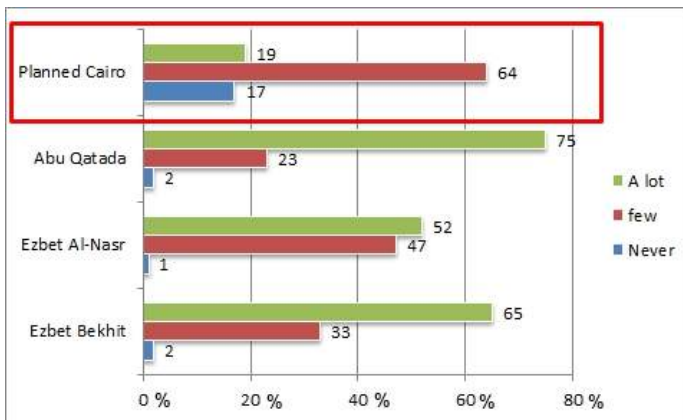
Figure 6.12. How many people do you know by name within your urban block/ house?
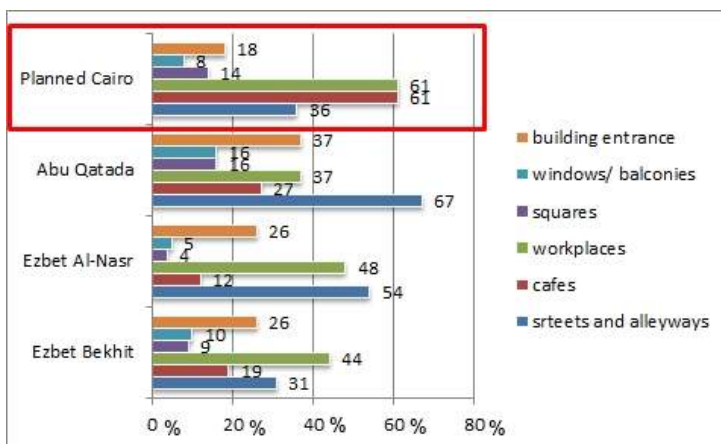
Figure 6.13. Frequency of interactional places within the case study areas.

	Ezbet Bekhit	Ezbet Al-Nasr	Abu Qatada	Planned Cairo
How often do you see or visit the members of your family?	3.18	3.75	2.85	3.05
About how long would it take you to get to where the members of your family live?	2.67	3.37	2.71	3.33
How many close friends do you have outside your neighborhood?	2.70	2.81	3.66	53.22
How often do you visit your close friend living outside your neighborhood?	1.26	1.50	1.34	2.03
How many of these friends are people you work with now?	1.44	1.62	1.75	18.07
do they all belong to your social class	.86	.81	.72	.83
What factors prevent you from meeting up with family or friends more often?	2.13	1.82	1.98	1.58
How many people do you know by name in the neighborhood?	2.62	2.36	2.55	2.06
How many people do you know by name within your	2.63	2.51	2.73	2.01

urban block/ house?				
How often do you visit people living in your neighborhood?	1.4300	1.1800	1.3700	1.4583

Table6.2. Mean of social ties in the case study areas

6.4. URBAN SAFETY AND SENSE OF COMMUNITY

As illustrated in the methodology chapter, people were asked whether they feel safe while walking in the area at different times of the night. At a similar proportion in all cases, the majority of respondents indicate that they feel quite safe walking in their neighborhoods during the evening. However, most respondents in all cases, except Abu Qatada, feel uncomfortable to allow their toddlers to play in streets and alleyways with their counterparts. Meanwhile, in the three informal settlements, the greatest group of respondents rarely see outsiders. Oppositely, about 62% of participants in planned Cairo claim that they frequently see people they do not know in their settlements—this is considerably a higher proportion than that in Ezbet Bekhit (38%) Ezbet Al-Nasr (26%) and Abu Qatada (33%). In other words, social mix between local and non-local residents is higher in planned Cairo than in informal areas. On the other hand, people prefer walking in commercial streets, which allow natural surveillance and sustain livability.

As for causes of clustering, people choose to live in their settlements for various reasons such as kinship, searching for job opportunities, and cheaper housing. In planned Cairo, the largest proportion of people claim that the main reason for choosing their settlements as a place for living is searching for better place. On the other hand, the greatest group of respondents in the informal areas state that their neighborhoods are their birthplaces and most

of them have their relatives living there. Finally, disadvantaged people prefer informal areas due to cheaper housing (see figure 6.14).

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	Ezbet Bekhit	Ezbet Al-Nasr	Abu Qatada	Planned Cairo
How often do you see people you know when you walk?	1.99	2.13	2.13	1.49
Do you feel safe walking in your neighborhood during the evening?	.66	.66	.64	.62
Which streets do you prefer for walking?	1.05	1.29	1.28	1.82
Do you feel it safe to leave children and toddlers playing in the street?	.48	.45	.60	.33

Table6.3. Mean of perception of walking and safety in the case study areas.
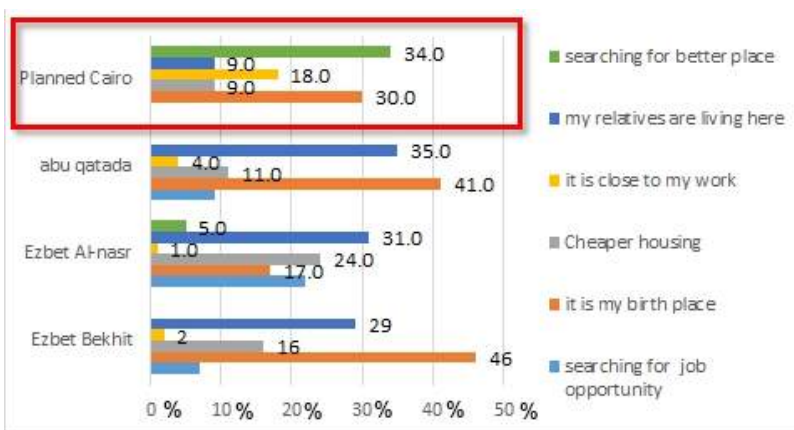
Figure 6.14. Causes of clustering in the case study areas.

In terms of mutual concerns, respondents in all case study areas claim that they care about their neighborhoods. Commonly, they support each other in

196

different occasions especially during calamities. Interestingly, residents of informal areas receive incorporeal support from their neighbors higher than those living in planned Cairo. Furthermore, disadvantaged people have stronger relations with their neighbors and less desire to move to another quarter. In short, mutual concerns in informal areas are higher than formal ones (see table 6.4).

	Ezbet Bekhit	Ezbet Al-Nasr	Abu Qatada	Planned Cairo
I care about my neighborhood	2.4	2.21	2.55	2.21
Death	.93	.92	.91	1
Wedding	.86	.75	.79	.92
Disasters	.88	.82	.87	.96
Birth	.01	.06	.03	.81
How much support would you get from your neighbors in the hard times?	2.57	2.56	2.69	1.94
What is the nature of the relationship between you and your neighbors?	4.11	4.08	4.19	3.40
Are you planning to leave this area?	.39	.45	.41	.65
fear of dwelling collapse	.00	.00	.00	.01
lack of services	.08	.11	.10	.1
problems with neighbors	.04	.04	.01	.06

| problems with dwelling owner | .00 | .00 | .00 | .01 |
| better future | .29 | .39 | .41 | .65 |

Table6.4. Mean of mutual concerns in the case study areas.

In terms of mode of transport, the majority of respondents, at relatively similar proportions in Ezbet Bekhit, Ezbet Al-Nasr and Abu Qatada, prefer to go to their work on foot as their shops and workshops are at a short distance from their homes and in most cases on the ground floors of their dwellings. Only very few people use private car. Unlike Cairo's informal areas, people living in planned Cairo are more likely to be car-dependent communities. They mostly work outside their neighborhoods and, thus, most errands require a car. Only 5% of respondents in planned Cairo commute to their work through walking, while 42% of them use public transport (see figure 6.15).
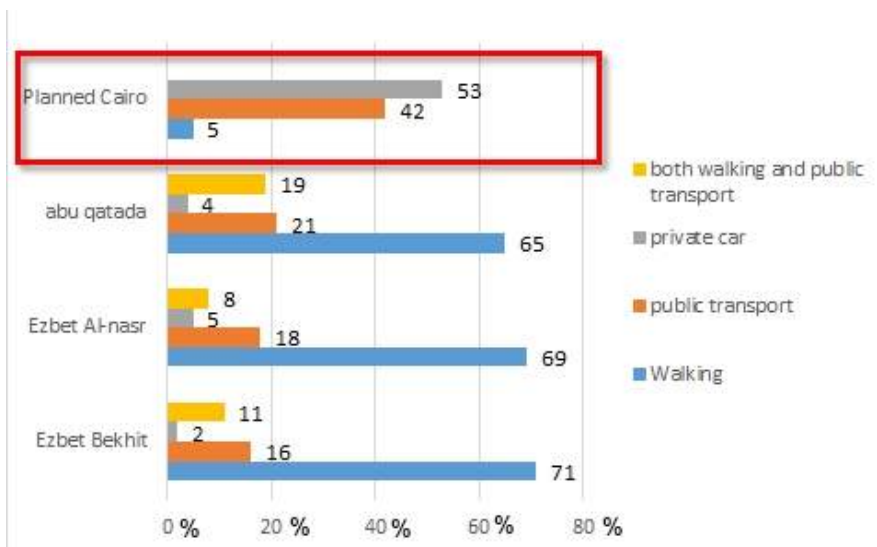
Figure 6.15. Mode of transport in the case study areas.

6.5. THE INTER-RELATIONSHIP OF SOCIAL VARIABLES

Correlations with Education

The results of Pearson correlations in Ezbet Bekhit and Abu Qatada showed that people who have higher qualification visit the members of their families and close friends less than those with less qualification or have no qualification. Furthermore, the more the people are educated, the more they have external friends and the more they have the intent to move out. This spiral of self-selection of the more educated to move out has a negative consequent effect on the neighborhood over the time, since the area will be a homogenous community of unqualified or disadvantaged and this in turn gives the area a *bad name* and leads it to be prone to crime and other social pathologies. Unlike Ezbet Bekhit and Abu Qatada, education level in Ezbet Al-Nasr and planned Cairo is neutral in terms of number of external friends and frequency of visit to external close friends. It can also be noted that more educated respondents in Ezbet Bekhit and Ezbet Al-Nasr tend to belong to young age groups. Conversely, education level has a positive correlation with age in the case of planned Cairo.

Table6.5. Correlations with education	Ezbet Bekhit	Ezbet Al-Nasr	Abu Qatada	Planned Cairo
Age	**-0.385**[**]	**-0.326**[**]	-0.312	**0.282**[**]
How often do you see or visit the members of your family?	**-0.270**[**]	0.166	**-0.197**[*]	0.164
How many Close friends do you have outside your neighborhood?	**0.261**[**]	0.123	**0.464**[**]	0.001
How often do you visit your close friends?	**0.361**[**]	**0.300**[**]	**0.392**[**]	**0.204**[*]

What is the nature of the relationship between you and your neighbors?	**-0.280**[**]	0.017	**-0.284**[**]	0.126
Are you planning to leave this area?	**0.253**[*]	**0.256**[*]	**0.247**[*]	0.071

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlations with length of residence

As can be seen in table 6.6., length of residence has a significant positive correlation with the number of people known by name within the residential urban block and with sense of community. Accordingly, long-term inhabitants living in informal areas visit more people and have stronger social relations with their neighbors. In this sense disadvantaged communities support each other in order to resist against non-locals. These findings consolidate the works from Mills (2007) and Can (2012). Oppositely, length of residence has a significant inverse correlation with both the frequency of seeing outsiders and the intent to leave the neighborhood. Remarkably, long-term inhabitants living in planned Cairo are neural in terms of feeling of safety, caring about the neighborhood and the intent to move to another settlement. Statistically speaking, the relationship between the duration of residence and various items of sense of community is stronger in the case of informal areas than in planned Cairo.

Table6.6. Correlations with length of residence	**Ezbet Bekhit**	**Ezbet Al-Nasr**	**Abu Qatada**	**Planned Cairo**
How many people do you know by name in the neighborhood?	.554[**]	.322[**]	.285[**]	0.322[**]
How many people do you	.569[**]	.425[**]	.431[**]	0.344[**]

know by name within your urban block/ house?				
How often do you visit people living in your neighborhood?	.265**	.248*	.199*	0.051
How often do you see people you know when you walk?	.438**	.424**	-.169	0.213*
Do you feel safe walking in your neighborhood during the evening	.559**	.162	.498**	-0.007
Do you feel it safe to leave children and toddlers playing in the street?	.452**	.314**	.430**	0.037
I care about my neighborhood	.595**	.607**	.619**	0.107
How much support would you get from your neighbors in the hard times?	.659**	.614**	.831**	0.162
What is the nature of the relationship between you and your neighbors?	.576**	.461**	.670**	0.225*
Sense of Community	.726**	.712**	0.794**	0.351**
Are you planning to leave this area?	-.387**	-.339**	-.401**	-0.120

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations with safety

In both Ezbet Bekhit and Abu Qatada case studies, sense of safety is significantly and positively associated with numerous variables; among which are number of acquaintances in the neighborhood and urban block, frequency of visit, sense of community, and the nature of the relationship

201

between the resident and his neighbors —in Ezbet Al-Nasr, feeling of urban safety correlated positively only with a number of acquaintances. Additionally, in the three informal areas, sense of safety correlates inversely with a respondent's desire to leave the neighborhood. It is noteworthy that the previously mentioned variables overlap with the findings of the study conducted by Can in 2012. Lastly, unlike the three informal areas, sense of urban safety in planned Cairo is neutral in terms of acquaintances in the neighborhood and within urban block, the frequency of visiting people, sense of community, and the intent to move out (see table 6.7 below).

Table6.7. Correlations with safety	**Ezbet Bekhit**	**Ezbet Al-Nasr**	**Abu Qatada**	**Planned Cairo**
How many people do you know by name in the neighborhood?	.687**	.339**	.381**	0.115
How many people do you know by name within your urban block/ house?	.704**	.339**	.311**	0.073
How often do you visit people living in your neighborhood?	.383**	.138	.384**	0.146
I care about my neighborhood.	.510**	.070	.409**	**0.227***
How much support would you get from your neighbors in the hard times?	.507**	.137	.552**	0.059
What is the nature of the relationship between you and your neighbors?	.454**	.129	.504**	-0.050
Sense of community	.657**	.246*	.615**	0.124

Are you planning to leave this area?	**-.205**[*]	**-.199**[*]	**-.391**[**]	-0.075

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlation between age and the intent to leave

As can be seen in table 6.8 below, there is no correspondence between age and people plan to move in the cases of Ezbet Bekhit and planned Cairo. Conversely, there is a strong inverse correspondence between age and people plan to move out in the cases of Ezbet Al-Nasr and Abu Qatada. In other words, aged or older people have less desire to move to another place than younger age ones.

Table 6.8. The relationship between age and the intent to leave		Ezbet Bekhit	Ezbet Al-Nasr	Abu Qatada	Planned Cairo
Are you planning to leave this area?	Pearson Correlation	0.000	**-.436**[**]	**-.527**[**]	.044
	Sig. (2-tailed)	.996	.000	.000	.667

6.6. GROUP STATISTICS AND INDEPENDENT SAMPLES T-TESTS

As can be seen in table 6.9, in Cairo's informal areas, there is a significant difference between males and females in terms of education, interactional places, and number of external close friends. Males seem to be more educated and to know more people. Men usually meet each other in streets, cafes and in workplaces, whilst women interact with each other through balconies and windows and before building entrance. Furthermore, the results of t-tests in both Ezbet Bekhit and planned Cairo show that males seem to have more social connections and higher mutual concerns than females. Finally, it is not worthy that t-test analysis for planned Cairo show that both males and females are neutral in terms of education, interactional places, and the intent to leave.

Table6.9. T-tests of gender groups for the case study areas			Ezbet Bekhit		Ezbet Al-Nasr		Abu Qatada		Planned Cairo	
		Mean		Sig. (2-tailed)	Mean	Sig. (2-tailed)	Mean	Sig. (2-tailed)	Mean	Sig. (2-tailed)
Education	Male	2.37	Equal variance assumed	.050	2.71	.024	3.11	**.039***	6.24	.372
	Female	1.76	Equal variance not assumed	**.044***	1.92	**.017***	2.32	.045	6.35	.443
How many close friends do you have outside your neighborhood?	Male	3.98	Equal variance assumed	.000	4.10	.001	5.08	.000	83.73	.103
	Female	.61	Equal variance not assumed	**.000****	.71	**.000****	1.24	**.000****	36.88	.197
How many people do you know by name in the neighborhood?	Male	2.81	Equal variance assumed	.000	2.40	.274	2.63	**.039***	2.25	.019
	Female	2.32	Equal variance not assumed	**.000****	2.29	.280	2.41	.035	1.97	**.031***
How many people do you know by name within your urban block/ house?	Male	2.82	Equal variance assumed	.000	2.50	.808	2.75	.671	2.19	**.043***
	Female	2.32	Equal variance not assumed	**.000****	2.53	.813	2.70	.664	1.92	.053

How often do you visit people living in your neighborhood?	Male	1.613	Equal variance assumed	.001	1.194	.720	1.33	.398	1.7813	.000
	Female	1.132	Equal variance not assumed	**.000****	1.158	.710	1.43	.428	1.2969	**.002****
Do you feel safe walking in your neighborhood during the evening	Male	.90	Equal variance assumed	.000	.76	.008	.70	.115	.81	.008
	Female	.26	Equal variance not assumed	**.000****	.50	**.011***	.54	.124	.52	**.004****
I care about my neighborhood	Male	2.5	Equal variance assumed	.151	2.18	.666	2.51	.500	2.34	.223
	Female	2.24	Equal variance not assumed	.158	2.26	.665	2.62	.497	2.14	.232
How much support would you get from your neighbors in the hard times?	Male	2.68	Equal variance assumed	**.045***	2.52	.372	2.62	.173	2.15	**.015***
	Female	2.39	Equal variance not assumed	.041	2.63	.362	2.81	.123	1.83	.017
What is the nature of the relationship between you and your neighbors?	Male	4.34	Equal variance assumed	**.008****	4.03	.519	4.13	.428	3.77	**.005****
	Female	3.74	Equal variance not assumed	.009	4.16	.493	4.30	.417	3.22	.008

Are you planning to leave this area?	Male	.39	Equal variance assumed	.940	.45	.967	.40	.730	.75	.134
	Female	.39	Equal variance not assumed	.940	.45	.967	.43	.731	.59	.120
Streets and alley ways	Male	.48	Equal variance assumed	.000	.63	**.022***	.73	.097	.41	.444
	Female	.03	Equal variance not assumed	**.000****	.39	.024	.57	.108	.33	.452
Cafes	Male	.31	Equal variance assumed	.000	.18	.024	.41	.000	.71	.161
	Female	.00	Equal variance not assumed	**.000****	.03	**.008****	.03	**.000****	.56	.152
Shop/ workshop	Male	.61	Equal variance assumed	.000	.55	.082	.38	.770	.71	.161
	Female	.16	Equal variance not assumed	**.000****	.37	.081	.35	.770	.56	.152
Open spaces (squares)	Male	.15	Equal variance assumed	.014	.06	.112	.21	.101	.18	.456
	Female	.00	Equal variance not assumed	**.002****	.00	**.045***	.08	.071	.12	.480

Windows/ balconies	Male	.00	Equal variance assumed	.000	.00	.003	.02	.000		.03	.184
	Female	.26	Equal variance not assumed	**.001****	.13	**.023***	.41	**.000****		.11	.115
Building entrance	Male	.05	Equal variance assumed	.000	.03	.000	.22	.000		.21	.633
	Female	.61	Equal variance not assumed	**.000****	.63	**.000****	.62	**.000****		.17	.643
Sense of community	Male	17.71	Equal variance assumed	**.000****	15.66	.451	16.71	.399	14.00		.015
	Female	14.95	Equal variance not assumed	.000	16.16	.458	17.32	.372	12.35		**.032****

**. Difference is significant at the 0.01 level (2-tailed).
*. Difference is significant at the 0.05 level (2-tailed).

In Cairo's informal areas, there is a significant difference between owners and new law tenants in terms of number of people known by name in the neighborhood, caring about the neighborhood and the nature of the relationship between the respondent and his neighbors. In most cases, owners have higher values than new law tenants in terms of the previously numerated variables. In other words, owners have more acquaintances within their neighborhoods as well as having stronger social relations with their neighbors than new law tenants. They are more likely to care about their neighborhoods than new law tenants. If so, then, homeownership influences the feeling of safety and sense of community (Chavis et al., 1986). On the other hand, owners and new law tenants are neutral in terms of education, number of friends outside the area, and frequency of visits to acquaintances and friends within the neighborhood.

Unlike Cairo's informal areas, owners and new law tenants in planned Cairo are neutral in terms of external and internal social connections as well as mutual concerns.

Table6.10. T-tests of ownership groups for the case study areas		Ezbet Bekhit		Ezbet Al-Nasr		Abu Qatada		Planned Cairo	
		Mean		**Sig. (2-tailed)**	**Mean**	**Sig. (2-tailed)**	**Mean**	**Sig. (2-tailed)**	**Mean**	**Sig. (2-tailed)**
Education	Owner	2.28	Equal variance assumed	.741	2.52	.931	2.98	.182	6.37	.594
	New law tenant	2.42	Equal variance not assumed	.748	2.49	.926	3.71	.184	6.28	.710
How many close friends do you have outside your neighborhood?	Owner	2.93	Equal variance assumed	.835	2.72	.444	3.25	**.003****	36.10	.017
	New law tenant	3.17	Equal variance not assumed	.837	3.57	.416	6.59	.012	126.73	.195
How many people do you know by name in the neighborhood?	Owner	2.78	Equal variance assumed	.014	2.48	.028	2.67	.013	2.01	.923
	New law tenant	2.46	Equal variance not assumed	**.035***	2.24	**.028***	2.29	**.046***	2.00	.897
How many people do you know by name within your urban block/ house?	Owner	2.78	Equal variance assumed	.032	2.65	**.007****	2.94	.000	1.99	.527
	New law tenant	2.50	Equal variance not assumed	.065	2.35	.009	2.35	**.003****	1.88	.464

How often do you visit people living in your neighborhood?	Owner	1.5435	Equal variance assumed	.355	1.2407	.324	1.385	.837	1.4143	.291
	New law tenant	1.3750	Equal variance not assumed	.333	1.135	.336	1.353	.849	1.5882	.360
Do you feel safe walking in your neighborhood during the evening	Owner	.78	Equal variance assumed	.299	.70	.286	.75	**.000****	.55	.251
	New law tenant	.67	Equal variance not assumed	.323	.59	.293	.24	.000	.71	.240
I care about my neighborhood	Owner	2.72	Equal variance assumed	.007	2.39	**.030***	2.71	.000	2.24	.149
	New law tenant	2.17	Equal variance not assumed	**.018***	1.95	.032*	1.65	**.000****	1.94	.265
How much support would you get from your neighbors in the hard times?	Owner	2.74	Equal variance assumed	.034	2.78	.000	2.96	.000	1.94	.089
	New law tenant	2.38	Equal variance not assumed	.061	2.16	**.000****	1.76	**.000****	1.67	.052
What is the nature of the relationship between you and your neighbors?	Owner	4.43	Equal variance assumed	.003	4.33	**.002****	4.42	**.000****	3.43	.028
	New law tenant	3.54	Equal variance not assumed	**.008****	3.70	.002	3.00	.000	2.88	**.007****

Are you planning to leave this area?	Owner	.24	Equal variance assumed	.001	.33	.050	.38	.006	.59	.176
	New law tenant	.63	Equal variance not assumed	.002**	.54	.053	.76	.005**	.76	.152
Streets and alley ways	Owner	.35	Equal variance assumed	.410	.57	.416	.67	.056	.37	.861
	New law tenant	.25	Equal variance not assumed	.398	.49	.418	.41	.072	.39	.864
Cafes	Owner	.26	Equal variance assumed	.194	.13	.940	.29	.622	.63	.547
	New law tenant	.13	Equal variance not assumed	.158	.14	.940	.35	.638	.56	.563
Shop/ workshop	Owner	.48	Equal variance assumed	.876	.43	.287	.44	.003	.63	.547
	New law tenant	.46	Equal variance not assumed	.877	.54	.289	.06	.000**	.56	.563
Open spaces (squares)	Owner	.13	Equal variance assumed	.563	.07	.092	.17	.067	.11	.229
	New law tenant	.08	Equal variance not assumed	.540	.00	.044*	.00	.002**	.22	.320

Windows/ balconies	Owner	.09	Equal variance assumed	.960	.06	.520	.13	.859	.10	.574
	New law tenant	.08	Equal variance not assumed	.960	.03	.493	.12	.858	.06	.519
Building entrance	Owner	.22	Equal variance assumed	.162	.28	.338	.42	.068	.18	.873
	New law tenant	.08	Equal variance not assumed	.117	.19	.326	.18	**.044**[*]	.17	.873
Sense of community	Owner	18.00	Equal variance assumed	.001	17.02	.000	18.27	.000	13.1143	**.027**[*]
	New law tenant	15.04	Equal variance not assumed	**.010**[*]	14.12	**.000**[**]	12.41	**.000**[**]	11.3889	.050

**. Difference is significant at the 0.01 level (2-tailed).

*. Difference is significant at the 0.05 level (2-tailed).

6.7. RESIDENTS' SATISFACTION AND PROBLEMS

In all case studies, respondents were asked to define what they like most in their neighborhood. In Cairo's informal areas, the greatest proportion indicated that social solidarity comes at the top of the list. However, a considerable ratio of the respondents stated that they like nothing in their neighborhoods as drabness, dirtiness and anti-social behavior are dominating. The lowest proportion, in the three cases, identified the locations of their neighborhoods as the most interesting thing. Unlike Cairo's informal areas, the largest group of people in planned Cairo stated that they most like their neighborhoods' locations, whilst social solidarity is not that interesting (see figure 6.16).

On the other side, people were asked to determine the most important issues in their quarters. According to respondents, in the three informal areas, the main problem is the spread of drug trafficking and thugs all over the area, especially at intersections and squares. Many interviewees reported that young people are commonly observed as the operators of 'anti-social behavior'. Some respondents stated that insecurity is the most common reason which would persuade them to leave; however, the feeling of insecurity is influenced by social ties, so that strong social bonds may have a defensive value. The second issue is dirtiness due to the lack garbage of garbage collection. Thirdly, the lack of services such as gas lines was mentioned in the questionnaire (see figure 6.17).

Unlike Cairo's informal areas, lack of services (45%) and dirtiness (33%) are frequently reported in planned Cairo, whilst problems of drug trafficking and thugs are less reported, only 7%. In short, social pathologies are not an issue in formal parts of Cairo.
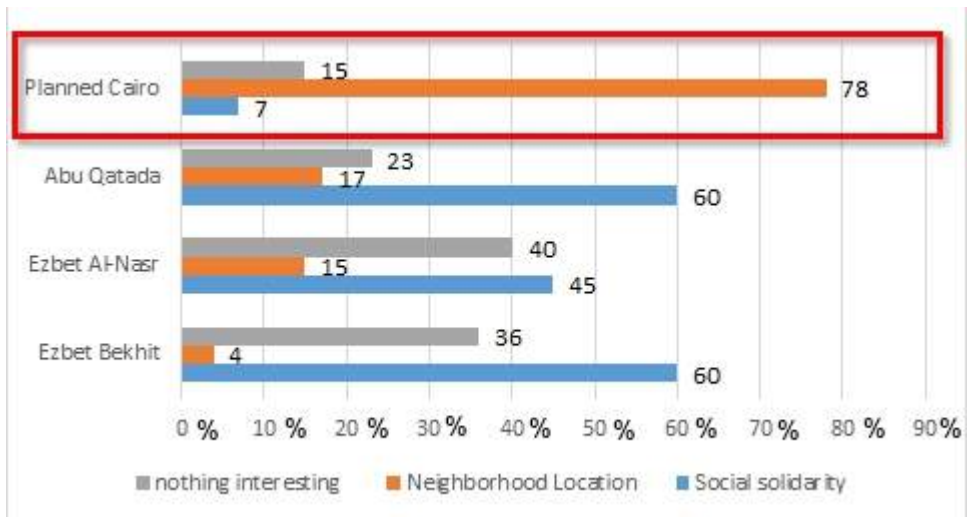
Figure 6.16. What do you most like about this neighborhood?
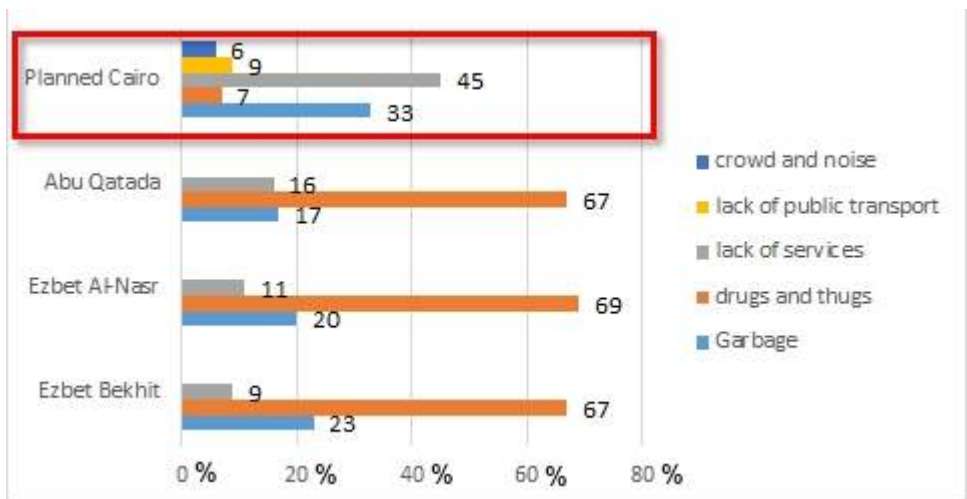
Figure 6.17. What do you most do not like about this neighborhood?

6.8 CONCLUSION

This chapter continued to show that informal settlements in Cairo have not only distinctive spatial pattern but also have territorial characteristics.

The results from the questionnaire showed that illiteracy rate in informal areas is considerably higher than in planned Cairo; consequently, the residents of informal areas have less job opportunities in the governmental

sector. In other words, the majority of the disadvantaged people are self-employed in the informal sector of economy and they are usually artisans and shopkeepers. Their workplaces either on the ground floors of their dwellings or at a walkable distance from there. Oppositely, the largest proportion of people in planned Cairo work outside their quarters and are mostly government employees.

In terms of homeownership, most respondents living in informal areas are either owner-occupiers or have fixed rent contracts. Unlike informal areas, the majority of people in planned Cairo are new law tenants. Furthermore, in all case study areas, the largest group of respondents lived in the neighborhoods for over 20 years. On the other hand, people clustered in the case studies for different reasons such as searching for job opportunities, cheaper housing, marriage, family roots, proximity to workplaces, or because respondents were born there.

When asked about the social class of their external close friends, the majority of respondents in all cases indicated that they belong to the same social class. On the other hand, new residents and educated people showed less assimilation into the host communities, especially in planned Cairo, and stated that they have more external social connections than internal. All in all, inhabitants of planned Cairo have more external relations than people living inside informal areas. This might reveal the existence of two types of society in informal areas: 1) a correspondence society where people have only social relations within their settlement (spatial solidarity); Expressed differently, social internal ties are relatively strong; however, this is not the case for external ones. Therefore, the community in informal settlements, to a certain extent, sustains its territorial preference. 2) A differential society where the community is a mix of low and middle class groups, but a social network is based on class and gender (see Hillier, 2009c). This helped

confirm that the spatially segregated disadvantaged areas were also socially excluded in terms of social networking and quality of life.

Contextual factors that predict mutual concerns could give a better understanding of social solidarity and emotional ties. Exploring the interrelations of social variables in informal areas showed that long-standing inhabitants have more acquaintances, stronger social ties, less wish to leave, minimal fear of crime, and higher sense of community in general than newcomer immigrants. This finding is in line with the sociological approaches to sense of community, where the length of residence is related positively to community attachment and social ties (Perkins et al., 1990; Janowitz & Kasarda, 1974; Goudy, 1990; Salomon, 2010). Besides, statistical analysis showed that sense of community is associated with safety. This is also in line with the literature (Ziersch et al., 2005). As mentioned previously, length of residence strengthens emotional ties to place and this in turn creates greater attachment to neighborhood (Rowles & Ravdal, 2002). The literature also showed that age influences the meaning of home (Case, 1996), though it is questioned in the research work presented here in the cases of Ezbet Bekhit and planned Cairo. This research shows that different age groups are neutral in terms of sense of community. In Ezbet Al-Nasr and Abu Qatada, aged or older people are less likely to move (see Gilleard et al, 2007) and more likely to have a stronger attachment to place (see Lewicka, 2005). Expressed differently, older people are more attached to their neighborhood in Ezbet Al-Nasr and Abu Qatada, while younger groups are more attached to friends, neighbors and relatives. This is generally in agreement with the literature (see Cuba and Hummon, 1993).

On the other hand, in Cairo's informal areas, education correlated positively with the inhabitants" wish to leave. This means that there will be a lack in more skilled people upon the time. Eventually, informal areas which already notorious in terms of crime and other social pathologies will be more segregated according to the vicious circle of decline (see Karimi and Parham, 2012).

In the case of planned Cairo, unlike informal areas, variables of length of residence, education and safety are neutral in terms of social connections, mutual concerns and the intent to leave. This might indicate that social relations between different groups living in planned Cairo are transpatial. In other words, social fabric crosses spatial boundaries.

T-test analysis shows that men living in informal areas are more likely to hold higher education and to know more people than women. Furthermore, gender differences appear in interactional places as well; males are more likely to interact in streets and open squares than females. On the other hand, both men and women are neutral in terms of sense of community— except in the case of Ezbet Bekhit and planned Cairo, where men have higher sense of community than women. This seems to differ from a community to another, since previous findings are in conflict with results of earlier research projects— see for example Fogel (1992) and Stevens (2009), which suggest that women are more attached to their neighborhoods and have "more personal friendships than men" (Steven 2009 in Driscoll, 2011: 15). According to Steven (2009), women favor to remain in a place in order to maintain their social network, since establishing new relationships in a new place is not that easy for them.

Statistical analysis shows also that homeownership plays a positive role in terms of sense of community. Owners are more likely to have higher sense of community than new law tenants. Owners elect to age in their neighborhoods, since they are emotionally tied to place. Furthermore, owners have stronger internal social bonds, while tenants have a higher number of non-local acquaintances. Actually, homeownership is a positive indicator of place attachment (Lewicka, 2010); however, it is not a principal aspect of attachment to a place (Windsong, 2010). In his studies, Windsong (2010) examined the relationship between homeownership and feeling of place attachment. He conducted in-depth interviews with families from communes in Southern Colorado. His findings showed that belongingness is not conditionally related to homeownership, since tenants can have a sense of attachment exactly like owners.

On the other hand, t-test analysis in this research indicate that homeownership is not entirely synonymous with education and interactional places. In other words, the relationship between homeownership and both educational level and interactional places is relatively disentangled.

In terms of transport mode, the majority of respondents in Cairo's informal areas prefer walking as their workplaces and other daily purposes are at a short distance from their dwellings. On the other hand, planned Cairo seems to be car-dependent communities. Lastly, social pathologies of drug trafficking and mugging are reported by many respondents of informal areas. To a certain extent, the current space organization is involved.

In conclusion, informal areas which are mainly physically isolated, as implied in chapter 4, are socially excluded. Additionally, the residents of these areas have commonly strong belongingness and sense of community.

These findings are in line with those from Edgü and Cimsit (2011) who demonstrated that living in physically isolated settlements enhances the social adaptation and thus place attachment. Lastly, the findings of this chapter complement those in chapters 4 and 5 giving an evidence that social and spatial issues are strongly connected.

7 DISCUSSION AND CONCLUSIONS

Chapter Seven

Discussion and Conclusions

7.1. INTRODUCTION

This chapter sets out to discuss the findings of the empirical part of this research in the light of the questions raised in chapter 1. The main question is:

- What is the relationship between the socioeconomic segregation of a settlement and its overall spatial configuration?

And sub questions are:

- What are the forces that influenced the spatial development of Cairo through history? And to what extent did such forces contribute to Cairo's spatial division?

- To what extent are deprived areas spatially integrated at a neighborhood as well as city level?

- Is there a link between spatial segregation and economic and social segregation?

- Is the distribution and rates of commercial activities within informal settlements mainly driven by the spatial composition of the area itself? Or is it more related to the overall structure of the city?

- To what extent do the locals assimilate into their neighborhood and the city as a whole?

This chapter first synthesizes the main findings of the analysis to gain and overarching statement about the case studies. Following are two sections, which discuss matches and conflicts between the findings of the thesis and the key issues of the theoretical part: the first of which criticizes

contemporary urban developments in Cairo and suggests that such developments exacerbate rather than solve Cairo's centuries-old divisions; the second of which puts forward the main contributions that this research raises: on the methodological and planning policy realms.

7.2. CONCLUSIONS

Conclusions of the study can be summarized as follows:

- **Investigation of Segregation within Cairo Metropolitan Area**
    - Urban segregation has been a continual feature of Cairo's history. Cairo is like a cracked vase, where fractures over many centuries have been graven in its physical memory.
    - Over the twentieth century random urban development has disrupted the overall continuity of the city's structure. It has engulfed core villages and suburbs and treated different parts of the city as isolated objects.
    - Pushing disadvantaged people to the outskirts of the city has brought about a mushrooming of abandoned and underutilized lands in the center.
    - The morphological analysis at a city scale showed that segregated parts of the city correspond mainly to informal areas' locations. The broken accessibility is arguably a main cause for the disinvestment and social segregation that prevail in the city. On the other hand, informal areas have a very distinctive spatial structure at local scale, which enhances the local functioning of the area. Interestingly, such areas are located along the global movement thoroughfares in order to get access to the city center and to workplaces. Informal areas lack

the axial integrators that link their local street network with the rest of the city. Put differently, informal areas are globally segregated, but locally integrated. The advantage of this spatial organization is that it sustains the territorial preference of the dwellers.

- Spatial segregation makes informal settlements, which have semi-autonomous nature, like small states within the city. <u>Spatial segregation denies people their basic right to the city, but it also starves the city of its lifeblood and tears apart its social fabric.</u>

- Investigating the relationship between spatial accessibility and socioeconomic segregation has proven that both are related significantly at a city wide scale.

- <u>The questionnaire's results</u> indicated that there is a lack of mix between the middle class and low income groups in informal areas, whilst there is a considerable social mix between local and non-local residents in the case planned districts. In informal areas, young people mostly do not have private property, so they usually affirm themselves on the streets and on the boundaries of their territories (e.g. railways and other physical features). Notably, features of co-dependence in informal areas are strongly reported.

- Residents of the informal areas have very limited external social network, which reveals that both societal and spatial boundaries are relatively overlapped. In other words, inhabitants of informal areas sustain their rural character and have territorial preference, and thus, socially segregated. Again, this is not the case in planned areas of Cairo.

- This research also showed that the most skilled and educated respondents, if any, are less attached to their neighborhoods and are self-selected to move out. This in turn will help, indirectly,

disadvantaged people to congregate in certain areas that will be notorious due to their vulnerability to anti-social behavior. Contrary to that argument, Woolever (1992) found that higher education level is positively related to higher place attachment, so that the more educated residents will have more social involvement, hence stronger place attachment (Livingston et al, 2008). However, the type of place attachment concerned in this study might be more functional than emotional.

Altogether, Cairo has become, or maybe has always been, a fragmented mosaic of wealthy enclaves, the poorest areas and everything in between. The findings of this thesis provide an understanding of the 'vicious circle or urban decline' (Figure 7.1). In this circle, slum formation starts with main socioeconomic forces (i.e. poverty, migration, changing economies, rapid urbanization, etc.). Immigrants or new comers have to cluster in the less attracting areas (e.g. old or historic parts of the city, steep slopes, flood plains, and villages absorbed in the cities' fabrics through rapid urban expansion), which are segregated at a city wide level. Informal areas, in principle, are shaped very quickly and lack the length of time to adjust their spatial structure. This creates poor spatial conditions such as poor accessibility, shortage of infrastructure networks and public services, higher densities, and lack of urban public spaces. Poor physical conditions result in aggregative socioeconomic problems until a deprived area reaches a hypothetical point that cannot reverse the descending spiral of decline.
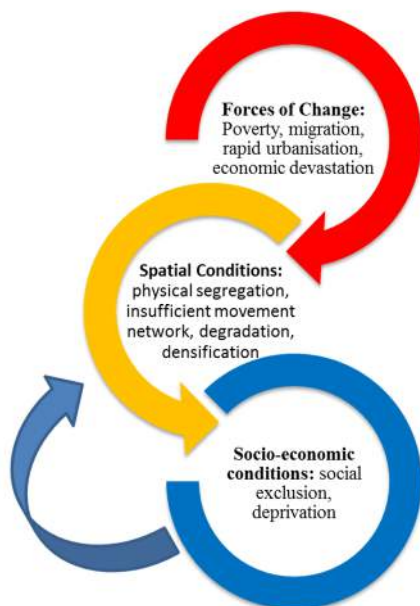
Figure 7.1. The vicious circle of urban decline. (Source: author)

7.3. A LONG HISTORY OF POOR-RICH DIVISION

By studying the city's long history it becomes clear that the social division of urban space and the discontinuities of urban development have produced sharp socio-economic and cultural differences in Cairo. Fatimid Cairo (969) was a walled-city exclusively established for the ruling class. In the Ottoman period, a *Hara*, mainly a gated quarter, was the basic urban unit of the city. Poor *harat* were located on the outskirts of the city, while the wealthy bourgeois could be found in the urban core. These dynamics persisted into the Mamluk period, during which the ruling elite would cluster around the periphery and surround their dwellings with gardens to isolate themselves from the public. More recently, the Khedivial city (1869), which was intended mainly for foreigners and wealthy Egyptians,

was established on vacant land west of historic part. A cursory look at the more recent history of Cairo reveals that socio-spatial divisions have continued until the modern day.

The idea of developing new towns in the desert began with the 1956 master plan and continued thereafter. Expensive housing and poor infrastructure dissuaded people from settling in what were ostensibly desert cities. The master plans of Cairo failed as the proposed new towns didn't manage to entice a significant population. Living in informal settlements was vastly preferred to these ugly towns whose only champions were the property speculators fueling their proliferation. In fact the failures continued unabated into the 1990s.

Over the last few decades neoliberal economic policies have contributed to the rise of elite gated communities, mainly located on the fringes of the Greater Cairo Region in the new urban communities of New Cairo and Sixth of October. Gated communities have attracted a burgeoning class of extravagantly wealthy Egyptians who have voluntarily isolated themselves from the rest of Cairo's citizenry. Walls, fences and barren desert have isolated this prestigious group from the city and from the wider community. This has had the effect of accentuating a 'them and us' dichotomy and in turn reinforcing social exclusion in the city at large.

As gated communities have flourished the chronic lack of affordable housing has forced rural immigrants and newcomers to cluster in less desirable locations within the city. Discontinuous development has disrupted the urban form of Cairo producing lost spaces of an ill-shaped and ill-planned urban environment.

From above, future urban planning policy should avoid development strategies that result in ill-shaped and fragmented urban structure. Furthermore, housing policies should also aim at providing affordable housing in order to overcome unplanned urban growth. Lastly, future development should focus on creating public realm that accommodates different communities.

7.4. REALMS OF CONTRIBUTION

This thesis started from the simple question: do spatial factors affect socioeconomic and physical improvements of the informal settlements in the Cairo metropolitan area? The purpose of this research was to contribute towards a better understanding of the relationship between space and society. Although the answer for the raised question is not simple, this research has given positive answers that could give a better understanding of the relationship between spatial factors and both physical and social development. Contribution in this area can be found in two main domains: methodological and regeneration policy.

7.4.1. Methodological aspects

On the methodological side, the building of an approach to study the relationship between space and socio-economic processes in informal areas in Cairo is important contribution. At city scale, it unifies various insights and methodologies from sociological, economic, geographic and urban planning theories and approach into a holistic approach for better understanding of mutual relations between space and society. At a settlement scale, the research endeavored to link insights from urban and economic perspectives.

On the other hand, normalizing the commercial rate in the settlements, through using the banding method, as well as employing the 'Gini Coefficient' provide reliable tools for investigating the relationship between spatial parameters and land use distribution. This allows for measuring the efficiency of distribution not only for built environment, but also for urban design projects. Furthermore, it opens the possibility of comparing efficiency of land use distribution in a wide range of settlements situated in different parts of a metropolitan city. Employing 'Gini Coefficient' method itself in urban planning reflects the importance of interdisciplinary research and demonstrates the feasibility of employing tools from a different field, like economy, to quantify an urban phenomenon.

7.4.2 Policy Aspects and Design Recommendations

The purpose of the regeneration process is to reverse the escalating spiral of urban decline, the vicious circle, and turn it to an ascending process of improvement, the 'virtuous circle of urban regeneration'.

Designers and planners cannot control the socioeconomic forces behind poverty and marginalization. Instead, a better understanding of urban decline process can help developing solutions that could result in a process of regeneration.

Although proposing a regeneration framework falls outside the scope of this thesis, it is of great importance to give some reflections on the spatial analysis introduced in this research. Spatial configuration analysis has led, to a certain extent, to a better understanding of the city's internal structure. It helped in detecting the isolated parts of the city through local accessibility analysis. Obviously, informal and deteriorated areas lack connections between their internal spatial structure and the surrounding wide street grid.

This relatively impedes urban consolidation and increases social segregation. Based on space syntax analysis, efficient strategy of intervention can be found to regenerate or to link the fragmented and isolated parts to the citywide street network. At the same time, the proposed upgrading plan should preserve the integrity of the existing spatial structure as much as possible. In other words, the proposed strategy should reconnect the local street network to the global one performing minimum degrees of intervention to the physical fabric.

The strategy of intervention includes the following: 1) making a spatial diagnosis of the spatial structure through analyzing the street and road network; 2) identifying the level and the priority of intervention depending on indicating the underperforming parts of the system; 3) suggesting a preliminary design to reconnect the isolated parts with the city-wide structure; 4) rerunning the spatial analysis in order to test the new model efficiency; 5) conducting the required refinement on the model.

Improving spatial accessibility in this way is likely to generate new movement patterns that will draw in new economies, stimulate investment and so stimulate the "virtuous cycle" of regeneration.
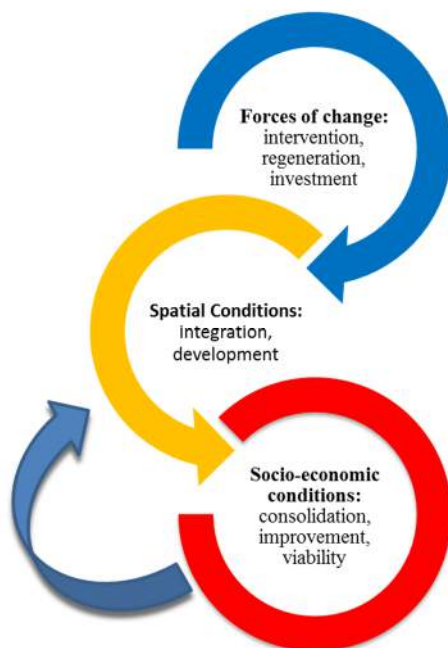
Figure 7.2. The hypothetical virtuous circle of urban regeneration. (Source: author)

At a more detailed level, the outputs of this study have some useful implications that can be applied in regeneration of informal areas. Future policy should be put on the basis that:

- Location of informal settlements should be connected to movement thoroughfares.
- Sub-centers of informal areas should be linked with each other within the wider urban context in order to not only transport income from formal areas but also to restore urban livability of the metropolitan.
- Commercial activity should generally be planned on the basis of spatial accessibility that minimizes time consuming travels and maximizes economic gain and social interactions. Superficial

insights that distribute activities on the principle of abstract geometric distance, such as putting the service center of the neighborhood in its geographical center should be revisited. In other words, centers should be located at the convergence of strategic routes to have the benefit of passing trade (figure 7.3). This is in line with New Urbanism principles.
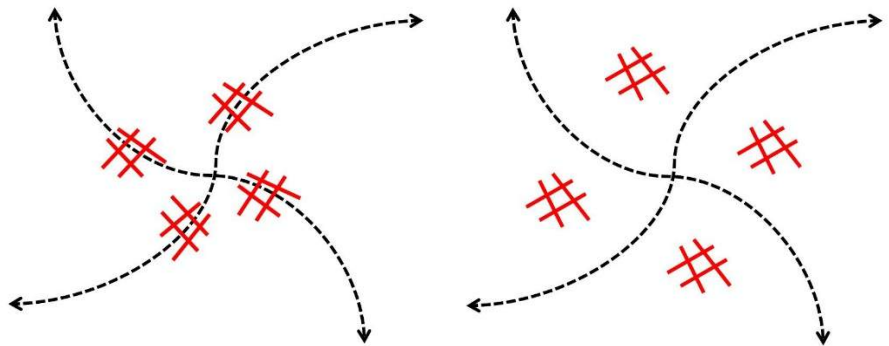
Traditional local urban centers   Post War local urban centers

Figure 7.3. A hypothesis on how the main route network is connected to local centers in traditional self-organized areas (left) and modern urban areas (right). (Source: author)

- Configurative approach is not only helpful in setting regeneration policy, but also it can contribute to monitoring and evaluating urban land use design for new projects.

- Identifying physical barriers and gaps should be seen as a first step in the process of urban restructuring. Those not local to an area will surely be encouraged to use it more were these barriers to be removed.

Altogether, integrating configurative approach and, social and economic thinking into master planning and design decisions will facilitate creating the right balance between physical and social systems and this in turn will enhance a better wellbeing and quality of life.

7.5. FURTHER WORK

As for future research, including more case studies and more spatial and social variables will give a more sufficient evidence and might lead to new associations that could help in formulating new policies. It is noteworthy that this thesis included only two components of urban form (urban layout and commercial land uses pattern) and did not discuss deeply the relationship between social variables and other component of urban form such as urban density. This opens the possibility for a future work in this area, but this is conditionally linked to data availability. Furthermore, this thesis did not examine the interrelationships of spatial factors; that is of great importance to be undertaken in a further research to reflect how dependent or independent the spatial factors from each other.

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APPENDICES

Appendix 1 Historical Maps of Cairo
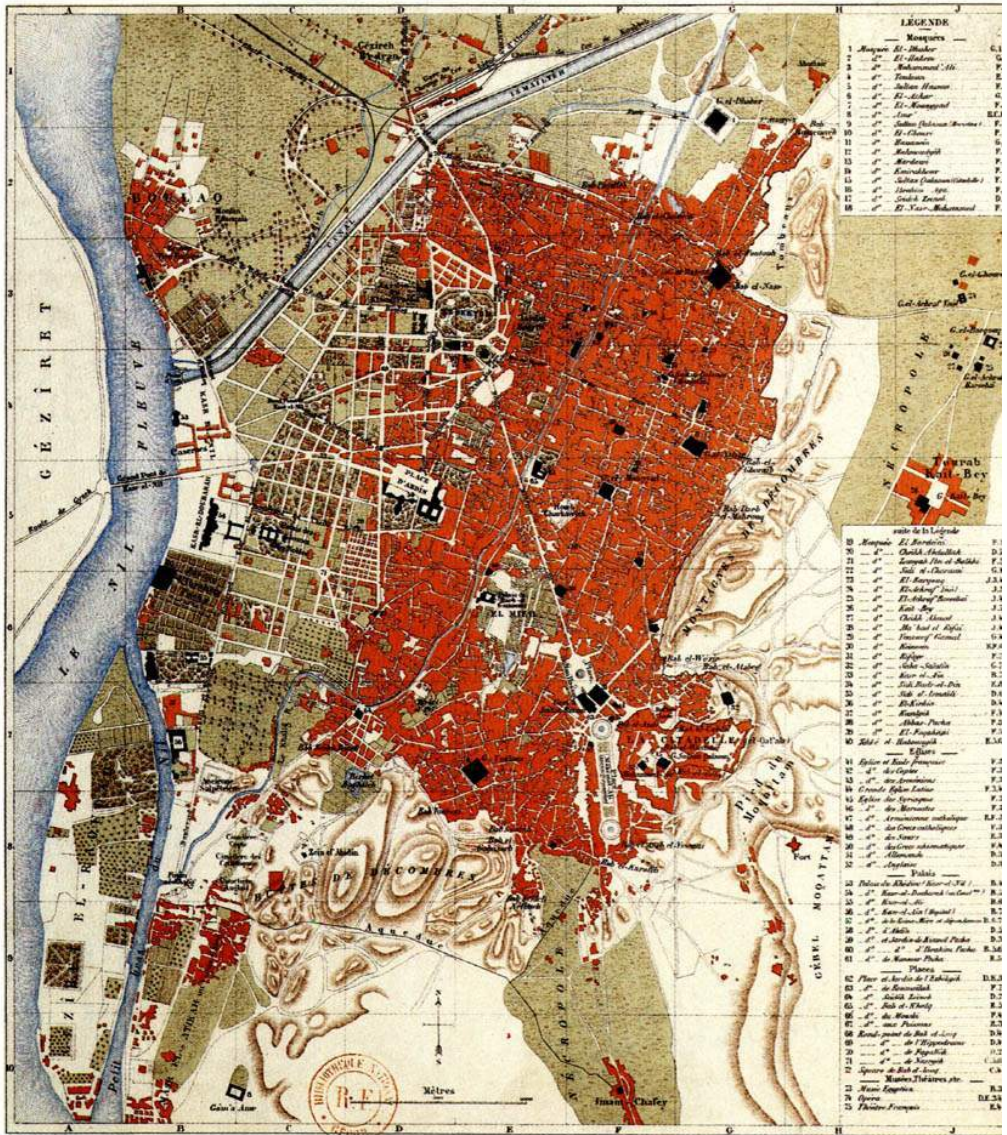
Cairo map Thuillier (1888)
(http://commons.wikimedia.org/wiki/File:Cairo_map1888_Thuillier.jpg; Le
Caire, Itinerare de l'Orient, Egypt, Dresse par L. Thuillier, Paris Hachette,
1888)
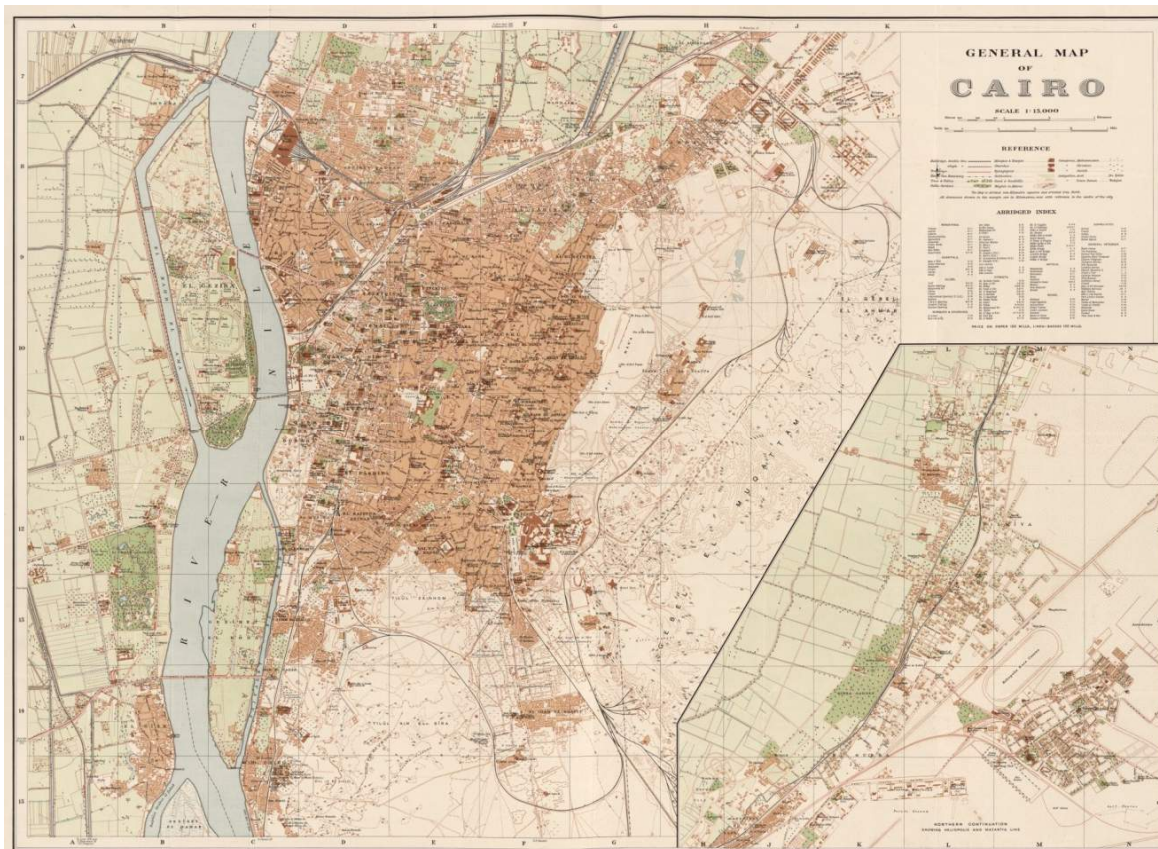
Cairo map (1920) (http://www.vintage-maps-prints.com/products/old-map-of-cairo-egypt-1920)
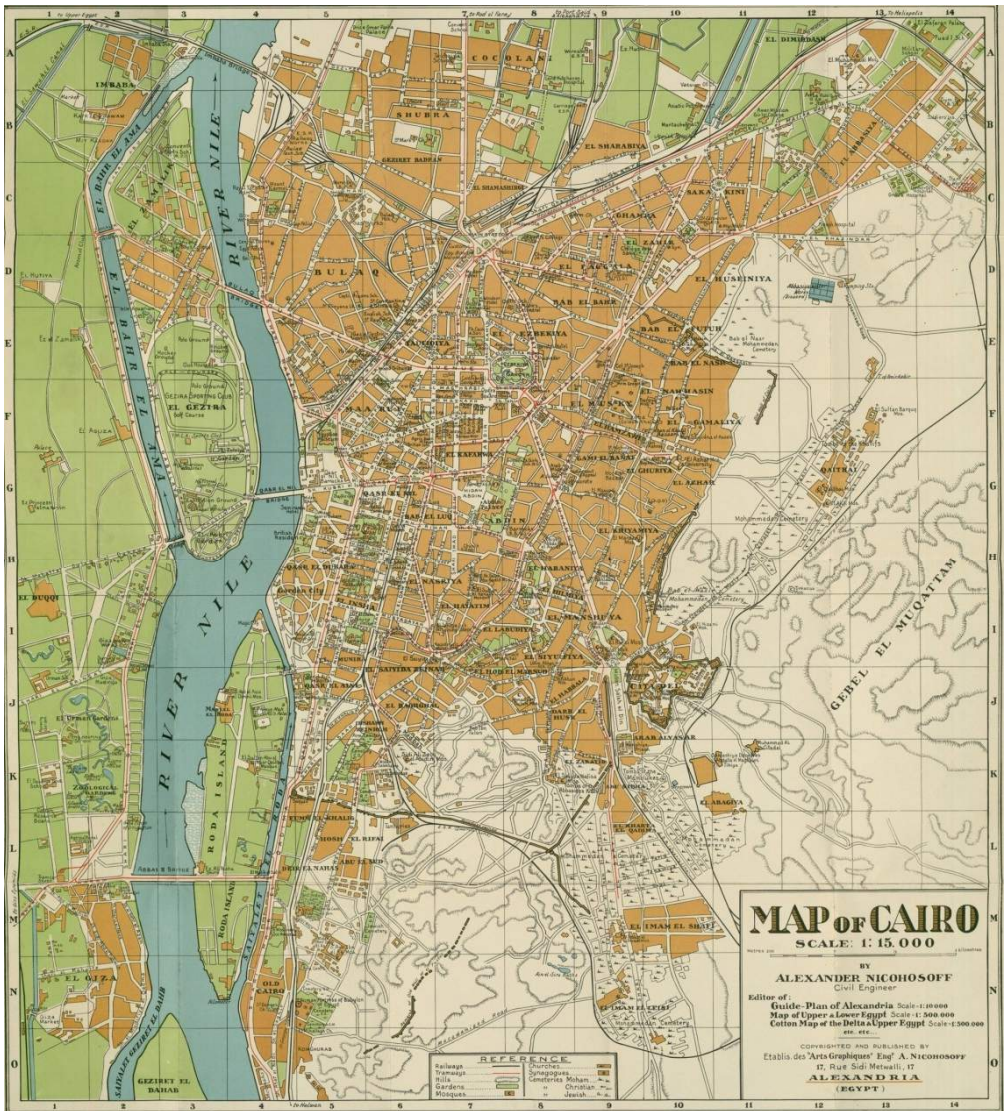
Cairo 1933. A map by Alexander Nicohosoff, 1933
(http://en.wikipedia.org/wiki/Timeline_of_Cairo#/media/File:Cairo_map193
3_Nicohosoff.jpg)
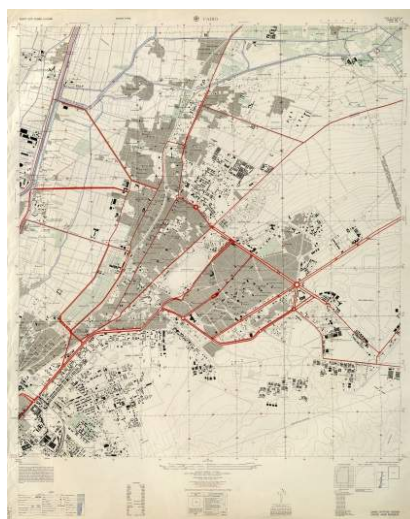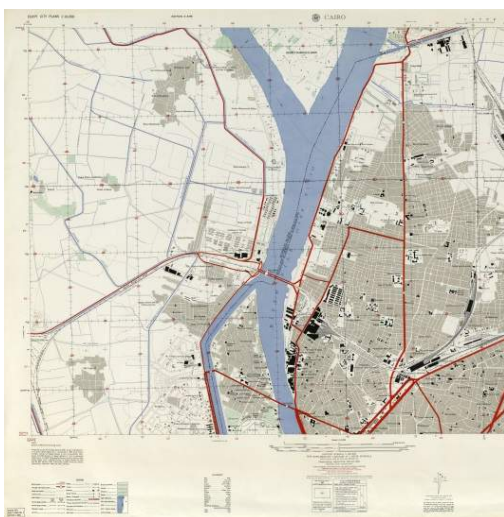
Cairo 1958
(http://www.lib.utexas.edu/maps/world_cities/txu-oclc-47175049-cairo1-1958.jpg)
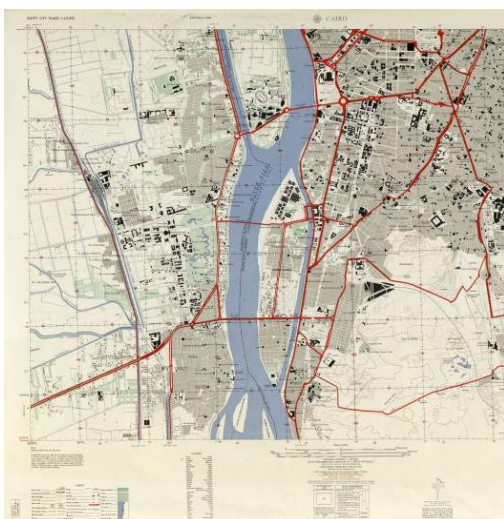
Appendix 2 spatial and socio-economic analyses
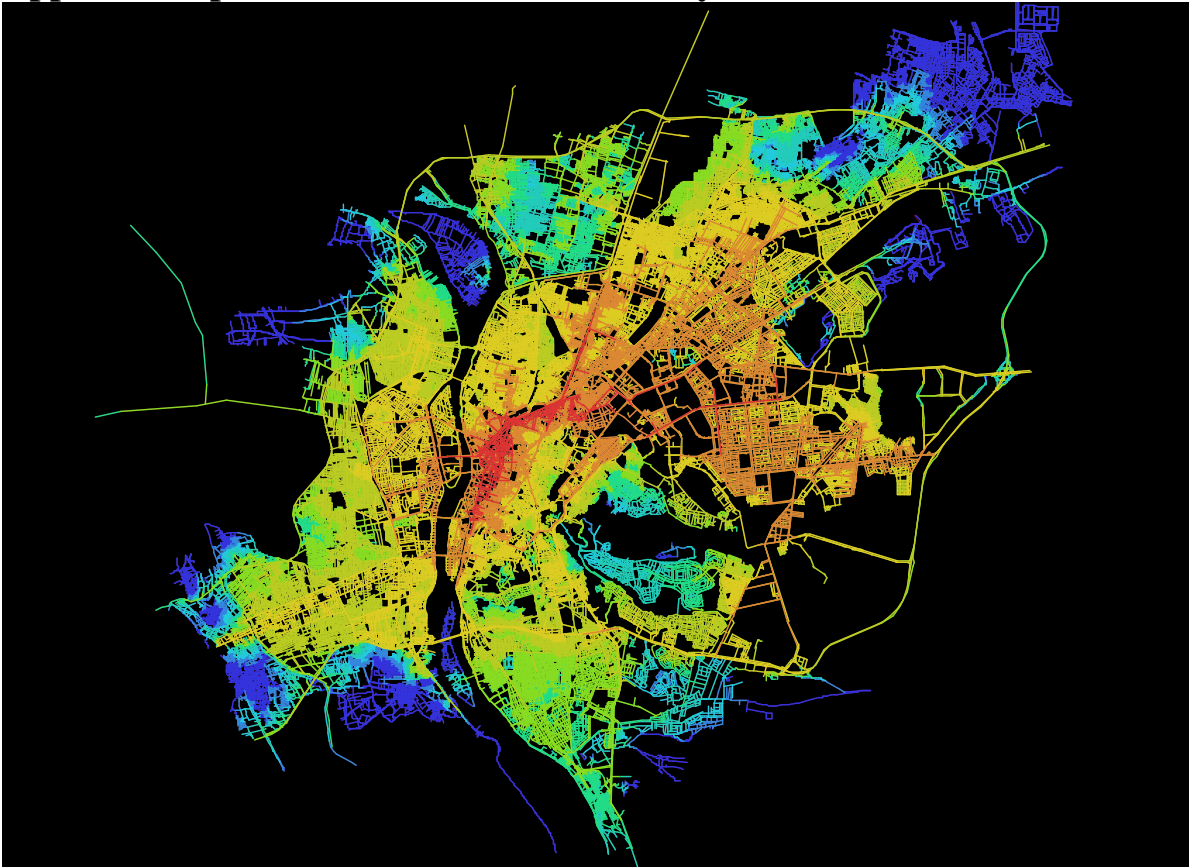
Topological
Integration Rn
(AXIAL MAP)
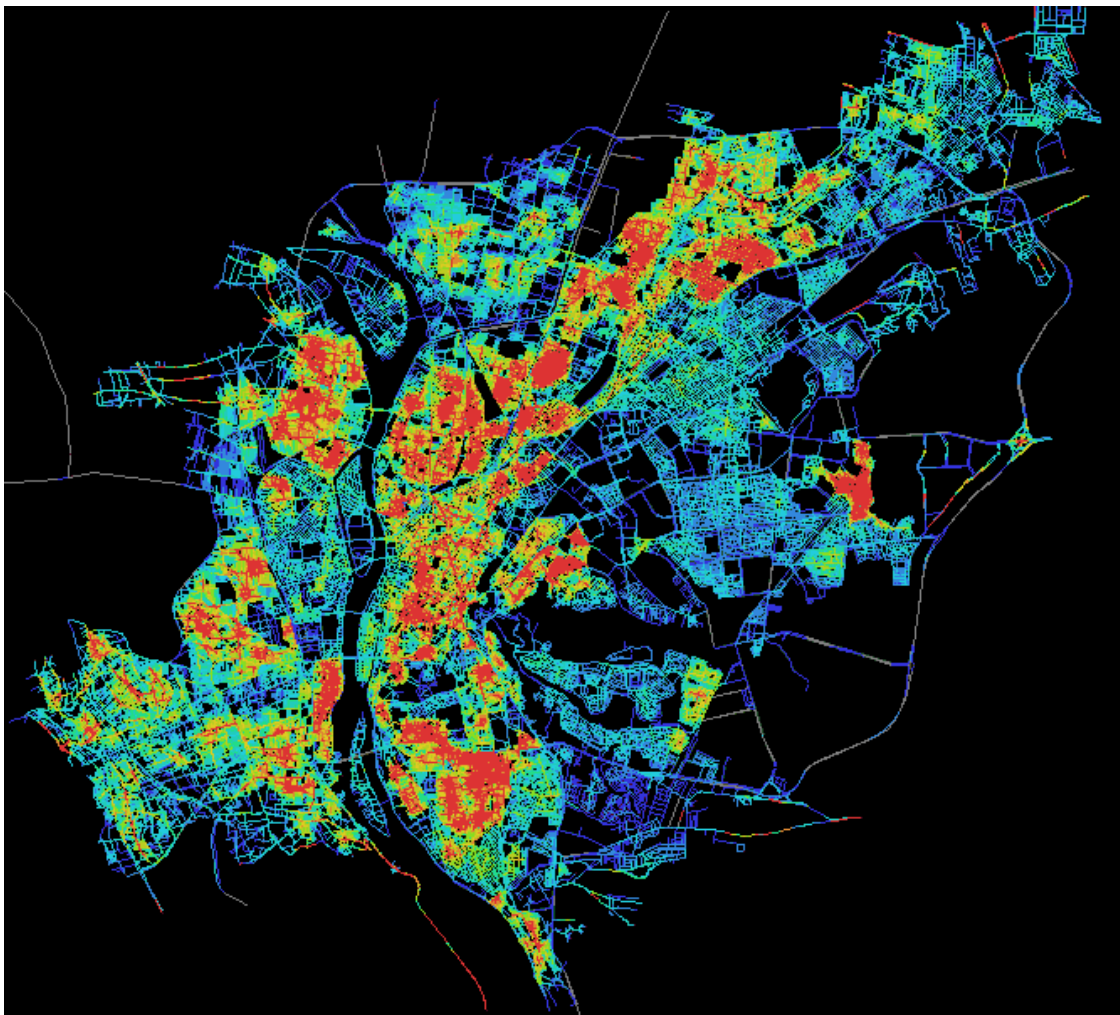
Angular Integration R
400m
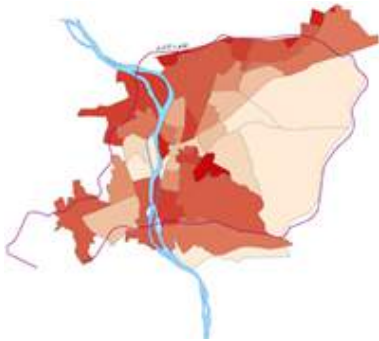
Illiteracy rate (+10) per district (according to Census of Egypt 2006)
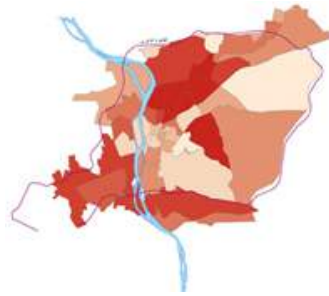
Unemployment rate (+10) per district (according to Census of Egypt 2006)
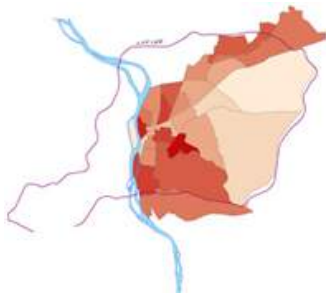
People beneath poverty line per district (according to HDR, 2008)
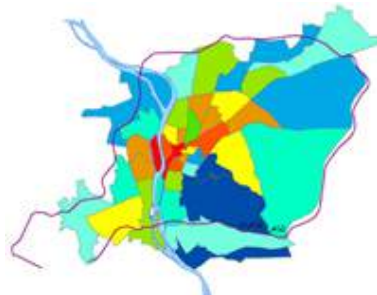
Angular Global Integration Rn per district

Angular Global Integration R1200 per district
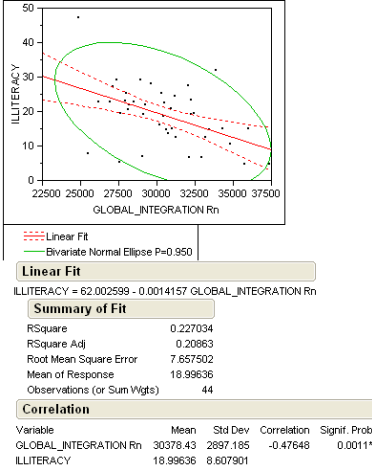
A scattergram graph of illiteracy against global integration Rn at district level
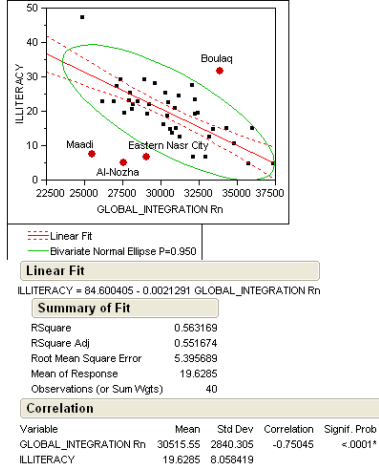
A scattergram graph of illiteracy against global integration Rn at district level excluding districts of Boulaq, Maadi, Al-Nozha and Eastern Nasr city
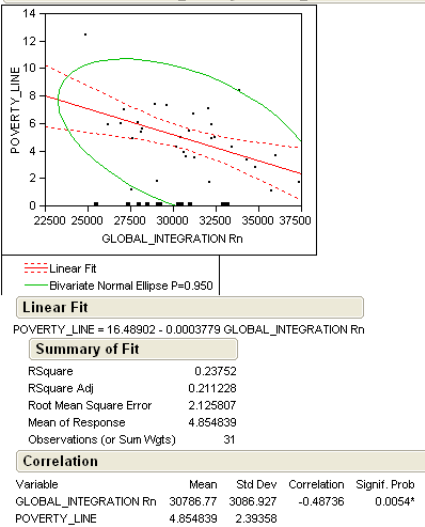
A scattergram graph of percentage of people below poverty line against global integration Rn at district level

Appendix 3 (a) Ezbet Bekhit Gallery

Autostrad (Al-Nasr Road)

Old British railway lines

Entrances to Ezbet Bekhit

Mokattam hills (strong cliffs)

Strong topography

One topological step entrance

Level difference

Direct connection to street

an internal street

Ezbet Bekhit from Autostrad

Cairo great cemetery

El Seka El Hadid Street

Garbage dump site before main entrance

Al-Shaikh Zaid hospital

(b) Ezbet Al-Nasr Gallery

An entrance from Autostrad

Autostrad street

Jewish cemeteries

Ring Road

A tunnel providing access to the area

a wall separating the area from the Jewish cemetery

Marble trading and processing

Iron art crafts

Car service

An internal street

Commercial activities

Breading animals in streets

Slaughter house wall bordering the area from the north
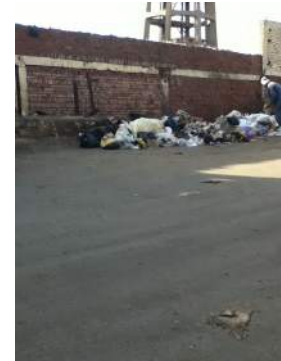
A public space used for playing

Using steps (Mastaba) before buildings for sitting and interaction

A service road facing Autostrad

Two topological steps entrance

Washing and drying
clothes in internal
streets

Mastaba

Marbel trading

Daily social life in the area

Children playing in
streets

Kids learning in a mosque

(c) Abu Qatada Gallery

Sudan street and railway Metro line

The neighborhood from Cairo University Campus

El-Zumour Canal

the street facing Agricultural Research Center (ARC)

the wall of ARC

Tharwat bridge and Saft El-Laban corridor

Al-Gameia St. (the informal daily market) during morning period
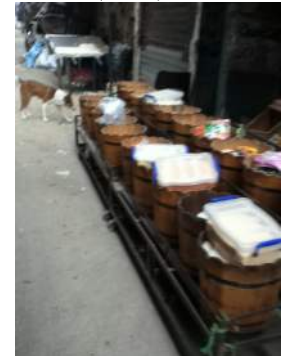
Al-Gameia St. during midday period

Car service in the area

Breeding goats in streets

Using internal streets for parking purposes

Non-inter-visible streets
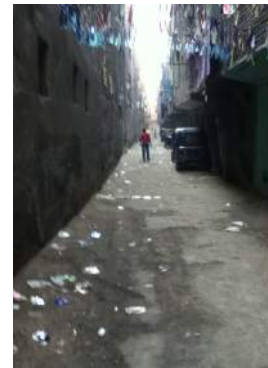
All and Fewest Axial Lines

All axial lines (Ezbet Bekhit)

Fewest axial lines (Ezbet Bekhit)

All axial lines (Ezbet Al-Nasr)

Fewest axial lines (Ezbet Al-Nasr)

All axial lines (Abu Qatada)

Fewest axial lines (Abu Qatada)

Appendix 4 Movement Observation Survey Form of Virtual Gates

Name   ………………..
Date   ………………..   Observer   ………………..
Area   ………………..   Weather   ………………..

Gate No.				Time			
Children (< 10)		Teenagers (10-18)		Adults (18- 60)		Elderly (> 60)	
Male	Female	Male	Female	Male	Female	Male	Female

Appendix 5 Questionnaire
a) Determining Sample Size

Table 1. Sample Size for ±3%, ±5%, ±7%, and ±10% Precision Levels where Confidence Level Is 95% and P=.5.

Size of Population	Sample Size (n) for Precision (e) of:			
	±3%	±5%	±7%	±10%
500	a	222	145	83
600	a	240	152	86
700	a	255	158	88
800	a	267	163	89
900	a	277	166	90
1,000	a	286	169	91
2,000	714	333	185	95
3,000	811	353	191	97
4,000	870	364	194	98
5,000	909	370	196	98
6,000	938	375	197	98
7,000	959	378	198	99
8,000	976	381	199	99
9,000	989	383	200	99
10,000	1,000	385	200	99
15,000	1,034	390	201	99
20,000	1,053	392	204	100
25,000	1,064	394	204	100
50,000	1,087	397	204	100
100,000	1,099	398	204	100
>100,000	1,111	400	204	100

a = Assumption of normal population is poor (Yamane, 1967). The entire population should be sampled.

Source: http://edis.ifas.ufl.edu/pd006

The formula for calculating the above results is as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where n is the sample size, N is the population size, and e is the level of precision (ibid).

b) Tentative version of the Questionnaire

1. Basic information /socio-economic characteristics

Name (optional)

Gender :	□ Male	□ Female
Age:		
Origin		
Birth place:		
Marital status	□ Single	□ Married
	□ Divorced	□ Widowed
Education	□ Postgraduate (Masters/PhD)	□ College (Bachelors)
	□ Higher school qualification	□ Secondary school qualification
	□ Primary school qualification	□ No qualification
Occupation	□ worker/farm worker	□ clerk/teacher
	□ artisan/trader	□ manager/entrepreneur
	□ unemployed	□ housewife
	□ Full time student	□ worker-student
	□ soldier	□ retired
	□ other	
Workplace	□ Inside the area	□ Out of the area:
	□ Both	

Income level

(Optional)

Since when do you live here? (less than 5 years, 5-10 years, 10-15 years, 15 -20 years, more than 20 years)

Do you suffer from any disease? (yes [   ] / no)

Does any member of your family suffer from any disease? ? (yes [   ] / no)

How many elders in your family?

2. House Data

Household Tenure	□ owner	□ Tenant (…….. EGP.)

289

How many rooms do you have in your house?   □one   □two

                                                 □three   □more than three

Unit size: …..m2

3. External Social ties

How often do you see or visit the members of your family?

□ lives in the same household   □ Daily   □ At least several times a week

□ At least once a week   □ At least once a month   □ Several times a year

□ Less often

About how long would it take you to get to where the members of your family live?

□ less than 15 minutes   □ between 15 and 30 minutes   □ between 30 minutes and 1 hour

□ between 1 and 2 hours   □ between 2 and 3 hours   □ over 3 hours

How many close friends do you have outside your neighborhood?

How often do you visit your closest friend?

□ Never   □ Sometimes   □ A lot

How many of these friends are people you work with now?

What factors prevent you from meeting up with family or friends more often?

□ lack of time due to paid work   □ lack of time due to childcare responsibilities

□ lack of time due to other caring responsibilities   □ poor public transport   □ other

4. Social Interaction within the neighborhood

Do you know people living in this neighborhood? If no, why?

□ Yes   □ No:

How many people do you know by name in the neighborhood?

How many people do you know by name within your urban block/ house?

How often do you visit people living in your neighborhood?

290

□ Never □ Sometimes □ A lot

5. Place of interaction (Please scale 1-5)

Streets and alley ways	○	○	○	○	○
Cafes/ local shops	○	○	○	○	○
Open spaces (squares)	○	○	○	○	○
Windows/ balconies	○	○	○	○	○
Building entrance	○	○	○	○	○

6. Walking and Safety

How often do you see people you know when you walk? (rarely/ sometimes/ a lot)

How often do you see strangers when you walk? (rarely/ sometimes/ a lot)

Do you feel safe walking in your neighborhood during the evening (Yes, No)

Which streets do you prefer for walking? (commercial streets, non-commercial streets)

Do you feel it safe to leave children and toddlers playing in the street? (yes, no)

7. Why did you select this place for living?

□ searching for job opportunity   □ it is my birth place

□ Cheaper housing   □ it is close to my work

□ searching for better place   □ my relatives are living here

□ Other

8. Sense of Community/ social solidarity

Do you have any concerns for your neighborhood? You may tick more than one box:

□ Anti –social behavior	□ Poor police presence	□ unsafe
□ Safe and secure	□ Comfortable	□ uncomfortable
□ crowded	□ not crowded	□ clean
□ dirty	□ familiar	□ strange

In which situation of the following do you cooperate with your neighbors?

□ Death	□ Wedding	□ Disasters
□ Birth	□ other	

How much support would you get from your neighbors in the hard

times?

□ A lot □ Sometimes □ Never

What is the nature of the relationship between you and your neighbors?

□ Strong relation □ bad relations □ weak relations

□ No relations at all □ in between

Do you have any problem with your neighbors?

□ Yes □ No

If yes, what kind of problems do you have with your neighbors?

Have you made new friends by living here?

□ No □ Yes

If yes, how did you recognize to them?

□ due to my child/ children □ we met at public spaces (cafes/ local shops/ public squares) □ due to work

□ due to participation in social activities within the neighborhood

Are you planning to leave this area?

□ no □ yes

If yes, why?

□ fear of dwelling collapse □ lack of services □ problems with neighbors

□ problems with dwelling owner □ other

9. Do you find it easy to commute somewhere from your neighborhood? (yes, no)

10. Which mode of transport do you usually use to commute your work from this neighborhood?

□ Walking □ public transport □ private car

11. What do you most like about this neighborhood?

12. What do you most do not like about this neighborhood?

13. Could you, please, locate the least favorite spot in your neighborhood?

Why:

14. Where do you go to when you are sick?

15. Which school do your children/ brothers go to?

c) The applied survey form

1. Basic information /socio-economic characteristics

Gender :	(1) Male	(2) Female
Age:		
Origin	(1) Greater Cairo (2) Upper Egypt (3) Delta	
Birth place:	(1) Greater Cairo (2) Upper Egypt (3) Delta	
Marital status	(1) Single	(2) Married
	(3) Divorced	(4) Widow
Education	(1) No qualification	(2) Primary school qualification
	(3) Preparatory school qualification	(4) Secondary school qualification
	(5) Higher school qualification	(6) College (Bachelors)
	(7) Postgraduate (Masters/PhD)	
Occupation	(1) worker/farm worker	(2) artisan
	(3) shop keeper	(4) street vendor
	(5) student	(6) housewife
	(7) unemployed	(8) retired
	(9) government employee	(10) engineer
	(11) private sector employee	(12) accountant
	(13) photographer	(14) other
Workplace	(1) Inside the area	(2) Out of the area:
	(3) Both inside and outside the area	

Since when do you live here? (1)less than 5 years, (2) 5-10 years, (3) 10-15 years, (4) 15 -20 years, (5) more than 20 years)

2. House Data

Household Tenure	(1) owner	(2) Old law tenant (…….. EGP.)
	(3) New law tenant (…….. EGP.)	

How many rooms do you have in your house?

Unit size: …..m2

3. How often do you see or visit the members of your family?

(1) Daily   (2) At least several times a week

(3) At least once a week   (4) At least once a month   (5) Several times a year

(6) Less often

4. About how long would it take to get to where the members of your family live?

(1) less than 15 minutes   (2) between 15 and 30 minutes   (3) between 30 minutes and 1 hour

(4) between 1 and 2 hours   (5) between 2 and 3 hours   (6) over 3 hours

5. How many close friends do you have outside your neighborhood?

6. How often do you visit your closest friend?

(1) Never   (2) Sometimes   (3) A lot

7. How many of these friends are people you work with now?

8. Do they all belong to your social class? (1) No (2) Yes

9. Which factor prevents you from meeting up with family or friends more often?

(1) lack of time due to paid work   (2) lack of time due to childcare responsibilities

(3) lack of time due to other caring responsibilities   (4) poor public transport   (5) lack of money for visit

10. Sense of Community

10.1. Social Connections

How many people do you know by name in the neighborhood? (1) Never
(2) Few
(3) A lot

How many people do you know by name within your urban block/ house?

(1) Never   (2) Few   (3) A lot

How often do you visit people living in your neighborhood?

(1) Never   (2) Sometimes   (3) A lot

10.2. Mutual Concerns

I care about my neighborhood (1) I disagree   (2) Neither agree nor

disagree   (3) I agree

In which situation of the following do you cooperate with your neighbors? You may tick more than one number:

(1) Death   (2) Wedding   (3) Disasters

(4) Birth

How much support would you get from your neighbors in the hard times?

(1) Never   (2) Sometimes   (3) A lot

What is the nature of the relationship between you and your neighbors?

(1) bad relations   (2) No relations at all   (3) weak relations

(4) in between   (5) Strong relation

11. If there are no financial constraints, would you plan to leave this area?

(1) No   (2) Yes

If yes, why? You may tick more than one box:

□ fear of dwelling   □ lack of services   □ problems with
collapse   neighbors

□ problems with   □ looking for better future
dwelling owner

12. Place of interaction You may tick more than one box:

Streets and alley ways

Cafes

local shops and
workshops

Open spaces (squares)

Windows/ balconies

Building entrance

13. Walking and Safety

How often do you see people you know when you walk? (1) rarely (2) sometimes (3) a lot

Do you feel safe walking in your neighborhood during the evening?
 (1) No   (2) Yes

Which streets do you prefer for walking? (1) commercial streets (2) non-commercial streets

Do you feel it safe to leave children and toddlers playing in the street?
(1) No   (2) Yes

14. Why did you select this place for living?

                              (1) searching for job   (2) it is my birth place

opportunity

(3) Cheaper housing   (4) it is close to my work

(5) searching for better place   (6) my relatives are living here

(7) Other

15. Which mode of transport do you usually use to commute your work from this neighborhood?
(1) Walking   (2) public transport   (3) private car
(4) both walking and public transport

16. What do you most like about this neighborhood? (1) social solidarity
(2) neighborhood location (3) other

17. What do you most do not like about this neighborhood? (1) Garbage
(2) drugs and thugs (3) lack of services (4) other

18. Where do you go to when you are sick?

Decoding the questionnaires

All questions were coded according to the choice number in the above survey form except yes and no questions as 0 was assigned to no, whilst 1 was given to yes. Further, questions with no choice such as age and the like are all continuous variables.

d) Reliability analysis for sense of community (Cornbach's alpha)

Reliability Statistics

Cronbach's Alpha	N of Items
.823	10

Item Statistics

	Mean	Std. Deviation	N
How many people do you know by name in the neighborhood?	2.5000	.53318	300
How many people do you know by name within your urban block/ house?	2.6200	.51945	300
How often do you visit people living in your neighborhood?	1.3267	.59537	300
I care about my neighborhood	2.3867	.89433	300
Death	.9200	.27175	300
Wedding	.8000	.40067	300
Disasters	.8567	.35100	300
Birth	.0333	.17981	300
How much support would you get from your neighbors in the hard times?	2.6067	.66339	300
What is the nature of the relationship between you and your neighbors?	4.1267	1.02671	300

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
How many people do you know by name in the neighborhood?	15.6767	11.658	.519	.806
How many people do you know by name within your urban block/ house?	15.5567	11.445	.602	.798
How often do you visit people living in your neighborhood?	16.8500	12.028	.351	.822
I care about my neighborhood	15.7900	9.805	.576	.805
Death	17.2567	12.673	.561	.813
Wedding	17.3767	11.754	.698	.797
Disasters	17.3200	12.158	.633	.804
Birth	18.1433	13.662	.103	.832
How much support would you get from your neighbors in the hard times?	15.5700	10.212	.750	.778
What is the nature of the relationship between you and your neighbors?	14.0500	8.850	.643	.802

Factor Analysis

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.819
Bartlett's Test of Sphericity	Approx. Chi-Square	1495.789
	df	36
	Sig.	.000

Total Variance Explained

Compon ent	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.480	49.780	49.780	4.480	49.780	49.780	3.591	39.901	39.901
2	1.422	15.805	65.585	1.422	15.805	65.585	2.312	25.684	65.585
3	.846	9.400	74.985						
4	.688	7.646	82.631						
5	.548	6.089	88.720						
6	.421	4.681	93.401						
7	.252	2.798	96.199						
8	.179	1.986	98.186						
9	.163	1.814	100.000						

Extraction Method: Principal Component Analysis.

Scree Plot
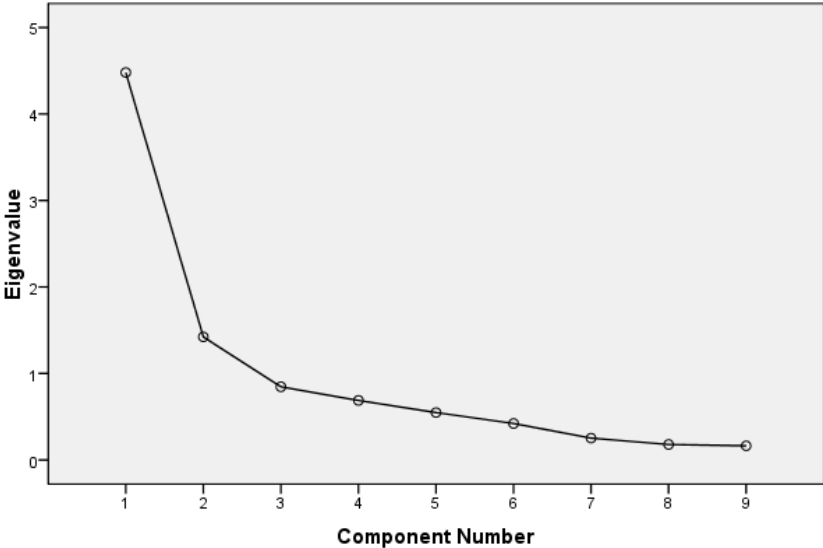
Communalities

	Initial	Extraction
How many people do you know by name in the neighborhood?	1.000	.806
How many people do you know by name within your urban block/ house?	1.000	.810
How often do you visit people living in your neighborhood?	1.000	.336
I care about my neighborhood	1.000	.437
Death	1.000	.615
Wedding	1.000	.804
Disasters	1.000	.792
How much support would you get from your neighbors in the hard times?	1.000	.749
What is the nature of the relationship between you and your neighbors?	1.000	.552

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
How much support would you get from your neighbors in the hard times?	**.850**	-.162
Wedding	**.824**	-.354
Disasters	**.785**	-.419
What is the nature of the relationship between you and your neighbors?	**.742**	

302

Death	**.719**	-.314
How many people do you know by name within your urban block/ house?	**.663**	.608
I care about my neighborhood	**.658**	
How often do you visit people living in your neighborhood?	**.411**	.409
How many people do you know by name in the neighborhood?	.594	**.673**

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Pattern Matrix^a

	Component	
	1	2
Disasters	**.942**	-.149
Wedding	**.923**	
Death	**.809**	
How much support would you get from your neighbors in the hard times?	**.795**	.143
What is the nature of the relationship between you and your neighbors?	**.617**	.229
I care about my neighborhood	**.468**	.309
How many people do you know by name in the neighborhood?		**.918**
How many people do you know by name within your urban block/ house?		**.876**

How often do you visit people living in your neighborhood?		**.576**

Extraction Method: Principal Component Analysis.

 Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 4 iterations.

Rotated Component Matrix[a]

	Component	
	1	2
Disasters	**.887**	
Wedding	**.885**	.146
How much support would you get from your neighbors in the hard times?	**.803**	.322
Death	**.775**	.123
What is the nature of the relationship between you and your neighbors?	**.647**	.365
I care about my neighborhood	**.519**	.410
How many people do you know by name in the neighborhood?	.137	**.887**
How many people do you know by name within your urban block/ house?	.231	**.870**
How often do you visit people living in your neighborhood?	.126	**.566**

Extraction Method: Principal Component Analysis.

 Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

One-factor solution

Component Matrix[a]

	Component
	1
How much support would you get from your neighbors in the hard times?	.850
Wedding	.824
Disasters	.785
What is the nature of the relationship between you and your neighbors?	.742
Death	.719
How many people do you know by name within your urban block/ house?	.663
I care about my neighborhood	.658
How many people do you know by name in the neighborhood?	.594
How often do you visit people living in your neighborhood?	.411

Extraction Method: Principal Component
Analysis.

a. 1 components extracted.
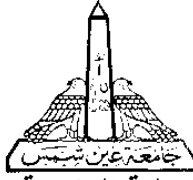
كلية الهندسة

قسم التخطيط العمراني

التأثيرات المتبادلة بين العوامل الفراغية والعوامل الاجتماعية والاقتصادية في المناطق العشوائية

رسالة مقدمه للحصول على درجة دكتوراه الفلسفة

في الهندسة المعمارية (التخطيط العمراني)

إعداد

عبدالبصير عبدالرحيم محمد السيد

حاصل على ماجستير العلوم في الهندسة المعمارية
(التخطيط العمراني)
كلية الهندسة, جامعة عين شمس, 2010

المشرفون

أ.م.د. مروة أبوالفتوح	أ.د محمد عبدالكريم صالحين
استاذ مساعد بقسم التخطيط والتصميم العمراني بكلية الهندسة جامعة عين شمس	أستاذ بقسم التخطيط والتصميم العمراني بكلية الهندسة جامعة عين شمس
أ.د كرستين كولرت	أ.د يوهانز هامهبر
استاذ بالمدرسة العليا لتصميم وسائل الاعلام بميونخ	استاذ بجامعة كولن للعلوم التطبيقية بألمانيا

2015

الموافقة على المنح

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إعداد

عبدالبصير عبدالرحيم محمد السيد

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أ.م.د/ مروة أبوالفتوح السيد خليفة

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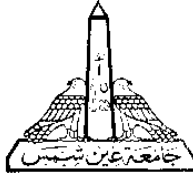
كلية الهندسة

قسم التخطيط العمرانى

<u>رسالة الدكتوراه:</u>

اسم الطالب   : عبدالبصير عبدالرحيم محمد السيد

عنوان الرسالة : التأثيرات المتبادلة بين العوامل الفراغية والعوامل الاجتماعية والاقتصادية في المناطق العشوائية

اسم الدرجة   :   دكتوراه الفلسفة فى الهندسة

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أ.م.د/ مروة أبوالفتوح السيد خليفة

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تاريخ البحث : ..../.............../..............

<u>الدراسات العليا:</u>

ختم الإجازة: اجيزت الرسالة بتاريخ   :

........./.............../.............

موافقة مجلس الكلية : ..../.............../...........

موافقة مجلس الجامعة : ..../.............../............

إقــــــرار

هذه الرسالة مقدمة إلى جامعة عين شمس للحصول على درجة الدكتوراه في الهندسة المعمارية – قسم التخطيط العمراني.

إن العمل الذي تحتويه الرسـالة قد تم إجراؤه بمعرفة الباحث في قسـم التخطيط العمراني بكلية الهندسة جامعة عين شمس في الفترة الواقعة بين 2012 – 2015 .

هذا ولم يقدم أي جزء من البحث لنيل أي مؤهل او درجة علمية لأي معهد علمي آخر.

وهذا إقرار مني بذلك ....

التوقيع :

الإسم: عبدالبصير عبدالرحيم

محمد

التاريخ: /   /

تعريف بمقدم الرسالة

الاسم	:	عبدالبصير عبدالرحيم محمد السيد
تاريخ الميلاد	:	1983/06/14
محل الميلاد	:	كفر صقر – محافظة الشرقية
اخر درجة جامعية	:	ماجستير العلوم في الهندسة المعمارية (تخطيط عمراني)
الجهة المانحة	:	كلية الهندسة – جامعة عين شمس
تاريخ المنح	:	2010
الوظيفه الحالية	:	مهندس معماري

مستخلص

يسعى هذا البحث إلى إثبات أن العوامل الإجتماعيه والإقتصاديه تعتمد بشكلٍ كبير على المتغيرات الفراغيه. وأن القاهره بوصفها مدينة متنوعه، حيث يعيش الأغنياء والفقراء بجانب بعضهم البعض، قد تم اختيارها كحالة دراسيه لاختبار العديد من المداخل والنظريات المتنوعه.

انطلاقاً من الدراسات السابقه المتعلقه بدراسة العلاقه بين العوامل الفراغيه والنواحي الاجتماعيه يطور هذا البحث إطاراً مفاهيمياً مستنبطاً من نظرية التركيب الفراغي لدراسة العلاقة التبادلية بين متغيرات الموقع العمراني والأبعاد الاجتماعية والاقتصادية على مستوى كل من المدينة والمجاورة السكنية. ويستخدم البحث أربع طرق لتغطية الإطار المفاهيمي المقترح. هذه الطرق هي نظرية التركيب الفراغي, الدراسة الحقلية والملاحظة, الاستبيان, و تحليل التقارير. بعد عرض النظريات والمداخل المختلفة المتعلقة بالقضايا العمرانية والاجتماعية يقدم فصل منهجية البحث توضيحا مفصلاً لطرق البحث المنتقاه.

يحتوي الجزء العملي من الرساله على ثلاثة فصول أحدها يستكشف العلاقه بين العوامل الفراغيه والظروف الاجتماعيه والاقتصاديه لسكان القاهره على مستوى كل من المدينه والمجاورة السكنيه. وثاني تلك الفصول يستكمل نتائج الفصل السابق من خلال استكشاف العلاقة بين العوامل الفراغيه وكل من معدل حركة المشاه وتوزيع الأنشطه التجاريه. بينما يوضح الفصل الثالث من الجانب العملي للبحث مرحلة التفسير للنتائج المستنبطه من الفصلين السابقين حيث يعتمد على تحليلات وصفيه لثلاثمائة ورقة استبيان لحالات الدراسه. إن الغرض من هذا الاستبيان هو فهم التركيب الاجتماعي ونوع التضامن الاجتماعي والإرتباط بالمكان ودرجة الإحساس بالأمان ومعرفة طبيعة العلاقات الاجتماعيه لسكان المناطق العشوائيه لإستنباط مدى الفصل الاجتماعي ودرجة التطابق بينه وبين الفصل العمراني الذي تم قياسه بإستخدام نظرية التركيب الفراغي في الفصلين السابقين. وقد اختار الباحث ثلاث حالات دراسة لهذا الغرض وهم عزبة بخيت بحي منشأة ناصر وعزبة النصر بحي البساتين وأبو قتادة بحي بولاق الدكرور. تمثل كل من عزبة بخيت وعزبة النصر مثالاً للمناطق العشوائيه المنشأه على الأراضي الصحراويه المملوكه للدوله بينما تمثل أبو قتادة مثالاً للمناطق العشوائيه المقامه على أراض زراعية مملوكه للأفراد. تختلف حالات الدراسه من حيث شكل النسيج العمراني

وطبوغرافية الأرض والموقع العام من المدينه بينما تتشابه المناطق الثلاث في المساحه والمورفولوجيا الاجتماعيه وبعض الخصائص الديموجرافيه.

وقد أوضحت نتائج البحث على مستوى المدينه أن هناك علاقة إحصائية دالة بين العوامل الفراغيه والفوارق الاجتماعيه والاقتصاديه. كما وجد أن المناطق العشوائيه لها نسيج عمراني كثيف ومزدحم على النطاق المحلي بحيث يمكن تمييز تلك المناطق المعزولة أو المحرومه عن المناطق المحيطة بها. ومن ناحية أخرى فقد أوضحت النتائج أن الأنشطة الاقتصادية مثل المحلات التجاريه والورش الصناعيه تتشكل داخل البيئه العمرانيه طبقا لدرجة الترابط بين الفراغ العمراني والفراغات المحيطه به وطبقا لإمكانية الوصول من مكان الى آخر.كما أثبتت النتائج أيضا وجودعلاقه إحصائيه داله بين العوامل الفراغيه ومعدلات حركة المشاه. وعلى الجانب الآخر فقد أوضحت نتائج المسح الاجتماعي أن المناطق العشوائيه بشكل عام تعاني التهميش وأن العلاقات الاجتماعيه لتلك المناطق قاصره على الحدود العمرانية القويه التي تساهم بدور ها في تفتيت المجال العمراني العام للمدينة ككل وفصل فئات وطبقات المجتمع المختلفه عن بعضها البعض.

مما سبق يتضح أن كل من الفصل الاجتماعي والعمراني وثيقي الصله ببعضهما البعض. وعلى ما يبدو فإن الفصل العمراني يزيد من الفصل الاجتماعي وبالتالي فإن تحسين التكامل الفراغي سيزيد من التكامل الاجتماعي والاقتصادي.

إن سياسات التنميه العمرانيه المتبعة حالياً مثل الليبراليه الجديده وتشجيع إنشاء المجتمعات المغلقه تساهم في خلق الظروف الفراغيه التي تزيد من الفصل الاجتماعي بين فئات المجتمع المتنوعه بالقاهره. إن تبني استراتيجيه عمرانيه جديده قائمه على تحسين شبكة الطرق بالمناطق العشوائيه وربطها جيداً بالمجتمعات الرسميه وبباقي أجزاء المدينه ككل سيساهم في تقليل الفصل العمراني والذي بدوره سيساهم في تقليل العزل والتهميش الإجتماعي.

الكلمات المفتاحية: صيغة التركيب الفراغي, المناطق العشوائيه, الفصل الإجتماعي, الفصل العمراني.

مقدمة

تعد القاهره إحدى اكثر المدن كثافة سكانيه في كل من أفريقيا والشرق الأوسط وهي مثال واضح لإقليم عمراني متعدد المراكز مع نقص في النواحي الاجتماعيه والاقتصاديه. إن التحضر السريع لهذا الإقليم أدى الى تجزأة الهيكل العمراني فأصبح شبيها بمجموعة من الجزر الصغيرة المفصولة عن بعضها البعض بحواجز طبيعية قوية. إن الأسوار والطرق السريعه والكباري والمواقع العسكريه والواجهات المائيه المهجوره وأماكن انتظار السيارات والأراضي الفضاء جميعها تساهم في الفصل العمراني بين أجزاء الاقليم المختلفة. بل إنه لا يوجد مجال عام من الفراغات العمرانيه لربط المجتمعات المختلفه ببعضها ولكننا على العكس من ذلك نجد أن كل فئه إجتماعيه تعيش في مقاطعه منفصله.

إن الاسكان اللارسمي يبدو السمة الغالبه للتحضر في اقليم القاهرة الكبرى. وانه ينشأ غالباً على أطراف الكتله العمرانيه على أراضٍ الزراعيه أكثر منه على أراضٍ صحراويه. ويعيش مايقارب من 65% من سكان الإقليم في مناطق عشوائيه. ولا زال التعدي على الأراضي الزراعيه المتاخمه للقاهره يزداد رغم جهود الحكومه للحد من هذا النمو غير المخطط.

ان ظاهرة الإسكان العشوائي بدأت في إقليم القاهرى الكبرى بعد الحرب العالميه الثانيه كنتيجة للهجره من المناطق الريفية في الدلتا والصعيد الى القاهرة. ويسعى المهاجرون الى الحصول على فرص عمل أفضل حيث ان الرواتب اعلى في القاهرة منها في باقي المدن المصرية. ويمثل الشباب الشريحه الأكبر من المهاجرين وبالتالي فإن لديهم غالباً إحتياجات بسيطه وهو الأمر الذي ساعدهم على التعايش سوياً وتقاسم الشقق أو الغرف المؤجره في المناطق التاريخيه من المدينه. وبعد ادخار بعض المال فإن بعض المهاجرين قد أصبح قادراً على شراء أرضاً على أطراف المدينه للبناء عليها حيث أن أسعار الأراضي على الأطراف أرخص منها في الأحياء المركزيه. وبالتوازي مع تلك الظاهره فإن ظاهرة الامتداد العشوائي على الأراضي المملوكة للدوله قد ظهرت على الأطراف الشرقيه من القاهره ومثال ذلك حي منشية ناصر.

وقد بدأت المرحلة الأولى من التوسع العمراني على الاراضي الزراعية في الستينات من القرن الماضي وفي الأجزاء الغربيه والشماليه من القاهره حيث يقوم الفلاحين ببيع أراضيهم حيث أن المضاربه العقاريه كانت أكثر جدوى وأكبر عائداً من استغلال الأرض

في الزراعه. ونتيجه للتحضر السريع فإن العديد من القرى المتاخمه للقاهره قد تم ابتلاعتها لتصبح جزء من النسيج العمراني للمدينه.

إن مشكلات الفصل الاجتماعي وضعف شبكة النقل ونقص الخدمات تظهر بوضوح في المناطق المركزية المتدهورة بالإقليم وانها بحاجة الى ان تكون محل دراسه متعمقه.
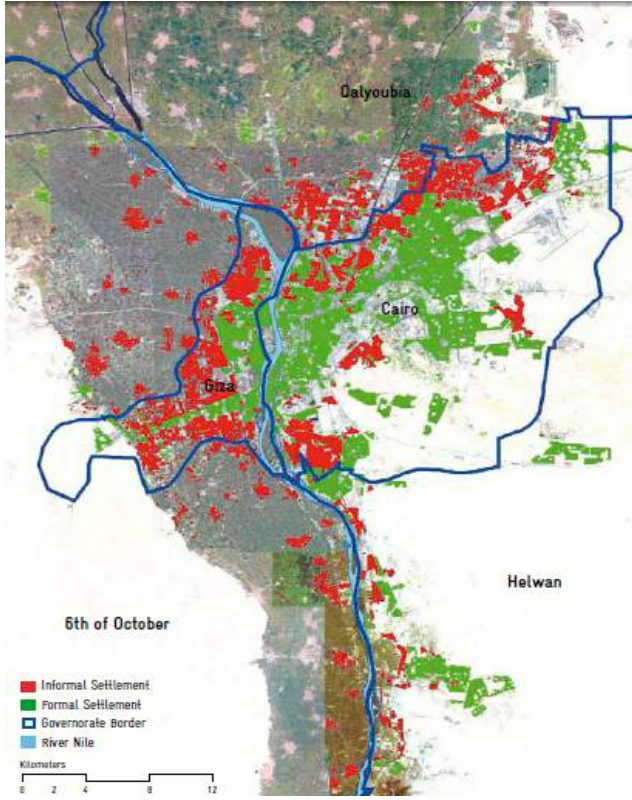
شكل 1: المناطق العشوائية بإقليم القاهرة الكبرى تبدو وكأنها حزام من الفقر يحيط بالاقليم

مشكلة البحث

شهدت القاهرة في القرن الماضي تحضرا سريعا يتسم بتنمية عمرانية غير متواصله مما أنتج مجموعة من المدن الأصغر غير المتناغمه مع بعضها البعض حيث الفرق الملحوظ في الطابع المعماري والعمراني والتفاوت الكبير في الظروف الاجتماعيه والاقتصاديه

والنواحي الثقافيه للسكان. فعلى سبيل المثال نلاحظ العديد من التناقضات بعمران القاهره حيث الإسكان الرسمي واللارسمي والريفي والعمراني والمناطق الغنيه والفقيره. إن هذا التنوع الكبير يمكن ملاحظته داخل كل فئة من الفئات السابقه فنجد على سبيل المثال أن الأجزاء الرسميه أو المخططه من المدينه تضم أنسجه عمرانيه متنوعه طبقاً للحقب التاريخية المختلفة مثل الحقب الاستعماريه والمعاصره. بالمثل، تشمل المدينه اللارسميه المناطق المنشأه على أراض زراعيه وتلك المبنيه على أراض صحراويه مملوكه للدوله. بالمثل أيضاً فإن المناطق المفصوله عمرانياً يمكن أن تكون مجتمعات مغلقه حيث الرفاهيه أو مناطق جيتو حيث الفقر والتهميش الإجتماعي والإقتصادي. إن كل تلك التصنيفات تعكس التنوع الهائل ومدى غياب العداله الإجتماعيه بالإقليم وتمثل تحدياً كبيراً لسياسات وإستراتيجيات التنميه العمرانيه بالمستقبل.

مما سبق يمكن القول ان مشكلة البحث تتمثل في أن نمو القاهره لم يكن متواصلاً ولم يكن وفق خطة واضحه لذا نجد العديد من المناطق الفقيره تتواجد في مواقع استراتيجيه من حيث قربها من وسط المدينه والمناطق الحيويه ومع ذلك فإن تلك المناطق الفقيره ذات المواقع الاستراتيجيه إقتصاديا لم تحقق الاستفاده المرجوه من مواقعها ومازالت تعاني الفقر والسؤال الذي يطرح نفسه الآن هو لماذا لم تتحسن ظروف تلك المناطق رغم ما تتمتع به من موقع استراتيجي داخل المدينه؟ إن هذا بدوره يتطلب بحثاً متعمقاً لفهم دور العوامل الفراغيه في نشؤ تلك المناطق المهمشه إجتماعيا وإقتصاديا. إن الفرضيه الأساسيه لهذا البحث تتمثل في وجود علاقة خطيه بين الفصل الإجتماعي والإقتصادي كعاملاً تابعا وبين الترتيب الفراغي الكلي للمنطقه العمرانيه كعامل مستقل. ولإستكشاف تلك العلاقه بين هذين العاملين فقد تم ربط البيانات الإجتماعيه و الإقتصاديه بأحدث قياسات نظرية التركيب الفراغي. ويقصد بالفصل الإجتماعي والإقتصادي في هذا البحث دليل الحرمان والذي بدوره يتألف من خمس خصائص إجتماعيه وإقتصاديه وهي معدل توقع الحياه ومعدل الأميه ونسبة البطاله ونسبة السكان تحت مستوى خط الفقر وأخيراً الفجوه في مستوى المعيشه. كما يقصد بالفصل أيضاً العمليه التي يتم فيها عزل فئه إجتماعيه معينه عن باقي فئات المجتمع بالنسبة للحقوق والموارد والعلاقات والقدرات.

شكل 2: دليل الحرمان بمحافظة القاهره طبقا لتقرير التنمية البشرية عام 2008

وتعد المناطق العشوائيه بالقاهره مثالاً جيداً لدراسة تأثير النسيج العمراني على النواحي الإجتماعيه والإقتصاديه. وقد ابتلع التحضر السريع على أطراف المدينه العديد من القرى خلال الخمس عقود الماضيه وأنتج فروقا قويه بين المناطق المخططه وغير المخططه في النواحي الطبيعيه والإجتماعيه.

حاولت الحكومة المصريه الحد من ظاهرة الإسكان اللارسمي بمنع إمداد المرافق لأولئك الذين ليس لديهم تصاريح بناء أو لأولئك الذين لا يستطيعون تقديم ما يثبت قانونية البناء. وفي ذات الوقت فإن الحكومة قد قدمت مقترحات عده صممت مع جهات مانحة لحل مشكلة الإسكان غير الرسمي. ومع ذلك فإن تلك الجهود كانت مخيبه للآمال (,Simth) 2009 وفي نهاية المطاف فإن الدوله قد قررت الإعتراف بعدد من المناطق العشوائيه مثل منشية ناصر متبنيةً أسلوب التنميه بالمشاركه في التطوير. إن مبادرة التنميه بالمشاركه قد تم تشجيعها وتمويلها بواسطة وزارة التنميه والتعاون الإقتصادي الألمانيه. إن برنامج التنميه بالمشاركه قد تم رعايته بواسطة الحكومه الألمانيه ووزارة التنمية

الإقتصاديه المصريه. وقد قام كل من البنك الألماني (KFW) وهيئة المعونه الألمانيه (GTZ) بالتعاون مع الحكومه المصريه لتحسين الظروف المعيشيه لسكان المناطق العشوائيه حيث قام البنك الألماني بتمويل الإمداد بشبكة المرافق من الماء والكهرباء والصرف الصحي. ويرى البعض أن النتائج الايجابيه للمشروع يعود الفضل فيها للبنك الألماني وليس لمشروع التنميه بالمشاركة المتبنى من قبل هيئة المعونة الألمانيه (Piffero, 2009). وأخيراً فقد ركز برنامج التنميه بالمشاركه في دراسته على تحديد الظروف العمرانيه والإجتماعيه والإقتصاديه بحالات الدراسه التجريبيه دون أخذ النواحي المكانيه والفراغيه في الإعتبار.

ركزت العديد من الدراسات على مدى جودة الحياة بالمناطق العشوائية وقد حددت تلك الدراسات نقاط الضعف في مدخل التنمية بالمشاركة. وفي دراساتها عن المناطق العشوائية عام 1987 فقد حددت جليلة القاضي (1987) عدة عوامل يمكن ان تساهم في تشجيع او اعاقة عملية التنمية ومن تلك العوامل الحيازة الآمنة والدخل والهجرة والتعليم وغيرها من العوامل غير ان العوامل الاجتماعية وحدها لا تستطيع أن تعطي تفسيراً كافياً للدرجات المختلفة من الفقر والحرمان داخل المناطق العشوائيه. ولتوضيح ذلك فإن عاملاً مثل الحيازه غير الآمهة للمسكن ربما يعتقد بأنه يعيق تحسين الظروف الإجتماعيه والإقتصاديه لسكان المناطق الفقيره حيث أن إحتمالات الإخلاء الجبري للسكان ربما لا تشجع الاستثمار بتلك المناطق غير أن الحجم الكبير للمناطق الفقيره يساهم في زيادة المقاومة المدنية ضد الاخلاء الجبري لسكان تلك المناطق وبالتالي يحول مسألة الحيازه الى مجرد مشكله مكانيه لا تعيق التنميه والإستثمار. ومن ناحية أخرى فليست المناطق الفقيرة جميعها تفتقر للحيازة الآمنه حيث توجد مناطق اسكان غير رسمي على الأراضي الزراعيه المملوكة للأفراد بالقاهره الكبرى. إن هذا بلا شك قد ترك مجالاً لإفتراض أن العوامل الفراغيه يمكن أن يكون لها تاثير كبير في التنميه العمرانيه وفي ظهور الفوارق الإجتماعيه والإقتصاديه. ولتلخيص ماسبق نقول بأن العوامل الفراغيه تبدو مؤثره في التنميه العمرانيه وإن حجم الأثر الذي تلعبه ينبغي قياسه. وبهذا المعنى فإن الفصل العمراني من المفترض أن يعيق تحقيق العداله في المدن. ومع ذلك فإن الفصل العمراني لا يمكن تصنيفه على أنه ظاهره جيده أو سيئه حيث يجب أن نفرق بين نوعين من الفصل الاجتماعي: الأول هو الفصل الإرادي حيث ترغب الفئات الغنيه أن تعزل نفسها في مجتمعات مغلقه حيث أن علاقتها مستقله عن الفراغ العمراني بمعنى أن انعزل تلك الطبقه لا يؤثر على إمكانية وصولها للعمل او لأماكن الخدمات حيث أن السيارة أو تكنولوجيا الإتصالات تتغلب على بعد المسافه. النوع الثاني من الفصل أو الانعزال

الإجتماعي وهو الفصل الإجباري حيث يضطر محدودي الدخل من المجتمع أن يعيشوا في أحياء مفصوله عمرانياً بحدود قويه مثل خطوط السكك الحديديه والمترو والترع والكباري سواءً بالقرب من قلب المدينه أو على أطرافها وهذه الطبقه على خلاف الطبقه الغنيه تعتمد بشكل جوهري على الفراغ العمراني في حياتها اليومية من ذهاب إلى العمل أو تسوق أو غيرها وفصلها بهذه الطريقه في أماكن شبه منعزله يؤثر عليها بشكل سلبي. وإنه من غير الواضح اذا ما كانت نتائج الدراسات السابقة التي تفيد بأن الفصل العمراني يمكن أن يؤدي إلى الفصل الإجتماعي والإقتصادي يمكن تعميمها على مدينةٍ مجزأه ومتنوعه كالقاهره حيث نجد ان كثير من مناطق الفقر تتواجد في أماكن حيويه بالمدينه نتيجه لظاهرة التنميه غير المتواصله وللتحضر السريع الذي يبتلع الكثير من القرى وبذلك نجد الأغنياء والفقراء يعيشون بجانب الى جانب.

اسئلة البحث

هناك تساؤل رئيسي بالبحث وهو:

- ماهي العلاقه بين الفصل الإجتماعي والإقتصادي وبين الترتيب الفراغي لمنطقة ما؟

كما توجد عدة أسئلة فرعيه وهي:

- ماهي القوى التي أثرت في التنمية العمرانية للقاهرة عبر التاريخ؟
- الى أي مدى تعد المناطق المحرومة متكاملة ومترابطة فرايغا على كل من مستوى المجاورة والمدينة ككل؟
- هل هناك علاقة بين الفصل العمراني والفصل الاجتماعي والاقتصادي؟
- الى اي مدى يندمج ويتفاعل سكان العشوائيات اجتماعيا واقتصاديا على مستوى كل من المجاورة السكنية والمدينة؟

فرضية البحث

توجد فرضيتان رئيسيتان لهذا البحث وهما:

- إن الفصل العمراني على مستوى المدينة يزيد من الفصل الاجتماعي والاقتصادي. بمعنى آخر فإن ظهور الفوارق الاجتماعية والاقتصادية يرتبط ارتباطا وثيقا بالتكوين الفراغي للبيئة العمرانية.

- إن التكامل الفراغي على مستوى المبنى يولد أنشطة اقتصادية صغيرة بالمناطق العشوائية الفقيرة.

أهداف البحث

يسعى هذا البحث الى اثبات ان المتغيرات الاجتماعية والاقتصادية تعتمد بقوة على العوامل الفراغية. وقد اثبتت العديد من الدراسات السابقة باستخدام القياسات العلائقية لنظرية التركيب الفراغي وجود تلك العلاقة القوية بين المتغيرات الفراغية والنواحي الاجتماعية والاقتصادية. غير ان البحث الحالي يركز على المناطق العشوائية بالقاهرة ويحاول ان يوجد مثل تلك العلاقة في مدينة متنوعة ومتناقضة كالقاهرة. كما يحاول هذا البحث باستخدام نظم المعلومات الجغرافية ربط البيانات الاجتماعية والاقتصادية بأحدث قياسات نظرية التركيب الفراغي والحصول على نتائج أفضل واكثر دقة. إن الهدف هو تحسين فهم ظهور الفوارق الاجتماعية والاقتصادية بالمناطق العشوائية بالقاهرة عن طريق أخذ المتغيرات الفراغية بعين الاعتبار. وبهذا يهدف البحث الى بناء مدخلا شاملا قائم على دمج النظريات والمداخل المتعددة لدراسة العلاقة بين المجتمع والفراغ العمراني.

نطاق وحدود البحث

إن فهم العلاقة التبادلية بين الفراغ العمراني والمجتمع ينبغي أن يتم على مستويات مختلفة تبدأ بالمبنى وتتدرج لتشمل المدينة ككل. وذلك لفهم العلاقة بين الجزء والكل وكيفية تكامل وتفاعل شبكة الطرق الرئيسية مع الشبكة الفرعية. إن نتائج الدراسه توضح كيف يؤثر كل من الفراغ العمراني والمجتمع ببعضهما البعض وسواء ما كان الفصل العمراني سيؤدي الى فصل إجتماعي وإقتصادي أم لا.

ولفهم الفوارق الفراغية والاجتماعية والاقتصادية على مستوى المدينة فقد تم تحليل التكوين الفراغي والعوامل الاجتماعية بالقاهره. كما أيضا تم اختيار ثلاث مناطق عشوائية كحالات تجريبية لدراسة متغيرات البحث بشكل مفصل. تمثل كل من منطقتي عزبة بخيت بحي منشأة ناصر وعزبة النصر بحي البساتين مثالا للاسكان العشوائي على الأراضي الصحراوية المملوكة للدولة بينما تمثل منطقة ابو قتادة بحي بولاق الدكرور بالجيزة مثالا للإسكان العشوائي على أراض زراعيه مملوكه للدوله. وتم دراسة نسبة وتوزيع الانشطة التجارية بالمناطق العشوائية الثلاثة. وتم اختيار منطقة الشركات بمدينة نصر كمجموعة ضابطة لمقارنة نتائجها بنتائج المجموعات التجريبية الثلاث. كما

تم إجراء استبيان لمعرفة النواحي الإجتماعية والإقتصادية والتفاعل والتكامل الاجتماعي بالمناطق العشوائيه ثم تم مقارنة النتائج باستبيان آخر تم إجراؤه بالأحياء المخططة بالقاهرة.

وقد مثلت النواحي الماليه تحدياً رئيسياً بهذا البحث حيث أعاقت توظيف فريق عمل لإجراء الدراسات الحقليه غير أن تلك العوائق الماديه لم تؤثر في ثبات وصدق نتائج الدراسه.

ماهو الجديد الذي يقدمه هذا البحث؟

لقد اثبتت الدراسات السابقة التي أجريت على عدة مناطق بأوربا(فون, 1999) وأمريكا الجنوبية (هيلير وآخرون 2000, جريني, 2000) أن الفصل العمراني يمكن أن يؤدي الى فصل اجتماعي واقتصادي. ومع ذلك فإن تلك الدراسات اعتمدت على تحليلات القياسات العلائقية بنظرية التركيب الفراغي. إن هذا البحث يستخدم كل من أحدث قياسات صيغة التركيب الفراغي وقاعدة البيانات الاجتماعية والاقتصادية ويدمج المداخل والنظريات المتعدده لاستكشاف العلاقة بين متغيرات البحث على مستوى كل من المجاورة السكنية والمدينة. ومن ناحية أخرى فلا يمكن تعميم نتائج الدراسات السابقة حتى يتم اختبار متغيرات البحث على مدينة القاهرة حيث يعيش الاغنياء والفقراء جنبا الى جانب نتيجة للتنمية غير المتواصلة.

وعلى الصعيد المصري فقد درست وفاء عامر (1990) العلاقة بين الابعاد العمرانية والابعاد الاجتماعية والاقتصادية عن طريق تحليل التحولات العمرانية بالقاهرة خلال خمسة عقود (1947-186) وقد خلصت النتائج الى كل من أن كثافة الانشطة الاقتصادية إضافة الى الحالة الاجتماعية والاقتصادية يلعبون دورا هاما في ظهور الفوارق الفراغية بين فئات المجتمع المختلفة. ومع ذلك فإن دراسات عامر لم تستخدم قياسات فراغية موضوعيه كما أن تلك الدراسات لم توضح دور شبكة الطرق على مستوى كل من المجاورة والمدينة في تسهيل أو إعاقة توظيف النظام العمراني.

وأعدت سلمى أنس (2014) مؤخرا دراسة لبناء منهجية جديدة لربط وتكامل النسيج العمراني للمناطق الفقيرة بالنطاق العمراني المحيط. وقد قامت تلك المنهجية على إعادة هيكلة شبكة الطرق بمساعدة نظم المعلومات الجغرافية وصيغة التركيب الفراغي. وقد تم اختبار المنهجية الجديدة على المناطق العشوائية بمدينة الفيوم بمصر. وبعد مازالت المعرفة قاصرة بالنسبة لأسباب التدهور العمراني والاجتماعي والاقتصادي لمجاورة

ما. كما أن دارسة أنس (2014) لم تحدد الخصائص الفراغية المشتركة لمناطق الفقر على مستوى المدينة ككل ولم توضح نوع العلاقة بين العوامل الفراغية العوامل الاجتماعية والاقتصادية حيث كان الهدف الأول لتلك الدراسة كما ذكر سابقا هو إعداد منهجيه للتدخل العمراني لربط وتكامل شبكة طرق المناطق الفقيره بالبيئة العمرانيه المحيطه.

إن البحث المقدم في هذه الرساله يسترشد بالتجربة المصرية في دارسة المناطق العشوائيه إضافة إلى الإستعانه بالدراسات والمداخل النظريه والتطبيقيه على المستوى الدولي وذلك لتقديم فهم أفضل العلاقه التبادليه بين البعد الفراغي والأبعاد الإجتماعيه والإقتصاديه.
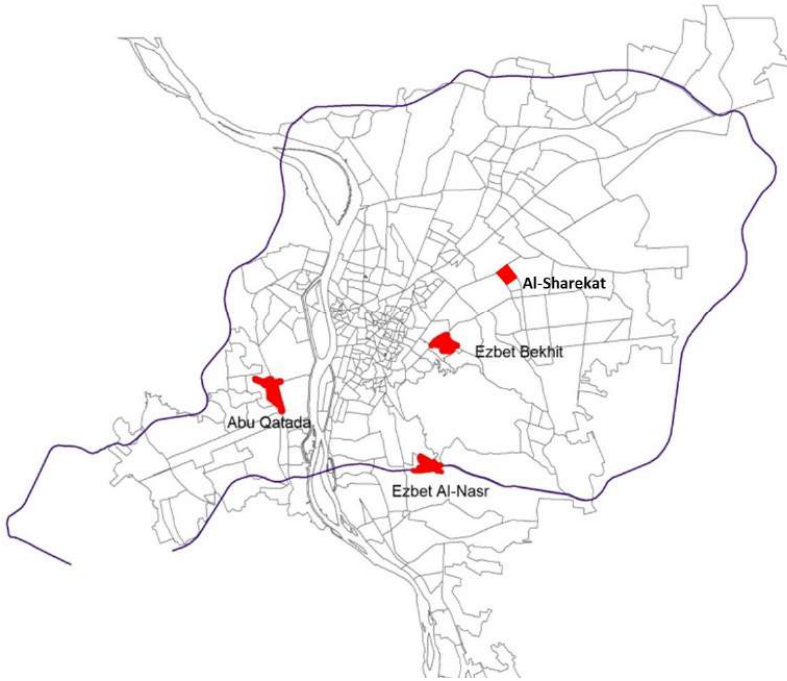
إختيار حالات الدراسة

تم اختيار اقليم القاهرة الكبرى لعدة اسباب منها أنه يحتوي القاهره التي تعكس بوضوح شكل الحياة المصريه كما أنه يعد مثالاً واضحاً لتنوع أشكال النسيج العمراني بالإضافة إلى العديد من الظروف الإجتماعية والإقتصادية المتباينة كما أنه يواجه تحديات عده مثل التحضر السريع وسيطرة السياره وعدم الإستخدام الأمثل لوسائل النقل العام وتهميش حركة المشاه. أيضاً فإن أحد الأسباب الهامه لإختيار إقليم القاهره الكبرى هو توافر المعلومات مقارنة بباقي الأقاليم المصريه الأخرى.

بالإضافة الى ما سبق فإن المناطق العشوائيه توفر المأوى لحوالي 63.6 % من سكان إقليم القاهره الكبرى. وقد تم انتقاء كل من عزبة بخيت بحي منشية ناصر وعزبة النصر بحي البساتين ومنطقة أبوقتادة بحي بولاق الدكرور من باقي المناطق العشوائيه كعينات للدراسة حيث أنهم يمثلوا الأنواع الرئيسية للإسكان العشوائي بإقليم القاهره الكبرى إضافة إلى أن لديهم بعض السمات المشتركه مثل النمو التلقائي غير المخطط والتقارب في المساحة وتاريخ النشأه كم أنهم مختلفين في نموذج شبكة الطرق في كل منهم فبينما تتخذ شبكة الطرق في أبوقتادة ببولاق الدكرور الشكل الشطرنجي المربع طبقا للتقسيم القديم للاحواض الزراعية نجد على النقيض تأخد منشية ناصر الشكل العضوي والنهايات المغلقه لتلائم طبوغرافية الأرض بينما تأخذ عزبة النصر شكلاً أكثر إنتظاما مقارنةً بعزبة بخيت حيث أن الأرض شبه مستويه بعزبة النصر. إضافة إلى ذلك فإن حالات الدراسه تقع في مواقع مختلفه من بعضها البعض داخل القاهره مما يتيح قياس أثر تغير البعد المكاني على النواحي الإجتماعيه والإقتصاديه. وأخيراً تجدر الإشاره إلى توافر معلومات جيدة عن حالات الدراسة مقارنة بباقي المناطق العشوائية بالقاهره حيث

تم اختياركلاً من حي بولاق الدكرور ومنشأة ناصر كأمثلة تجريبية أو إرشادية للعديد من المشروعات.

وقد اختار الباحث منطقة الشركات بمدينة نصر كعامل ضابط يمكن مقارنته بالمناطق العشوائية الثلاث. ويرجع اختيار منطقة الشركات لعدة أسباب منها: 1) أنها منطقه مخططه ذات مركز خدمات واضح. 2) أن مساحتها مقاربه إلى حد ما لمساحة كل منطقة من المناطق العشوائيه المنتقاه. 3) أن حدودها الإدارية متطابقة مع حدودها المكانيه. 4) أنها تعتبر الى حد ما متكامله ومترابطه فراغيا مع البيئة العمرانية المحيطه بينما تعاني المناطق العشوائيه الثلاث من الفصل العمراني على مستوى المدينه.

شكل 3 موقع حالات الدراسة من اقليم القاهرة الكبرى

أهمية البحث

إن الفصل الاجتماعي مسأله جدلية وظاهرة معقدة يصعب تفسيرها. ورغم بعض المبادرات لدراسة الفوارق الفراغية والاجتماعية بالقاهرة المعاصرة فإن دور البعد العمراني في تخفيف أو تفاقم الفصل الاجتماعي مازال مجهولا بقدر كبير. إن دراسات

المخططين والمصممين العمرانيين مازالت قاصرة بقدر كبير على موضوعات محدده مثل سياسات الإسكان والتحولات العمرانية ومازالت النقاشات محدودة حول مسألة الفصل الاجتماعي كظاهرة عمرانية (لجبي, 2010).

لذا فإن الفهم المتعمق لقضية الفصل الإجتماعي من منظور التصميم العمراني مازال مفقودا. إن حجم مشكلة الفصل الاجتماعي بالقاهرة يتجلى بقوة في هدف العدالة الاجتماعية الذي تم التأكيد عليه في ثورة 25 يناير 2011. من ناحية أخرى فإن فشل سياسات العمران في وقف أو تخفيف الامتداد العشوائي يؤكد الحاجة الى وضع سياسة عمرانية غير تقليدية قائمة على الفهم العميق للمشكلة. ويفيد مكاوي ويسري (2012) بأن " كل من المناطق العشوائية والمحرومة والمجتمعات المغلقة تحتاج الى المزيد من الدراسة للنواحي العمرانية والاجتماعية لتشخيص وبالتالي تحسين سياسات واستراتيجيات التدخل (11).

إن نتائج هذه الرسالة تساعد في فهم القضايا التاليه:

1) تحديد الأسباب الرئيسية لتكوين المناطق الفقيرة.
2) تحديد مدى التنوع العمراني لأجزاء القاهرة.
3) فهم دور السياسات العمرانية المعاصرة في ظهور الفصل الاجتماعي بالقاهرة وبالتالي يمكن استخلاص الدروس المستفادة من فشل تلك السياسات.
4) تحديد الخصائص الفراغية للمناطق العشوائية بالقاهرة.

وبالتالي فإن خلاصة هذا البحث يمكن أن تساهم في فهم أعمق لما يسمى بالدائره الشريره للتدهور العمراني. وسيمثل ذلك الخطوة الأولى لإعادة هيكلة عمران القاهرة ومن ثم سينشط ما يسمى بالدائرة الفاضلة لتجديد أحياء المدينة.

قياس تاثير التكوين الفراغي على النواحي الاجتماعية

إن العلاقة بين مورفولوجيا العمران والنواحي الاجتماعية قد انعكست في العديد من الاعمال فعلى سبيل المثال وجود ممرات مشاة آمنة (Jacobs, 1961; Lennard and Lennard, 1995; Sennett, 1977) وشوارع مستغلة جيدا (Lennard and Lennard, 1984; Whyte, 1988) يمكن أن يسهم في انعاش الحياة الاجتماعية بمنطقة ما (Pongsmas, 2004.). ومع ذلك فإن تلك الأعمال لم تقدم مقترحاتا قوية للتدخل والتطوير. فعلى سبيل المثال قامت جين جاكوب في كتابها موت وحياة المدن الأمريكية الكبرى عام 1961 بنقد تخطيط المدينة الحديثة وتقديم مباديْ وأهداف جديدة

لتخطيط المدينة وأكدت على تاثير شوارع المدينة والاستخدامات المختلطة على الحيوية العمرانية. وفي نفس الوقت فإن كريستوفر الكسندر (1966) قد أدرك اهمية النسيج العمراني ولكنه قدم مقترحات غير مرنه وضعيفه. وقد أكد ماكي (1965) أيضا على أهمية تقديم خيارات متعدده للنسيج العمراني لخلق اماكن ناجحه ولكنه لم يقدم مقترحات فعليه في هذا الإتجاه.

يلاحظ مما سبق أن البيئة العمرانية معقدة وأن العائق الرئيسي لقياس دور العوامل الفراغية يتمثل في وجود مفاهيم بديهية وضعيفة لوصف هذا التعقيد. وقد قاد ذلك الى وصف سطحي للمدينة اعتمادا على تبسيط المفاهيم اللغوية مثل التدرج والأشكال هندسية المنظمة (هيلير, 2009). إضافة الى ذلك فإنه يصعب عرض مقترح كمي واضح للتدخل وبالتالي يوجد العديد من الأخطاء ومزيد من استهلاك الوقت على المستوى التطبيقي (جريني, 2002). ولقد أثبتت نظرية صيغة التركيب الفراغي قدرتها على مواجهة الإشكاليات والتحديات السابقة حيث تسمح تلك النظرية بقياس العديد من العوامل الفراغيه قياساً كمياً على مستوى كل من المجاوره والمدينه. وبالتالي فإن دور التكوين الفراغي يمكن قياسه كعامل مستقل وقياس نوع وقوة العلاقة الاحصائية بينه وبين النواحي الاجتماعية والاقتصادية.

منهجية الدراسة

ان هذه الرسالة قائمة على الاعتقاد بأن الحركة تلعب دورا هاما في التنمية العمرانية لمنطقة ما. من هذا المنطلق فإن الفصل الثاني من هذه الرسالة يقوم بعرض الدراسات السابقة التي ناقشت العلاقة بين الفراغ والمجتمع واذا ماكانت حدود المجتمع مكانية او تتجاوز المكان لتشمل اماكن مختلفة متباعدة المسافات وكيف أن الانشطة التجارية يمكن أن تساهم في تحسين الظروف الاجتماعية والاقتصادية للمجتمع. إن هذا الإطار النظري سيمهد الطريق لتقديم أطروحة العلاقه بين الفصل العمراني والفصل الإجتماعي وكيف أن ذلك يعيق اهداف التنمية.

بعد بناء الجانب النظري للدراسة ولاختبار الفرضية الأولى للبحث قام الباحث بدراسة القوى الاجتماعية والاقتصادية والسياسية المختلفة التي أنتجت العمران الحالي للقاهره. لقد قام الباحث بقياس الفصل والتهميش الاجتماعي والاقتصادي على مستوى كل مجاورة من خلال خرئط تعكس النواحي الاحوال الاقتصادية والاجتماعية المختلفة مثل معدل الحرمان ومعدلات البطالة والأمية. كما قام أيضا بتحليل النسيج العمراني للقاهرة باستخدام أحدث قياسات أداة صيغة التركيب الفراغي. لقد ساعد ذلك في قياس الفصل

العمراني بالقاهرة قياسا كميا ومن ثم تم استكشاف العلاقة الإحصائية بين كل من خرائط الفصل الاجتماعي والفصل العمراني على مستوى الحدود الادارية لكل مجاورة لتقديم دليل مادي على آثار النسيج العمراني في وجود فوارق اجتماعية واقتصادية.

إن قياس تأثير العوامل الفراغية على النواحي الاجتماعية ينبغي قياسه أيضا على مستوى البلوك العمراني حيث أن الاعتماد على خرائط على مستوى الحدود الادارية للمجاورة يعد أقل دقة حيث أن الحدود الادارية لبعض المجاورات السكنية ليست دقيقة ولا تتطابق مع شكل النسيج العمراني الذي تشمله في كثير من الأحيان. ولتلافي هذه المسألة ولاختبار الفرضية الثانية للبحث قام الباحث باختيار أربع مجاورات سكنية لقياس تأثير النواحي الفراغية على معدل حرة المشاة والأنشطة الاقتصادية. وأخيراً دعم الباحث نتائج الدراسة بعمل استبيان كمي لدراسة التركيب الاجتماعي والاقتصادي ومدى الترابط الاجتماعي وشكل شبكة التواصل الاجتماعي بشكل مفصل وللحصول على نتائج تتمتع بالمصداقية والثبات. وفي نهاية المطاف يتم نقاش متغيرات البحث في ضوء النتائج لاستخلاص توصيات الدراسة.

هيكل البحث

الجزء الأول: الدراسات السابقة

إن هذا الجزء يشكل الاطار النظري للدراسة ومنهجية الدراسة والطرق المستخدمة داخل تلك الدراسة.

الفصل الأول: مقدمة

يتناول هذا الفصل عرض لمشكلة البحث وأهميته وأهدافه واسئلة البحث والمنهجية المتبعة.

الفصل الثاني:

الفراغ العمراني والحياة الاجتماعية

ينقسم هذا الفصل الى جزئين حيث يتم اولاً استعراض النظريات التي تعكس العلاقة بين الفراغ العمراني والمجتمع وكيف يؤثر كل منهما في الآخر والميكانيكيات التي يعمل بها ويقوم عليها هذا المجتمع ثم يتم في الجزء الثاني من هذا الفصل مناقشة مفهوم العزل

العمراني وآثاره وكيفية قياسه والعلاقة بين ظهور مناطق الفقر والعزل العمراني واذا ما كان التجمع في مناطق معينة يمكن أن يؤدي الى الانعزال والفقر.

الفصل الثالث:

منهجية البحث

يستعرض هذا الفصل طرق البحث والاطار المفاهيمي وتصميم البحث ويستعرض مباديء نظرية التركيب الفراغي والدراسات الحقلية المستخدمة في البحث وأخيراً يستعرض الاستبيان المستخدم في الدراسة وأبعاده وحجم العينة.

الجزء الثاني: الجانب التطبيقي

يمثل هذا الجزء بداية الجانب العملي من الرساله لفهم متغيرات البحث على مستوى الاقليم.

الفصل الرابع:

اقليم القاهرة الكبرى

قبل تحليل النسيج العمراني لحالات الدراسة فإنه من الضروري فهم النسيج العمراني للاقليم والعوامل التي أدت الى ظهور مثل ذلك النسيج لذلك فسيتم عرض التغيرات المختلفة التي طرأت على النسيج العمراني اثناء عملية التحضر ثم بعد ذلك سيتم تحليل الخرائط تاريخية للنسيج العمراني في تلك الفترات لتحليلها ودراسة الخصائص العمرانية للمناطق العشوائية وأخيرا يتم مطابقة العوامل الفراغية للوضع الراهن للاقليم مع البيانات الاجتماعية المتاحة لمقارنة القيم المختلفة للنسيج مع مناطق الفقر بالاقليم. إن ذلك بالطبع سوف يساهم في فهم حالات الدراسة على النطاق الأشمل لقاهره ككل.

الفصل الخامس

التحليل الفراغي لحالات الدراسة داخل القاهره

يحاول هذا الجزء فهم الفوارق الفراغيه والإجتماعيه والإقتصاديه بشكل أعمق وأكثر تفصيلاً على مستوى الشوارع والبلوكات العمرانيه الممثله للمجاورات السكنيه. وينقسم هذا الفصل الى جزئين ففي الجزء الاول يتم تقديم خلفيه تاريخيه حالات الدراسه والتطور التاريخي لهم واستعمالات الاراضي بهم كما يتم في الجزء الثاني قياس كفاءة النسيج

العمراني لهم باستخدام التركيب الفراغي ثم يتم بعد ذلك مقارنة خصائص النسيج العمراني بالأبعاد العمرانيه والإجتماعيه المختلفه مثل استعمالات الأراضي ومعدلات حركة المشاه وغيرها لاستكشاف العلاقه بينهم.

الفصل السادس

قياس الترابط الاجتماعي داخل حالات الدراسه

يتم في هذا الفصل دراسة الخصائص المختلفة للسكان مثل التركيب الإجتماعي والوظائف ومعدل الأميه وأماكن العمل والعلاقات الاجتماعيه ومدى الترابط والتضامن الإجتماعي وغيرها لمعرفة مدى تكامل تلك المجتمعات أو انعزالها عن المناطق المحيطة بها وذلك لتقديم تفسير عملي لنتائج الفصلين السابقين.

الجزء الثالث: الخلاصة والأبحاث المستقبليه

الفصل السابع

النقاش والخلاصة

يتم في هذا الفصل مناقشة نتائج الفصول السابقة والإجابة على اسئلة البحث وأثر ذلك على المفاهيم المطروحة في الاطار النظري ثم وضع التوصيات والخلاصة في ضوء تلك النتائج وأخيرا يعطي الباحث لمحة عن اتجاهات الأبحاث المستقبلية.

ويلي ذلك خمس ملاحق. يوضح المحلق الأول الخرائط التاريخية للقاهرة بينما يوضح الملحق الثاني خرائط للنواحي الاجتماعية والاقتصادية والفراغية على مستوى الحي السكني ويضم الملحق الثالث عرضا لمجموعه من الصور الفوتوغرافيه لحالات الدراسه أما بالنسبة للملحق الرابع فيبين استمارة تسجيل معدل حركة المشاه وأخيراً يبين الملحق الخامس إستمارة الإستبيان والجداول الاحصائيه المختلفه ذات الصله.